

UNIVERSITY OF WISCONSIN-LA CROSSE

Graduate Studies

THE IMPACT OF A HEALTHY LIVING CHALLENGE AND POINT-OF-DECISION
PROMPTS ON HEALTH BEHAVIOR AND SELF-EFFICACY LEVELS AMONG
ELEMENTARY-AGED STUDENTS

A Chapter Style Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Public Health in Community Health Education

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Health Education and Health Promotion

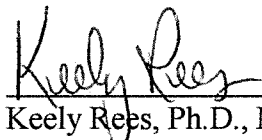
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By Rachel King

We recommend acceptance of this thesis in partial fulfillment of the candidate's requirements for the degree of Master of Public Health in Community Health Education.

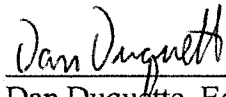
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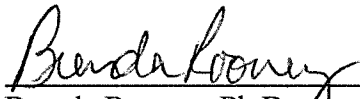
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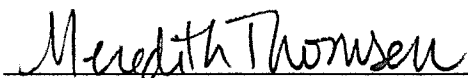


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ABSTRACT

King, R. E. The impact of a healthy living challenge and point-of-decision prompts on health behavior and self-efficacy levels among elementary-aged students. MPH in Community Health Education, December 2018, 132pp. (K., Rees)

Childhood obesity trends are on the rise across the nation. With obesity as a growing issue, it is important to address the underlying behaviors that lead to weight gain and sedentary behaviors among children. The risk for obesity can be addressed through behavioral changes related to a healthy diet, physical activity, and decreasing sedentary activities, as well as adapting the physical environment. The purpose of this research was to assess knowledge, self-efficacy, and behavior related to fruit and vegetable consumption, screen time, physical activity, sugar-sweetened beverage consumption, and sleep of fourth and fifth grade students at one elementary school. A six-week program and point-of-decision prompts were developed and implemented. The researcher studied the initial impact and effectiveness of the intervention through a pre- and post-survey. The results from 39 participants were analyzed. Major findings suggest that multicomponent programs and point-of-decision prompts can be effective methods when used among elementary-aged students. Statistical significance was found for a change in knowledge over the course of the program. Future childhood obesity prevention efforts should focus on a collaborative approach between health care systems, schools, and public health entities to create a long-lasting impact on obesity.

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CHAPTER I
INTRODUCTION TO THE ISSUE

Statement of the Problem

Organizations and individuals throughout La Crosse County are focused on creating a healthy environment for residents to live, learn, work, and play. La Crosse County is located on the western border of Wisconsin right next to the Mississippi River. The estimated population is over 118,000 people with the majority of residents that identify as White, non-Hispanic or Latino (United States Census Bureau, 2017). Throughout La Crosse County, the land is surrounded by bluffs and has multiple waterways that feed into the natural habitat. These natural environmental features enhance the accessibility for residents to be physically active in and around their neighborhoods. Organizations and non-profit groups have established Safe Routes to School and Complete Streets to enhance safe walking and biking for school-aged youth as well as all La Crosse County residents (Get Active La Crosse, 2018a). Farm to School (Get Active La Crosse, 2018b) and Grow La Crosse (n.d.) were also established as community initiatives that foster healthy nutrition and consumption of locally grown foods for school-aged youth. Even with the focus on creating a healthy environment and providing resources for healthy behaviors, obesity is still a health issue that needs to be addressed for children in La Crosse County.

Within La Crosse County, the School District of La Crosse has 11 elementary schools, with five of those schools as choice and charter schools. A choice school is

defined as a school with students from the surrounding neighborhood as well as students that choose to attend the school based on its unique qualities (School District of La Crosse, n.d.). Hamilton Early Learning Center is one of the three choice schools at the elementary school level. This school runs on a year-round school calendar with 45 days of instruction followed by a 15-day break with an optional intersession for enrichment classes.

The school calendar is not the only quality that makes Hamilton Early Learning Center unique. This school includes students from three census tracts where approximately 20% of the households have children living below the poverty line compared to only 13.7% of households living below the poverty line in all of La Crosse County (B. Rooney, personal communication, March 2018). The socioeconomic status of the neighborhood around Hamilton Early Learning Center is evident when considering that 71.8% of students qualify for a free or reduced breakfast and lunch at school. Out of all elementary schools in La Crosse County, Hamilton Early Learning Center has the second highest percentage of students that qualify for a free or reduced breakfast and lunch.

The natural environment in La Crosse plus the focus on local initiatives that enhance healthy behaviors are a benefit to elementary-aged youth that live in the city of La Crosse. However, the work to create a healthy environment has not overcome all obstacles for local children to grow into healthy adults. Obesity is a health issue that impacts individuals in La Crosse County and also at Hamilton Early Learning Center. The prevalence of obesity among fourth and fifth grade students within Hamilton's

school boundaries is at 15.5% compared to only 14.2% for individuals of the same age group throughout La Crosse County (B. Rooney, personal communication, March 2018).

Obesity trends among children are on the rise at local, state, and national levels. According to obesity trend data from Gundersen Health System, a large medical facility that serves La Crosse County along with 18 other counties, youth ages 2-18 had an obesity prevalence rate of 19.6% in 2016 (Rooney, n.d.). The data display higher levels of obesity prevalence among 6-9 year olds and 10-13 year olds compared to all other age categories from 2-18 years. National data from the Centers for Disease Control and Prevention (2011) show a similar trend with obesity prevalence rates being highest among 6-11 year old children across the United States. Research also indicates that youth who are obese are more likely to become obese adults (Rogers, Hart, Motyka, Rines, Vine, & Deatrck, 2013). National obesity prevalence continues to rise into adulthood where rates reach as high as 40.2% for adults ages 40-59 years old (Ogden, Carroll, Fryar, & Flegal, 2015).

These disease trends become even more alarming when discussed in relation to the health risks that accompany obesity in childhood. Childhood obesity may lead to other physical conditions, such as hypertension, high cholesterol, and type 2 diabetes (Office of the Surgeon General, 2010). Children who are overweight or obese also have an increased risk for developing asthma, sleep apnea, and orthopedic and joint problems (Liebhart, Wegner, & Pesik, 2008; Polacsek et al., 2009). There is also a greater chance for developing mental and emotional issues, such as low self-esteem, anxiety, and depression (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, December). The health risks

from childhood obesity continue into adulthood as well where adults with obesity are at risk for stroke, cancer, and even a shorter life span (Gonzalez, Feinstein, Iezzi, & Fisher, 2015).

Importance of Obesity Prevention Work

With obesity as a growing issue, it's more important than ever to address the underlying behaviors that lead to increased weight gain and sedentary behaviors. Obesity is a complex health issue that is linked to a multitude of behaviors. Individuals that are overweight or obese can positively impact their weight by consuming a healthy diet, being physically active, and decreasing sedentary activities (Rogers et al., 2013). There are also contributing factors that impact obesity, such as the built environment, education levels, and food marketing and availability (Division of Nutrition, Physical Activity, and Obesity, & National Center for Chronic Disease Prevention and Health Promotion, 2017, August). Individual health behaviors and other contributing factors affect obesity levels; however, individuals may be able to influence their key risk factors.

Modifiable risk factors for obesity have been studied and recommendations have been made based on the evidence from this research. The Surgeon General released a report in 2010 that provided recommendations for influencing modifiable risk factors through physical activity, a healthy diet, screen time behavior, and stress management (Office of the Surgeon General, 2010). In addition, the Community Preventive Services Task Force (CPSTF) has reviewed obesity prevention programs and approaches from the scientific literature to identify the most effective ways to address obesity as a health issue. Specific recommendations will be further discussed in Chapter II.

Obesity is a multifaceted health issue that is influenced by not only multiple health behaviors, but also contributing risk factors, such as the built environment. As this health issue contains a complex web of causes and risk factors, there are also a multitude of recommendations for improving health and preventing obesity. A systematic review by van Sluijs, McMinn, & Griffin (2007) identified multicomponent interventions as an evidence-based approach for creating healthy changes in physical activity for youth. Multicomponent programs were also recommended by the CPSTF as an effective approach for obesity prevention. A multicomponent program has the flexibility to address multiple health behaviors and include multiple levels of influence to impact one target population.

As the built environment is also a contributing factor for obesity, it is important to address the impact of the environment. Recommendations suggest improving access to fruits and vegetables or displaying point-of-decision prompts to increase physical activity and consumption of healthier foods (County Health Rankings, 2017b). Point-of-decision (POD) prompts are posters or signage that encourages an individual to make a healthy choice or change their behavior. The signs are typically placed near a location where a health behavior may occur. For example, one common location for POD prompts is next to an elevator. The sign may encourage walking up the stairs instead of using the elevator as a way to increase daily physical activity. Point-of-decision prompts are an easy and inexpensive method that can change the environment and have an impact on health behaviors.

Need for the Research

While obesity rates have increased over the last 40 years across the nation for all ages, childhood obesity rates increased almost 12%, with the largest percentage of affected youth from ages 6-11 and ages 12-19 (Ogden et al., 2015). Children whose families have low socioeconomic characteristics have obesity trends that increased at almost a third higher when compared to all children in the United States (Rogers et al., 2015). In the city of La Crosse, the neighborhood that surrounds Hamilton Early Learning Center has a higher percentage of households living below the poverty line and a higher rate of childhood obesity when compared to all of La Crosse County (B. Rooney, personal communication, March 2018). Childhood obesity needs to be a top priority in the populations that are the most affected and at the most risk.

In La Crosse County, there are two major healthcare systems. Both systems chose to utilize the same health messages to deliver to children and their families during primary care or well child visits. The health message is commonly referred to as 5-2-1-0. This health message is a mnemonic that stands for 5 fruits and vegetables a day, 2 hours or less of recreational screen time, 1 hour or more of physical activity, and 0 sugar-sweetened beverages. These health messages are part of a pre-existing evidence-based program called *Let's Go! 5-2-1-0* (MaineHealth, 2018a). Currently, health care providers discuss these messages and behaviors during patient visits where the children and families receive information about these four healthy behaviors.

In order for the 5-2-1-0 program and messages to be effectively communicated and to increase healthy behaviors, children can be influenced at multiple levels. The Social Ecological Model illustrates how an individual can be influenced by their own

knowledge, attitudes, and beliefs at the intrapersonal level. Additionally, the model portrays the influence of families and relationships at the interpersonal level, the influence of groups at the organizational level, the influence of a community, and even the influence of policies and laws (McLeroy, Bibeau, Steckler, & Glanz, 1988). This model emphasizes how individuals are influenced at all levels. In La Crosse, health care providers are able to influence their patients and families by educating and discussing health behaviors related to the 5-2-1-0 message. However, the 5-2-1-0 message and program should also be used at other levels of influence.

The *Let's Go! 5-2-1-0* program was created by the Maine Youth Overweight Collaborative (MYOC) in 2006 as a way to address childhood obesity. The program was designed to be used in multiple settings throughout the community, including schools, out-of-school sites, early childhood centers, and workplaces (MaineHealth, 2018b). The need for a multicomponent program to address obesity in La Crosse is apparent when looking at the obesity rates and disparities among low-income neighborhoods. Additionally, there is a need to stimulate behavior change through multiple levels of influence. A targeted approach may impact knowledge, self-efficacy, and behavior change through a multicomponent program that utilizes point-of-decision prompts to enhance behavior change in the school environment.

Purpose of the Research

The purpose of this research was to assess knowledge, self-efficacy, and behavior related to fruit and vegetable consumption, screen time, physical activity, sugar-sweetened beverage consumption, and sleep of fourth and fifth grade students at Hamilton Early Learning Center. The *5-2-1-0 Bingo on the Go!* program was developed

to improve knowledge, self-efficacy levels, and healthy behaviors. The researcher studied the initial impact and effectiveness of the program.

Research Questions

The study addressed the following research questions:

1. To what degree does the *5-2-1-0 Bingo on the Go!* program increase knowledge of the four main messages in the 5-2-1-0 mnemonic?
2. How does the *5-2-1-0 Bingo on the Go!* program change self-efficacy levels of the participants in relation to increasing daily consumption of fruits and vegetables, reducing screen time, increasing physical activity, decreasing daily consumption of sugar-sweetened beverages, and following a consistent sleep schedule?
3. How does the *5-2-1-0 Bingo on the Go!* program change the level of proxy efficacy of the participants in relation to fruit and vegetable consumption?
4. How does the *5-2-1-0 Bingo on the Go!* program influence self-reported behavior regarding the daily consumption of fruits and vegetables, screen time, physical activity, daily consumption of sugar-sweetened beverages, and sleep?
5. How do the point-of-decision prompts change behavior of the participants?

Delimitations

Research participants were recruited from Hamilton Early Learning Center in La Crosse, WI. The *5-2-1-0 Bingo on the Go!* program along with the pre- and post-survey were developed for students in fourth and fifth grade. Eligible participants were in the fourth and fifth grade classrooms at Hamilton Early Learning Center during July and August of 2018. The Hamilton school building also houses a charter school, School of the

Arts and Technology I (SOTA I). Fourth and fifth grade students that attend SOTA I were not in attendance during the timeframe of the program and were not included in the research. Additionally, any fourth and fifth grade students that enrolled at Hamilton Early Learning Center during the duration of the program were eligible to participate in the program; however, these students were not administered the pre- and post-survey and were not included in the overall research.

Limitations

Limitations were predicted for this research. The target population for the program intervention and research included fourth and fifth grade students from the ages of 8-11 years old. Limitations for this research include cognitive and behavioral limitations of the priority population. The students were limited by their ability to comprehend the pre- and post-survey questions and the program instructions. If the student was unable to understand the survey questions, the responses may have been affected. Additionally, if the student was unable to understand the program instructions, the program results may have been affected. The study was also limited by the accuracy and legibility of the pre- and post-survey written responses.

The research was also limited by student registration at Hamilton Early Learning Center. If a student transferred to a different school after completing the pre-survey, the data collection and analysis could be affected. Similarly, a limitation of the study was parent permission for participating in the pre- and post- survey and the overall program. If a student was not given permission to complete the pre- and post-survey, the results of the study could be affected.

Hamilton Early Learning Center has unique qualities that may impact the results of the research. This elementary school has a higher rate of childhood obesity among the priority population compared to all of La Crosse County fourth and fifth grade students. Additionally, the elementary school has a higher percentage of students living below the poverty line compared to the rest of La Crosse County overall. Due to the unique qualities of the participants, the results of this research are not generalizable to the overall population of fourth and fifth grade students.

Assumptions

Assumptions were made throughout the planning, implementation, evaluation, and analysis of this research. It was assumed that the research participants provided honest responses to the pre- and post-surveys. In similar research, a focus group consisting of fourth and fifth grade students advised the researcher “to ask participants right upfront to ‘please tell the truth.’ Then...children will be honest” (Lassetter, Macintosh, Williams, Driessnack, Ray, & Wisco, 2018, pg. 3). To gain honest responses from program participants, the same approach was utilized for this research study.

In order to conduct this research, it was also assumed that responses to the pre- and post-surveys were not going to be recalled with complete accuracy due to recall bias of the participants. The age of the participants contributed to the presence of a recall bias where the individual may not have remembered previous behaviors in order to respond accurately on the pre- and post-surveys.

Operational Definitions

The following terms are defined for the purposes of this study:

5-2-1-0 Mnemonic = This mnemonic stands for 5 or more fruits and vegetables a day, 2 hours or less of recreational screen time, 1 hour or more of physical activity, and 0 sugary drinks, more water and low fat milk (Rogers et al., 2013).

Childhood Obesity = “Body mass index (BMI) at or above the 95th percentile for children and teens of the same age and sex” (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, October).

Point-of-Decision Prompt = Point-of-decision prompts are educational or motivational signs placed on or near a location where a behavioral choice may occur.

Proxy Efficacy = “The belief that one can get others to act on their behalf to reach desired outcomes” (Geller, Dzeqaltowski, Rosenkranz, & Karteroliotis, 2009, p. 52).

Self-Efficacy = “Beliefs in one’s capabilities to organize and execute the course of action required to produce given attainments” (Bandura, 1997, p. 3).

Youth = Children in the age ranging from 2-18 years old.

CHAPTER II

LITERATURE REVIEW

Obesity and Overweight Trends in Children

According to a report from the Wisconsin Department of Health Services, “unless the obesity epidemic can be curbed, today’s children are likely to have a shorter life expectancy than their parents do” (Liebhart et al., 2008, p. 2). Since 1980, the prevalence of obesity has been on the rise for adults and children. The prevalence of childhood obesity has increased from 5% in 1980 to 17% in 2008 (Office of the Surgeon General, 2010). As recently as 2014, there has been a decline in obesity prevalence among preschool-aged children that are enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (Pan et al., 2016); however, despite the decline, obesity still affects over 12.7 million children and adolescents in the United States (Division of Nutrition, Physical Activity, and Obesity, & National Center for Chronic Disease Prevention and Health Promotion, 2017, April). Nationally, the prevalence of obesity among 2-5 year old children is only 8.9%, while older youth have a higher prevalence of obesity. For children aged 6-11, obesity prevalence is at 17.5% and is higher for adolescents aged 12-19 with a prevalence rate at 20.5%. These rates continue to rise into adulthood where the prevalence of obesity reaches as high as 40.2% for adults aged 40-59 (Ogden et al., 2015).

According to the American Academy of Pediatrics, a child or adolescent that has “gained weight beyond the healthy level for his/her height” is noted as overweight and

the level for obesity is an “even greater increase of overweight” (University of Wisconsin Hospital and Clinics, 2013). When a child is measured for his/her height and weight, the body mass index (BMI) is calculated to assist with classifying the child as underweight, normal weight, overweight, or obese. The BMI is plotted on the clinical growth charts to identify the percentile where the child ranks (Centers for Disease Control and Prevention [CDC], & National Center for Health Statistics, 2017). The normal weight category is below the 85th percentile. Children whose BMI is “at or above the 85th percentile and below the 95th percentile for children and teens of the same age and sex” are defined as overweight (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, October). Obesity is defined as a “BMI at or above the 95th percentile for children and teens of the same age and sex” (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, October).

Nationally, the obesity epidemic is a serious issue that is putting children’s health at risk. This national trend is also seen in Wisconsin where the current obesity rate for children aged 2-4 is at 14.7%. The prevalence rate has decreased from 2010 to 2014; however, the prevalence of obesity among other youth age categories has not declined. In 2016, the prevalence of overweight and obesity was at 29.5% for youth aged 10-17 years old (Trust for America’s Health & Robert Wood Johnson Foundation, 2018b). Similar to statewide trends, La Crosse County has seen obesity trends increase over the last few decades. The prevalence of obesity in La Crosse County in 2006 was at 30% for adults aged 18 and older (Choudhary & Rooney, 2009).

Gundersen Health System is a large medical facility that operates in 19 counties in Wisconsin, Iowa, and Minnesota, including La Crosse County. This health system is able to track obesity and overweight trends for their patients. According to an analysis of the obesity trends of Gundersen Health System patients, youth aged 2-18 had an obesity prevalence rate of 19.6% in 2016. In this same dataset, there is a significant difference in obesity rates between male and female patients with males having a higher rate of obesity. Additionally, there is a significant difference in obesity rates between age categories. Patients that are in the age range from 6 to 9 years and 10 to 13 years have higher levels of obesity prevalence than other age categories (Rooney, n.d.). According to a *Morbidity and Mortality Weekly Report*, the national data reflect a similar trend with the highest prevalence of obesity rates among 6 to 11 year old children (Centers for Disease Control and Prevention [CDC], 2011).

Health Risks

Obesity is an issue that affects children now and as they age. Childhood obesity can have a harmful effect on the growing body. Children who are overweight or obese have a greater chance of hypertension, high cholesterol, and insulin resistance (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, December; Gonzalez et al., 2015). These risk factors can lead to childhood development of atherosclerosis, cardiovascular disease (CVD) and type 2 diabetes (Office of the Surgeon General, 2010). Additional health risks are increased chances for asthma, sleep apnea, and other breathing problems (Liebhart et al., 2008). Furthermore, children who are overweight or obese may also develop orthopedic and joint problems (Polacsek et al., 2009; Division of Nutrition,

Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, December). In addition to physical health risks, childhood obesity is also related to social and emotional health risks. Children who are overweight or obese may have a greater chance for low self-esteem, social stigmatization, anxiety, and depression (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, December; Gonzalez et al., 2015).

Obesity health risks in childhood lead to health risks for these children as they age as well. Children who are overweight are “much more likely than their healthy weight peers to become obese adults” (Rogers et al., 2013, p. 1010). According to a report from the Wisconsin Department of Health Services, approximately “60% of obese adolescents will be obese as adults” (Liebhart et al., 2008). As an overweight or obese child moves into adulthood, there are many health risks that become more prevalent and may be more severe due to obesity. These comorbidities include “cardiovascular disease, type 2 diabetes, sleep apnea, stroke, cancer, osteoarthritis, and shorter life span” (Gonzalez et al., 2015, p. 336).

Causes of Obesity

Obesity is a multifaceted issue that cannot be tied to one specific behavior. Two of the major elements of overweight and obesity are tied to diet and physical activity levels (Kessler, Vine, & Rogers, 2015). According to Rogers et al., “overweight is a result of a calorie imbalance, genetics, and health status that can be impacted by improving diet, increasing physical activity, and reducing sedentary activity” (2013, p. 1010-1011). In addition to health behaviors, contributing factors for obesity include “the

food and physical activity environment, education and skills, and food marketing and promotion” (Division of Nutrition, Physical Activity, and Obesity, & National Center for Chronic Disease Prevention and Health Promotion, 2017, August).

The prevalence of obesity is also influenced by socioeconomic factors. Research by Singh, Siahpush, and Kogan (2010) explored the relationship between obesity prevalence among 10-17 year old children and socioeconomic factors between 2003 and 2007. The researchers discovered that “obesity prevalence increased by 23% to 33% for children in low-education, low-income, and higher unemployment households” (Singh et al., 2010, p. 45) while there were no significant increases in obesity prevalence for other socioeconomic groups. Additionally, children who were living below the poverty threshold were 2.7 times more likely to be obese than children with family incomes 400% above the poverty threshold (Singh et al., 2010).

Another study of middle school students in Massachusetts (Eagle et al., 2012) researched the connection between socioeconomic factors, body mass index measurements, and other health-related behaviors (e.g., fruit and vegetable consumption). This research found that children, who live in neighborhoods with lower socioeconomic levels, including those with little or no access to healthy foods and recreation spaces, report a greater imbalance of healthy behaviors resulting in higher weight gain (Eagle et al., 2012). As observed in these two studies, obesity is influenced by socioeconomic factors including the built environment of low-income neighborhoods.

While obesity can be caused by a multitude of factors, individuals are able to influence some key risk factors. The Office of the Surgeon General released a report in 2010 titled *The Surgeon General's Vision for a Healthy and Fit Nation*. This report

provided recommendations for influencing the modifiable risk factors related to physical activity, a healthy diet, screen time, and stress. According to the report, “increased physical activity and decreased sedentary behavior are associated with lower rates of obesity, and it reduces the risk for many of the diseases associated with obesity, such as diabetes and heart disease” (Office of the Surgeon General, 2010, p. 4).

Recommendations for a healthy diet and for maintaining a healthy weight include breastfeeding early in life, more consumption of low-caloric density foods such as fruits and vegetables, and less consumption of fast foods and sugar-sweetened beverages.

Additionally, stress and the amount of time spent watching television can increase high-calorie food consumption and decrease motivation for healthy eating patterns (Office of the Surgeon General, 2010). Managing stress, along with increasing physical activity and making smarter nutrition decisions, may positively influence health and prevent obesity.

These recommendations may influence not only the weight of an individual, but may also positively impact the overall health of the individual in regards to high blood pressure, high cholesterol, type 2 diabetes, asthma, sleep apnea, and mental and emotional health. Furthermore, the benefits of following the aforementioned recommendations may also impact the future health of an individual as he or she ages.

Recommendations for Obesity Prevention

Just as obesity is influenced by many risk factors, the key to obesity prevention is also multifaceted. Recommendations for obesity prevention include addressing one risk factor or addressing multiple risk factors at one time. The Community Preventive Services Task Force (CPSTF) reviews programs and approaches from the research literature in topic areas focused on health to identify what approaches are most effective

for promoting the public’s health. The findings from the review are issued into recommendations based on the best-available evidence. The recommendations also give insight to the root causes of childhood obesity by addressing the multitude of factors that may influence the weight of an individual. Obesity prevention recommendations from the CPSTF are included in Table 1.

Table 1. Obesity Prevention Recommendations

- Behavioral Interventions that Aim to Reduce Recreational Sedentary Screen Time Among Children
- Meal and Fruit and Vegetable Snack Interventions to Increase Healthier Foods and Beverages Provided by Schools
- Multicomponent Interventions to Increase Availability of Healthier Foods and Beverages in Schools
- Worksite Programs
- Technology-Supported Multicomponent Coaching or Counseling Interventions to Reduce Weight or to Maintain Weight Loss

(Source: Community and Preventive Services Task Force, 2017)

Recommendations for obesity prevention are also found when researching reputable sources and their guidelines. The Centers for Disease Control and Prevention lists their strategies for obesity prevention according to the environment where the target population can be reached or impacted, such as, early childhood care, schools, the community, and in clinical practices (Division of Nutrition, Physical Activity, and Obesity, & National Center for Chronic Disease Prevention and Health Promotion, 2017, January). Based on a review done at the School of Public Health at Harvard University, recommendations for obesity prevention should focus on “limiting unhealthy foods and beverages, increasing physical activity, limiting screen time, improving sleep, and reducing stress” (The President and Fellows of Harvard College, 2018).

The previous recommendations provide general guidelines for addressing obesity prevention among a variety of age groups. According to a review provided in the American Academy of Pediatrics, obesity prevention for children should focus on the areas of “food and nutrients, eating behaviors, family interactions around food and meals, physical activity and sedentary behaviors, and working with parents to address children’s eating and activity behaviors” (Davis et al., 2007, p. S230). In addition, a review of the literature performed by Waters et al. (2011) identified obesity prevention techniques that focus specifically on youth ages 6-12 years old. This systematic review identified policies and strategies that, while not evidence-based, appeared to be promising. These policies and strategies are as follows:

- school curriculum that includes healthy eating, physical activity and body image
- increased sessions for physical activity and the development of fundamental movement skills throughout the school week
- improvements in nutritional quality of the food supply in schools
- environments and cultural practices that support children eating healthier foods and being active throughout each day
- support for teachers and other staff to implement health promotion strategies and activities (e.g. professional development, capacity building activities)
- parent support and home activities that encourage children to be more active, eat more nutritious foods and spend less time in screen based activities

(Waters et al., 2011, p. 2)

Another systematic review was performed by van Sluijs, McMinn, & Griffin (2007) that focused on interventions promoting physical activity in children. This review looked at studies that were controlled trials and would be able to provide a more solid evidence-base to the research. The research in this review provided a recommendation for utilizing multicomponent interventions that include the school, family, and community to make important changes in physical activity for youth. In addition, there was some

evidence that recommended environmental interventions to increase physical activity levels of children (van Sluijs et al., 2007).

Following each recommendation to prevent and control obesity would result in a large undertaking that many organizations would not have the capacity to initiate and may leave the target population feeling overwhelmed. Research has been done to identify how much behavior change is necessary to prevent weight gain. One study hypothesized that weight gain could be prevented by making small changes in diet and physical activity in a family-based intervention. The intervention focused on increasing daily steps and encouraging cereal consumption for breakfast and snacks. While this intervention seems simplistic, the results showed that small changes “can be effective in overweight children in reducing or preventing excessive weight gain” and can improve “weight, BMI, and percentage body fat for parents” as well (Rodearmel et al., 2006, p. 1399). This study demonstrates the effectiveness of creating family-based interventions that focus on small lifestyle changes to aid in obesity prevention.

Multicomponent Programs

Another promising approach includes the use of a multicomponent program. A multicomponent program is when the proposed initiative focuses on multiple pathways for influencing the same issue. For example, a multicomponent program could be one that is focused on obesity prevention by addressing physical activity levels, a healthy diet, and decreasing screen time. Another example of a multicomponent program would be an initiative that focuses on changing physical activity levels by addressing the target population in multiple locations of influence, such as at a school, a medical facility, and throughout the overall community. Multicomponent programs include initiatives that

focus on multiple risk factors for one health problem or initiatives that focus on one risk factor for a health problem by addressing it through multiple levels of influence.

The University of Wisconsin Population Health Institute (UW-PHI) provides recommendations for public health interventions based on the scientific support that can be identified through research. The UW-PHI identified multicomponent programs for addressing obesity prevention through school-based interventions as “scientifically supported.” A program that is labeled as scientifically supported identifies the strategy as having been “tested in many robust studies with consistently positive results” (County Health Rankings, 2017a). Multicomponent programs at the school level for obesity prevention have been shown to “increase physical activity, improve weight status, and improve dietary habits” (County Health Rankings, 2017a).

As multicomponent programs can vary significantly in how they are designed and implemented, the UW-PHI also provides examples of programs that have been implemented and shown positive results. One program that has shown consistent results in obesity prevention for youth is the *Let's Go!* program. The *Let's Go!* program is “a community-based childhood obesity prevention program in Portland, Maine that promotes strategies to boost healthy eating and physical activity among children through age 18 years” (Kessler et al., 2015, p. 278). This program is also highlighted by the Centers for Disease Control and Prevention because the program’s core principles “affirm that environmental and policy changes influence behavior change, interconnectivity across sectors is essential, and strategies should be evidence-based and continuously evaluated” (CDC, 2011).

Let's Go! Program

The *Let's Go!* initiative was created in 2006 as a way to address childhood obesity by a team of professionals that were working together on the Maine Youth Overweight Collaborative (MYOC). The program initially focused on the healthcare setting and expanded into the community in 2007 as a way to address obesity from multiple settings (MaineHealth, 2018b). This program addresses childhood obesity by focusing on behavior change related to physical activity, healthy eating, and screen time.

The *Let's Go!* program has four messages that are portrayed as a mnemonic for representing the healthy eating and physical activity messages as 5-2-1-0. The messages are as follows: 5 or more fruits and vegetables a day, 2 hours or less of recreational screen time, 1 hour or more of physical activity, and 0 sugary drinks, more water and low fat milk (Rogers et al., 2013). The *Let's Go!* program has identified the scientific rationale that justifies the 5-2-1-0 message. According to the rationale, fruit and vegetable consumption is important as a way to prevent weight gain through controlling total calories with low-caloric density foods. The focus for reducing recreational screen time is due to the association between too much screen time and “increased prevalence of overweight and obesity, lower reading scores, and attention problems” (MaineHealth, 2018a). Regular physical activity is a key component for maintaining a healthy weight. School-age children are typically active, but this trend declines as the child enters adolescence. Sugar-sweetened beverages are associated with overweight and obesity as well as decreased milk consumption and increased dental cavities (MaineHealth, 2018a). A focus on these four target behaviors is the key to the *Let's Go!* program.

According to the *Let's Go!* Annual Report 2017, this program has been initiated in schools, school cafeterias, child care programs, out-of-school programs, and health care practices (MaineHealth, 2017b). The *Let's Go!* program offers free access to toolkits designed to assist these settings in implementation of a program that utilizes the 5-2-1-0 message. The *Let's Go!* program was built around the concept of the Social Ecological Model (SEM) and was designed to affect childhood obesity rates through the range of influence. Programs that are created with the basis of influencing individual behavior through some or all of the levels in the Social Ecological Model have been shown to be “effective in slowing the rate of increase of overweight and obese children” (Rogers et al., 2013, p. 1011) and can be a “viable foundation for mitigating the influences that lead to childhood obesity” (Rogers et al., 2013, p. 1018).

Social Ecological Model



Figure 1: Social Ecological Model retrieved from Agency for Healthcare Research and Quality, 2013.

The Social Ecological Model (SEM) was originally created by Urie Bronfenbrenner in the late 1970s. The model depicts the relationship between an individual and the other levels of influence that can affect an individual. The levels include the individual, interpersonal groups, organizations, the community, and policies as seen in Figure 1. The creation of the SEM is derived “from a systems orientation to human development, in which individuals are understood to influence, and be influenced by, people and organizations with whom they interact, available resources and institutions, and societal norms and rules” (Golden, McLeroy, Green, Earp, & Lieberman, 2015, p. 9S).

Bronfenbrenner’s Social Ecological Model depicts how an individual is affected by multiple levels of influence and how the individual may also affect those levels by their own actions. At the individual level, a person is influenced by his or her own knowledge, attitude, and beliefs. The interpersonal level is when a person is influenced by the relationships around them. For example, a person may be influenced by their family members, friends, co-workers, or other social networks (McLeroy et al., 1988). The organizational level shows how “organizational characteristics can be used to support behavioral changes” (McLeroy et al., 1988, p. 359). At the organizational level, a person may be influenced by being a member of a group in the community, such as schools, worksites, and clubs. The role of the community level in the SEM focuses on the community created with families, friends, neighborhoods, and the organizations in a defined location or geographical area. The policy level of influence is portrayed in “policies, procedures, and laws to protect the health of the community” (McLeroy et al., 1988, p. 365).

The possibility to influence an individual at multiple levels throughout the SEM can be seen in a local example set by Gundersen Health System (GHS), as a local healthcare organization that is based in La Crosse, WI. This healthcare organization has integrated the *Let's Go! 5-2-1-0* message in their pediatrics and family medicine clinics. The providers at GHS are able to influence their patients at the individual level by providing education to help change knowledge, attitudes, and beliefs. The providers also have conversations with parents of the younger patients. Therefore, the providers are able to influence the patients at the interpersonal level by educating the parents and family members. Additionally, GHS is able to influence the individual at the organizational level by providing a consistent 5-2-1-0 message that is utilized across the health system and also throughout the community.

Research Based on the 5-2-1-0 Message

Due to the success of the 5-2-1-0 message and the *Let's Go!* program, studies have been conducted to identify the most effective way to implement the 5-2-1-0 messages in different communities. The *Let's Go!* program was created in Maine and the program has support from the community and many organizations throughout the state. When a new location utilizes the 5-2-1-0 messages, there may be varying degrees of support for starting a new initiative. One study conducted in Minnesota evaluated the effectiveness of a nurse-led school-based program that utilized the 5-2-1-0 message with fourth and fifth grade students. The program consisted of 10-15 minute educational sessions conducted by the school nurse and 10-15 minute motivational interviewing (MI) sessions from nursing students. The educational sessions focused on the 5-2-1-0 messages and the MI sessions focused on setting health goals related to one of the 5-2-1-

0 messages. The program lasted up to 21 weeks depending on the elementary school calendar. The study collected pre and post-intervention data on body mass index (BMI), response to the Healthy Habits Survey, and activity measured by a pedometer. The study results showed that the program increased the number of steps taken, increased fruits and vegetables consumption, and decreased fruit juice and whole milk consumption. The results from this program displayed that reinforcement coaching by the nursing students was a key component of the intervention in order to change health behaviors (Tucker & Lanningham-Foster, 2015).

A similar study was conducted with second and third grade students in Rochester, MN. The program consisted of eight educational sessions taught by classroom teachers and focused on the 4 messages from the 5-2-1-0 mnemonic. The results of the study did not show statistical significance between the intervention and control groups. However, the study also did not have sufficient numbers of participants to assess the effectiveness of the program (Lynch et al., 2016). This study may indicate that educational sessions may not be sufficient for changing behavior. While some of the results from studies that utilize the 5-2-1-0 message are mixed, the *Let's Go!* program has an evidence-base that shows there is a capacity to positively influence health behaviors that lead to childhood obesity through this program.

Point-of-Decision Prompts

Multicomponent programs, such as the *Let's Go!* program, are effective for reducing the prevalence of obesity; however, the feasibility and capacity to implement an effective multicomponent program may not be available in every community. Another strategy that has a high evidence-base for influencing health behavior is the use of point-

of-decision (POD) prompts. A point-of-decision prompt is an educational message that is placed near a location where a behavioral choice can be made. For example, a popular location for POD prompts is near an elevator. The POD prompt may inform people waiting for an elevator about the health benefits of walking up the stairs instead of using the elevator. This type of prompt is an example of a tactic “within the realm of ‘nudging,’ which is gaining prominence as a non-invasive means of improving public health” (Kaczynski, Wilhelm Stanis, & Hipp, 2014, p. 87). Nudging individuals towards making a decision about their behavior through a small environmental change may avoid the conflict of creating a policy to restrict behaviors.

According to a review of the literature by the University of Wisconsin-Public Health Institute (UW-PHI), point-of-decision prompts are scientifically proven to work for increasing physical activity. In addition, POD prompts that focus on nutrition have some evidence of being effective, but needs more research to be a solid finding (County Health Rankings, 2017b). POD prompts are deliberately created to influence a health behavior by “providing information about a healthier alternative or establishing a deterrent to the behavioral standard, with the intended goal of motivating and enabling people to change their behavior and maintain that change over time” (Soler et al., 2010, p. S293).

The school setting is an ideal location to influence food choices and the food environment because there are “more than 30 million children purchasing a U. S. Department of Agriculture-sponsored school lunch each day” (Greene, Gabrielyn, Just, & Wansink, 2017, p. 452). The method of prodding individuals to choose more fruit and vegetables with their meal is common in school lunchrooms that are working to create a

healthier environment. For example, the Smarter Lunchrooms movement created POD signs to place along the lunch line near the fruits and vegetables to highlight the options for the day and encourage students to choose these healthy options (Cornell University, 2017).

One of the benefits of utilizing POD prompts as an effective intervention is the relatively low cost for implementing a small environmental change. Schools that want to create a healthier lunchroom environment can guide students to eat more fruits and vegetables by utilizing POD prompts as a “low-cost, effective, and easily scalable intervention” (Hanks, Just, & Wansink, 2013, p. 868). The use of POD prompts has become a popular intervention for improving nutrition in a small environment or throughout a community. In 2010, federal funding was distributed to 39 communities to reduce obesity and tobacco use through policy, systems, and environmental changes in the Communities Putting Prevention to Work (CPPW) grants. Out of the 39 communities that were working on improving nutrition in their communities, there were 33 of the grant recipients (approximately 85%) that utilized point-of-purchase/promotion strategies (Bunnell et al., 2012). Point-of-purchase (POP) strategies are similar to POD prompts; however, POP strategies are utilized in locations where an individual is purchasing an item and has the opportunity to make a choice through what they purchase. Whereas, POD prompts are focused more on the health behavior that can accompany a purchase or a decision that is being made.

Point-of-decision prompts are typically used with an adult population. Research to understand the effectiveness of POD prompts is also focused mainly on an adult population. Regarding young children, the parents, guardians, and other care providers

are responsible for making many choices to influence the child's health. Typically, adults are responsible for buying the food, selecting meals, and making decisions about physical activity. In addition, POD prompts are ineffective for younger children that are still not able to read. However, there is some research that has identified POD prompts as effective interventions for younger populations (Fuel Up to Play 60, 2017).

Fuel Up to Play 60

Point-of-decision prompts are a recommended component in the Smarter Lunchrooms Movement. This program emphasizes creating a healthy environment focused on nutrition choices. The Fuel Up to Play 60 program also encourages the use of point-of-decision prompts in the school environment. Fuel Up to Play 60 (FUTP 60) is a national program created in partnership with the National Dairy Council, National Football League, and the United States Department of Agriculture. The Fuel Up to Play 60 program emphasizes both nutrition and physical activity. The program is tailored for each school based on their needs and capacity for implementing strategies from the program's suggested tactics. FUTP 60 is designed for school-aged students of all ages, in elementary, middle, and high schools. Additionally, the program is implemented by school staff, parents, and students and not by an external entity.

One strategy in the FUTP 60 program used to encourage physical activity in schools is the use of POD prompts. The program recommends placing reminders throughout the schools to remind students to be more active with extra emphasis on places that people pass on a regular basis. For example, a prompt could be placed near the water fountain to encourage students who are waiting in line to march in place as a way to be physically active throughout the school day. The POD prompts can also be used to

encourage healthy food choices in the lunchroom, on the food line, and near vending areas. The FUTP 60 program recognizes that POD prompts are an “effective strategy for increasing physical activity behavior in communities” (Fuel Up to Play 60, 2017). The FUTP 60 program recommends POD prompts as an effective method for children.

Importance of Self-Efficacy

The goal of many obesity prevention programs is to change behavior in a target population that will lead to improved health outcomes. A community that implements a multicomponent program focused on increasing healthy eating and physical activity and decreasing screen time and sugar-sweetened beverages is aiming for better health outcomes. There are a multitude of factors that lead to behavior change and one key factor has not been identified as the most effective strategy. On the other hand, self-efficacy is a construct that affects every level of behavior change from initiating a new behavior, to adopting the behavior, and finally to maintaining the behavior (Bandura, 2006). Self-efficacy is defined as an “individuals’ beliefs that they can accomplish a goal [and] not only affect how they feel about themselves but also influence whether or not they are successful at reaching their goal” (Lassetter, Ray, Driessnack, & Williams, 2015, p. 22). Self-efficacy may lead to behavior change due to the belief or confidence in being able to accomplish a task.

Self-efficacy is a construct that can be found in multiple theories across health education and health promotion literature. The Social Cognitive Theory (SCT) utilizes self-efficacy as a construct to explain the confidence level of a person when making a behavioral change. In the SCT, there are three components that influence one another in a concept called reciprocal determinism—the person, the environment, and behavior

interact reciprocally toward each other (LaMorte, 2016). The person component includes self-regulation and self-efficacy. These two constructs portray a person's ability to regulate their behavior and a person's belief or confidence that they can achieve a goal, respectively. The concept of self-efficacy determines if an individual has a "sense of control over one's environment and behavior" (Schwarzer & Luszczynska, 2006, p. 141). Individuals with low self-efficacy believe that when a behavior is difficult, there is no reason to continue trying. Therefore, low self-efficacy produces low results for behavioral changes. The opposite is true for individuals with high self-efficacy. Those with high self-efficacy believe that they are capable of overcoming a difficult obstacle and will have better results when attempting a behavioral change (Bandura, 2006).

According to Schwarzer and Luszczynska, the construct of "self-efficacy is a proximal and direct predictor of intention and of behavior" (2006, p. 142). If the purpose of initiating an obesity prevention program is to change behavior, then it will be important to also address the self-efficacy levels of the participants in the program. In order to achieve higher self-efficacy, an individual must develop coping strategies to help overcome obstacles and regain control after they have encountered a setback (Bandura, 2006). Consider an obesity prevention program that focuses on diet and physical activity for children. If the program focuses solely on educational efforts to promote health, typically the program will produce weak results (Bandura, 2006). On the other hand, if the program focuses on increasing the child's "confidence about eating nutritiously and being physically active, [the child] might be more inclined to do so" (Lassetter et al., 2015, p. 22). Self-efficacy is an important construct to develop throughout a program and measure when evaluating behavior change.

Proxy Efficacy

When considering the ability of children to create a behavior change, proxy efficacy is an important construct to understand as well. Proxy efficacy is defined as “the belief that one can get others to act on their behalf to reach desired outcomes” (Geller et al., 2009, p. 52). For a child, proxy efficacy means having the ability or confidence to ask others, meaning adults or care providers, to help them make a change. As the Social Cognitive Theory demonstrates, an individual is influenced by behavior and also the environment. A child’s environment has a strong influence on their ability to create change. Many of the decisions that lead to the surrounding environment are influenced by the adults that play a large part in a child’s life, including parents, grandparents, school staff, and other care providers. Additionally, the built environment along with policies and laws are created by the adults in the child’s community. In order for a behavior change to occur for a child, there needs to be available resources or the capacity to create the change. For example, when considering a program that focuses on increasing fruit and vegetable consumption, it would be important for the child to have access to fruits and vegetables. If the healthy food is readily available, the child can focus on gaining the confidence to eat the fruits and vegetables. On the other hand, if the healthy food is not readily available, a child must have enough confidence to ask another person to help gain access to fruits and vegetables. Therefore, proxy efficacy may be a crucial construct to identify when evaluating any behavior change with children.

Addressing the Local Need for Obesity Prevention

As seen at the national, state, and local levels, the rate of obesity has been on the rise since the 1980s. National data has seen a rise in obesity prevalence of approximately

12% in just the youth population. The largest portions of youth that are affected by obesity are children aged 6-11 and adolescents aged 12-19 (Ogden et al, 2015). However, there is an even more concerning trend; obesity prevalence for children whose families have low socioeconomic characteristics have increased dramatically—between 23-33% more compared to all children in the United States (Rogers et al., 2015). Research studying the obesity prevalence in a sample of 80 Massachusetts school districts shows that as the income level of a household trends downward the prevalence of obesity increases or trends the opposite direction (Eagle et al., 2012). Other research has shown that “children living in low-income neighborhoods are 20 percent to 60 percent more likely to be obese or overweight than children living in high socioeconomic status neighborhoods” (Trust for America’s Health & Robert Wood Johnson Foundation, 2018a).

In the city of La Crosse, Wisconsin, the relationship between income level and obesity prevalence can be seen as well. Hamilton Early Learning Center is an elementary school in the School District of La Crosse. This elementary school runs their school-age program all-year round and has three intersessions throughout the school year. Hamilton Early Learning Center includes students from three census tracts in La Crosse, WI, including census tract 10, 11.01, and 12. Across La Crosse County, 13.7% of households are living below the poverty line. In the three census tracts that are included inside of Hamilton’s school boundaries, approximately 20% of the households have children living below the poverty line (B. Rooney, personal communication, March 2018).

Additionally, Hamilton Early Learning Center qualified to become a Community Eligibility Provision (CEP) school for the 2017-2018 school year. When a school

qualifies to become a CEP school, all enrolled students are eligible to receive a free breakfast and lunch at school through the National School Lunch and Breakfast Program. According to the Wisconsin Department of Public Instruction (n.d.), Hamilton Early Learning Center qualifies for a free and reduced lunch rate for 71.8% of their student population. Furthermore, the overall rate of childhood obesity is higher in the three census tracts that comprise Hamilton's school boundaries. Among fourth and fifth grade students from Hamilton's school boundaries, the prevalence of obesity in 2017 was 15.5% compared to 14.2% for all individuals of the same age group in all of La Crosse County (B. Rooney, personal communication, March 2018). The relationship between low-income and an increased obesity prevalence rate is clear when considering the current status within Hamilton's school boundaries.

Current Obesity Prevention Resources

The health of the students at Hamilton Early Learning Center is a priority for many groups that have initiated programs at the elementary school over the last decade. Hamilton students are able to participate in a variety of programs that address obesity prevention techniques, such as increased physical activity and greater access to nutritious and local foods. Safe Routes to School is a national program that focuses on active transportation to and from school. This program was introduced to La Crosse County elementary schools in 2007 and has grown over the last decade. The goal of the Safe Routes to School program is to address safety issues for walking and biking and to promote being physically active as part of the student's day. Walking and biking to school helps promote an active lifestyle and decreases the risk of becoming overweight (Get Active La Crosse, 2018a).

Hamilton Early Learning Center is also involved in two programs that support healthy nutrition for the students. The Farm2School program is a program that offers fresh, locally grown foods to students and staff during the school day at lunch, during taste testings, and for snacks in the classrooms (Get Active La Crosse, 2018b). Farm to school educational activities are offered in the classroom and through hands-on learning in school gardens (National Farm to School Network, 2018). The combination of offering healthy foods and also educating about how foods are grown builds a foundation for making smarter food choices. GROW La Crosse is a local organization that is also involved at Hamilton Early Learning Center. The work of GROW La Crosse is to assist with school gardens. The building and maintenance of a school garden is one component of GROW La Crosse's work. The organization also assists with educational sessions, taste testings, and providing fresh food to the cafeteria (GROW La Crosse, n.d.).

These additional programs are a positive influence on physical activity and healthy eating behaviors at Hamilton. Each program addresses a unique component of obesity prevention; however, there is evidence that supports school-based interventions that address multiple risk factors at one time (County Health Rankings, 2017a). Multicomponent programs have the capability to focus on addressing physical activity levels, a healthy diet, and decreasing screen time. The *Let's Go!* program is an ideal program that focuses on increasing fruit and vegetable consumption, decreasing screen time, increasing physical activity, and decreasing sugar-sweetened beverage consumption. These four target areas address multiple risk factors for obesity in one program while enhancing the lessons and healthy messages that are received in other

school-based interventions, such as Safe Routes to School, Farm to School, and GROW La Crosse initiatives.

5-2-1-0 Bingo on the Go!

Based on the *Let's Go!* program, the researcher created a program called *5-2-1-0 Bingo on the Go!* to address obesity prevention techniques through a multicomponent approach. The program was guided by the four health messages in the 5-2-1-0 mnemonic that was created by the *Let's Go!* initiative. There were multiple facets of the program that delivered the four health messages. The first facet of the program was a weekly bingo board. The board included a healthy activity on each bingo square linked to one of the four health messages. The boards can be seen in Appendix A. The goal of the bingo boards was for the students to complete one line of bingo by practicing healthy behaviors each week of the six-week program. The bingo board provided an opportunity for the participants to build their self-efficacy and mastery of healthy behaviors. Additionally, the bingo board included a "pair-up challenge." This challenge was intended to encourage the students to include their family and friends in the healthy activity as well. This aspect of the bingo board was created to enhance proxy efficacy skills.

Point-of-decision prompts were placed in the school as a method for changing the environment during the program. The locations for placing the POD prompts were selected to align with places where students are encouraged to make healthy choices. For example, a POD prompt was placed in the lunchroom to encourage the choice of low-fat milk or water to drink with the meal. The POD prompts can be seen in Appendix B. The purpose of the prompts was to reinforce the 5-2-1-0 message as well as serve as a reminder to make healthy choices.

The final component of the *5-2-1-0 Bingo on the Go!* program was weekly video messages. The weekly videos were crafted to provide additional knowledge about the 5-2-1-0 messages. Each week, the video focused on one health message and included tips for improving the healthy habits linked to the weekly topic. The video also served as a weekly reminder about the goal of the program and encouraged the participants to continue working on their bingo board.

In conclusion, obesity prevalence is on the rise for elementary-aged youth. Across the country, youth that live in low socioeconomic neighborhoods have an increased risk for becoming overweight and obese. Multicomponent obesity prevention programs are a vital tool for influencing healthy behaviors in children. The *5-2-1-0 Bingo on the Go!* program addressed four target behaviors that may have an impact on knowledge and awareness of healthy behaviors. In addition, the program was designed to increase the self-efficacy and proxy efficacy of the participants by providing an opportunity to practice and learn about healthy behaviors. Increasing self-efficacy may also increase the likelihood of creating behavior change. The *5-2-1-0 Bingo on the Go!* program addressed the need of fourth and fifth grade students at Hamilton Early Learning Center by providing an opportunity to increase knowledge, self-efficacy, and behavior change.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purpose of this research was to assess knowledge, self-efficacy, and behavior related to fruit and vegetable consumption, screen time, physical activity, sugar-sweetened beverage consumption, and sleep of fourth and fifth grade students at Hamilton Early Learning Center. The *5-2-1-0 Bingo on the Go!* program was developed to improve knowledge, self-efficacy levels, and healthy behaviors. The researcher studied the initial impact and effectiveness of the program. This chapter describes the participants, instruments, methods and procedures, and data analysis techniques that were used.

Participants

The *5-2-1-0 Bingo on the Go!* program was implemented with fourth and fifth grade students at Hamilton Early Learning Center (HELIC) in La Crosse, WI. The School District of La Crosse has 11 elementary schools including public charter schools. Hamilton Early Learning Center is a unique school in the district. This elementary school runs all-year round and has three intersessions throughout the school year. The school also has combined the fourth and fifth grade students into two classrooms. Both classrooms participated in the program. All fourth and fifth grade students at HELIC were eligible to participate in the program. The two classrooms had an expected total of 55 students that ranged in age from 9 to 12.

Hamilton Early Learning Center includes students from three census tracts in La Crosse, WI. The school boundaries include parts of census tract 10, 11.01, and 12. According to recent data, 13.7% of households are living below the poverty line in La Crosse County. In the census tracts included in Hamilton's school boundaries, approximately 20% of the households have children living below the poverty line which is approximately 6% higher than in the county overall (B. Rooney, personal communication, March, 2018). According to data from 2017, the free and reduced lunch rate at Hamilton Early Learning Center was 71.8% (Wisconsin Department of Public Instruction [WI DPI], n.d.). Due to the large percentage of students that qualify for free and reduced lunch rates, HELC staff applied to become a Community Eligibility Provision (CEP) school for the 2017-2018 school year. When a school becomes a CEP school in the National School Lunch and Breakfast Program, all enrolled students are eligible to receive a free breakfast and lunch at school.

The neighborhood surrounding Hamilton has a higher poverty level than the county overall; additionally, the overall rate of obesity is also higher than the county overall. Among the fourth and fifth graders that live in the neighborhood surrounding Hamilton Early Learning Center, the overall rate of obesity among patients seen at Gundersen Health System in 2017 was 15.5% compared to 14.2% for those individuals of a similar age in all of La Crosse County (B. Rooney, personal communication, March, 2018).

Inclusion and Exclusion Criteria

All students that were enrolled in fourth and fifth grade at Hamilton Early Learning Center during the 2018-2019 school year were eligible to be a participant in the

5-2-1-0 Bingo on the Go! program. The Hamilton school building also houses students from a public charter school called the School of the Arts and Technology I (SOTA). As this charter school is held during the typical nine month school calendar, the students from SOTA were not in session during implementation of the program. Therefore, the fourth and fifth grade students from SOTA were not eligible to be in the program. Parental consent was required for participation in the pre-survey, post-survey, and overall program. All program materials and survey instruments were written in English.

Measures

The *5-2-1-0 Bingo on the Go!* program included a pre-survey and post-survey to identify program effectiveness and to receive participant feedback about the program. The full surveys can be found in Appendix C. The independent variables that were used in this research are the implementation of a 6-week bingo incentive program in combination with point-of-decision (POD) prompts placed throughout the school environment. The variables that were measured during the pre- and post-survey were awareness or knowledge of healthy habit recommendations related to the 5-2-1-0 message, self-efficacy of performing healthy behaviors, proxy efficacy, and behavior change. In addition, the post-survey also evaluated the effectiveness of point-of-decision prompts in changing awareness of the health messages and behavior change.

Instrumentation

The survey was a combination of items developed by the researcher and items developed from previous research. The researcher developed one survey question to identify awareness of the 5-2-1-0 healthy habits recommendations. The post-survey also included three items related to the POD prompts that were developed by the researcher.

The first item related to POD prompts identified the accuracy of the recall for POD prompt locations. The second item identified the frequency of reading each POD prompt. The final item asked the participant to gauge how much he or she felt their behavior changed due to the POD prompts.

The self-efficacy of participants was measured with an 11-item self-efficacy scale in the pre- and post-survey. For purposes of the current project, the researcher utilized a self-efficacy scale developed by Lassetter and colleagues (2018), which has been found to be a valid and reliable scale. The self-efficacy scale developed by Lassetter and colleagues is called the Healthy Eating and Physical Activity Self-Efficacy Questionnaire for Children (HEPASEQ-C) and can be referenced in Appendix D. The HEPASEQ-C consists of nine items and addresses health behaviors related to physical activity, fruit and vegetable consumption, and sugar-sweetened beverages (Lassetter et al., 2015). This tool was developed by a team of researchers with input from fourth and fifth grade students that participated in focus groups to provide guidance during the development of the tool. The original tool was judged for content validity, construct validity, and construct reliability; the self-efficacy scale was found to be valid and reliable (Lassetter et al., 2018). Content validity of the self-efficacy scale was developed through an expert panel. The HEPASEQ-C has an item content validity index between .80 and 1.00 with a score of 1.00 for the total questionnaire and an acceptable Cronbach's alpha score (.749) (Lassetter et al., 2018).

The scope of this research included additional health behaviors that were not addressed in the Lassetter self-efficacy tool. Due to the expanded scope of the self-efficacy topics, the researcher adapted the nine item self-efficacy scale developed by

Lassetter and colleagues. The 11-item self-efficacy scale used in this research included seven items from the original Lassetter tool, two additional items to address screen time and sleep habits, and two additional items to address proxy efficacy. The wording of the four new items was developed to match the language and the Likert scale from the original self-efficacy scale. The revised self-efficacy scale is found in Appendix C included in the pre- and post-surveys.

The final items on the pre- and post-survey were developed by the *Let's Go!* program and are included in the 5-2-1-0 Toolkit for Health Care (MaineHealth, 2018c). The items were taken from the Healthy Habits Questionnaire developed for children that are 10 years old or older. The original questionnaire is included in Appendix E. The questions were intended for a health care setting. However, the items are adaptable to other settings and aim to identify health behaviors. The researcher identified eight items that met the needs of the study and included these in the pre- and post-surveys. The wording of the items was revised to provide additional clarity on the timeframe for the question. Additionally, the researcher identified response values to provide concise data points for analysis.

Methods and Procedures

The study was approved by the Institutional Review Board (IRB) at the University of Wisconsin-La Crosse and the Institutional Review Board at Gundersen Health Systems. The IRB submissions and approval letters are included in Appendix F. The study was also approved through the Research and Development Committee at the School District of La Crosse. The approval form from the school district is also included in Appendix F.

The researcher attended the Back to School Fair at Hamilton Early Learning Center on July 18, 2018 to promote the *5-2-1-0 Bingo on the Go!* program and to gain informed parent permission from the parents/guardians of the fourth and fifth grade students. The researcher set up an information table outside the fourth and fifth grade classrooms that contained information about the pre- and post-surveys, the 6 week program, and an informed consent document. Signatures were required from parents that did not want their child to participate in the program or to fill out the pre- and post-surveys. The informed consent document was also sent home with the fourth and fifth grade students on the first day of school. Distributing the parent permission letter with two methods ensured that all parents would have the opportunity to “opt out” of the study or the program before implementation began.

The pre-survey was administered in the fourth/fifth grade classrooms on July 23, 2018. The researcher administered the survey by reading each survey item aloud to the students. The students were asked to answer the survey questions honestly with the response that fits the best for each individual. The researcher was able to answer student questions about the survey if there was confusion about a specific item or statement. The student wrote his or her name on the copy of their survey. After completing the survey, the name was substituted with a number coded to match the student’s pre-survey and post-survey at the end of the program. The pre-survey instrument is included in Appendix C.

The *5-2-1-0 Bingo on the Go!* program began on July 23, 2018 and was implemented over the first 6 weeks of the school year. The students were given one bingo board to use for each week of the program. The proposed goal was for each child to

complete one row of activities on their bingo board each week of the program.

Completed bingo boards were collected by the classroom teachers at the end of each week and a new board was distributed the first day of the following week. The researcher delivered weekly messages to the participants to encourage consistent participation and remind the students about the four main messages of the program. The weekly messages were delivered via pre-recorded video that were approximately three to five minutes each week.

The program also included point-of-decision (POD) prompts to remind the fourth and fifth grade students about making healthy choices throughout the school environment. The point-of-decision prompts were placed in key areas where students had the opportunity to make a choice regarding a health behavior. The prompts were placed in the lunchroom, gymnasium, library, computer room, classrooms, near the playground doors, and near the water fountains. The messages on each prompt reminded the participants about making a healthy choice related to the location it was near. For example, in the lunchroom, a prompt was placed near the lunch line where fruits and vegetables are served with a message saying “Got your 5 for the day? Fill up with fruits and veggies.” The POD prompts are included in Appendix B.

The post-survey was administered in the classroom by the researcher on September 4, 2018 (included in Appendix C). The survey items were read aloud by the researcher and questions were answered if there was confusion about a specific item. Again, the students were asked to answer the questions honestly with the answer that best fits the person who is answering it. The purpose of the post-survey was to look for

changes in awareness, knowledge, self-efficacy, proxy efficacy, and behavior over the 6-week program.

The *5-2-1-0 Bingo on the Go!* program included incentives for the participants in fourth and fifth grade. Each student that was a participant received a nominal incentive at the beginning, middle, and end of the program with the 5-2-1-0 message included on the item. Small incentives included water bottles, frisbees, canvas drawstring bags, and magnets. The program also included a prize drawing at the end of the six weeks. The prize drawing was used as an incentive for students to continue participating in the program throughout the six weeks. There was a chance for multiple entries into the prize drawing. Each participant in the program was entered one time upon completion of the pre-survey. Additional entries were earned by completing a post-survey and handing in at least two completed bingo cards for a total of three extra entries into the drawing.

The prize drawing was held on the same day as the completion of the post-survey. The prizes were chosen to fit the theme of the healthy behaviors that the participants had been asked to work on over the 6-week program. The prizes included gift certificates for a local entertainment center with active games and attractions, an indoor trampoline park, and a healthy restaurant. A list of the items included in the incentives and the budget are included in Appendix G. Funding for the incentives was from the Gundersen Medical Foundation and distributed by the Community and Preventive Care Services Department at Gundersen Health System.

Data Analysis

The data collected from the pre-survey and post-survey were matched for each participant. Data were entered into an Excel spreadsheet and checked for errors.

Descriptive and inferential statistics were used to analyze the data using SAS 9.4 (SAS Institute Inc., Cary, North Carolina). Descriptive statistics that were run include frequencies, percentages, measures of central tendency, and measures of variability. Inferential statistics that were run include dependent sample t-tests, Cronbach's alpha, and a Pearson product-moment correlation coefficient. An alpha level of $p < 0.05$ was used for all statistical tests with a sample size of more than 30 participants. When analyzing the data by age and gender, an alpha level of $p < 0.1$ was used due to a smaller sample size. Results of the data analysis and program effectiveness were reported to the organizations that were involved in the program, including the School District of La Crosse and Hamilton Early Learning Center staff, Gundersen Health System representatives in the Community and Preventive Care Services department, and Gundersen Medical Foundation.

The demographics of the study participants were analyzed to identify the percentage in each category for age and gender. The pre- and post-survey were designed to identify changes in knowledge, self-efficacy, and behavior change of the program participants. Additionally, the post-survey included items that addressed engagement of the participants as well as process evaluation. The knowledge of participants was analyzed by creating a score for the number of correct responses to the 5-2-1-0 mnemonic. The pre- and post-survey score was compared through a dependent sample t-test to identify the change in knowledge. Table 2 identifies the research questions for this study and the corresponding data points for each item in the pre- and post-surveys.

Table 2. Research Questions and Pre- and Post-Survey Data Points

Research Question	Pre-Survey Data Point	Post-Survey Data Point
To what degree does the <i>5-2-1-0 Bingo on the Go!</i> program increase knowledge of the four main messages in the 5-2-1-0 mnemonic?	Item: 3	Item: 1
How does the <i>5-2-1-0 Bingo on the Go!</i> program change self-efficacy levels of the participants in relation to increasing daily consumption of fruits and vegetables, reducing screen time, increasing physical activity, decreasing daily consumption of sugar-sweetened beverages, and following a consistent sleep schedule?	Item: Self-efficacy scale (pg. 3-4)	Item: Self-efficacy scale (pg. 3)
How does the <i>5-2-1-0 Bingo on the Go!</i> program change the level of proxy efficacy of the participants in relation to fruit and vegetable consumption?	Item: Last 2 items in self-efficacy scale (pg. 4)	Item: Last 2 items in self-efficacy scale (pg. 3)
How does the <i>5-2-1-0 Bingo on the Go!</i> program influence self-reported behavior regarding the daily consumption of fruits and vegetables, screen time, physical activity, daily consumption of sugar-sweetened beverages, and sleep?	Item: 4, 7, 8, 9, 10, 11	Item: 2, 5, 6, 7, 8, 9
How do the point-of-decision prompts change behavior of the participants?	N/A	Item: 10, 11, 12

The self-efficacy of participants was measured through an 11-item scale on the pre- and post-survey. For each item in the scale, there was a possible score of -1, 0, or +1. When respondents replied with the response “there is no way I can do this,” they received a score of -1 for that item. Similarly, if the respondent replied with the response “I believe I can do this,” the respondent received a score of +1 for that item. If the respondent replied with “this could be hard for me,” a score of 0 was received for that item. To create the self-efficacy scale, the eleven items were combined with a possible range of scores from -11 to +11. In order to determine the correlation between the self-efficacy items, a Cronbach’s alpha test was calculated. The Cronbach’s alpha denoted the

internal consistency of the 11 items and measured the reliability of the self-efficacy scale. The researcher accepted the Cronbach alpha score at .7 or above to signify a reliable score for the self-efficacy scale. The change in self-efficacy from pre- to post-survey was analyzed with a dependent sample t-test. One sub-scale was also analyzed to identify change in proxy efficacy.

The behavior of participants was measured through five pre- and post-survey items. Each item measured one behavior related to fruit and vegetable consumption, screen-time, physical activity, sugar-sweetened beverages, and sleep. The change in behavior of participants was analyzed with a dependent sample t-test. Additional behavioral items were measured through three items. These items relate to other healthy habits, including eating dinner with a family, eating breakfast on a daily basis, and having access to television or internet-connected devices in the bedroom.

In order to analyze the effectiveness of the point-of-decision prompts, there were three separate items that measured the effectiveness: awareness of POD prompts, the frequency of reading the signs, and self-reported behavior change due to the signage. These data were analyzed with descriptive statistics for the frequency distribution for each response and the percentage of correct responses for the POD prompt awareness.

CHAPTER IV

RESULTS

Introduction

Obesity is a complex health issue and the importance of addressing this problem increases each day. Childhood obesity trends are on the rise at national, state, and local levels. In the United States, the prevalence of childhood obesity has increased from 5% in 1980 to 17% in 2008 (Office of the Surgeon General, 2010). Rates are highest among 6-11 year old children across the United States and locally in La Crosse, WI. Obesity trend data from Gundersen Health System reflect higher levels of obesity prevalence among 6-9 year olds and 10-13 year olds compared to all other age categories from 2-18 years (Rooney, n.d.). Additionally, youth that live in low socioeconomic areas have higher rates of obesity than other areas. The research also shows that children who are obese are more likely to become obese adults (Rogers et al., 2013).

Childhood obesity may also lead to further physical and emotional health conditions. As a child, obesity may lead to hypertension, high cholesterol, type 2 diabetes, asthma, sleep apnea, and orthopedic or joint problems (Office of the Surgeon General, 2010; Liebhart et al., 2008; Polacsek et al., 2009). Children who are obese or overweight may also be impacted by mental and emotional health issues, including low self-esteem, anxiety, and depression (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, December).

As obesity continues to be a growing health issue, it is important to address the factors that lead to increased weight gain and sedentary behaviors. Obesity is linked to a multitude of health behaviors as well as the influence of the surrounding environment. According to research, individuals can positively impact their weight by consuming a healthy diet, being physically active, and decreasing sedentary activities (Rogers et al., 2013). Environmental changes can also positively contribute to a healthy weight for individuals and the overall population. Evidence-based recommendations include improving access to fruits and vegetables or utilizing point-of-decision prompts to increase physical activity and consumption of healthier foods (County Health Rankings, 2017b).

The purpose of the research was to assess knowledge, self-efficacy, and behavior related to fruit and vegetable consumption, screen time, physical activity, sugar-sweetened beverage consumption, and sleep of fourth and fifth grade students at Hamilton Early Learning Center. The *5-2-1-0 Bingo on the Go!* program was developed to improve knowledge, self-efficacy levels, and healthy behaviors. The research studied the initial impact and effectiveness of the program. This section will cover the results of the research in alignment with the five research questions and will identify significant findings.

Participants

The participants of this research were fourth and fifth grade students from Hamilton Early Learning Center in La Crosse, WI. There were two classrooms involved in the study with each classroom containing fourth and fifth grade students ranging from 8 to 11 years of age. At the beginning of the study, there were a total of 45 students

eligible for participation. Upon completion of the pre-survey, there were 41 students that had participated in the research with parental consent. Out of the 45 eligible students, 39 completed the pre- and post-survey, resulting in an 86.7% participation rate. Students were informed that their parents had given permission for them to participate in the study; however, the students were also given the option to skip questions that they did not want to answer. The demographics for program participants are included in Table 3. When examining the data for age and gender, the participants were divided evenly between demographic groups.

Table 3. Demographics of *5-2-1-0 Bingo on the Go!* Participants

Demographics	Participants (N = 39)	%
Age		
8-9 years	22	56
10-11 years	17	44
Gender		
Boy	20	51
Girl	19	49

Knowledge Results

The first research question of this study asks, “to what degree does the *5-2-1-0 Bingo on the Go!* program increase knowledge of the four main messages in the 5-2-1-0 mnemonic?” Knowledge was measured through accurate response to an item based on the four messages. The overall mean score for all participants was 2.26 ($SD = 1.44$) at the pre-survey and 3.43 ($SD = 1.10$) at the post-survey with a total possible score of 4. The pre- and post-survey scores were used in a t-test for dependent samples to identify the difference between the mean scores. The change in knowledge was analyzed and there was a statistically significant difference ($t = 4.39, p < .001$). The participants increased their knowledge by the end of the program with over 75% of the participants responding

to the knowledge question with a perfect score. Figure 2 shows the difference between pre-survey responses and post-survey responses to the knowledge question.

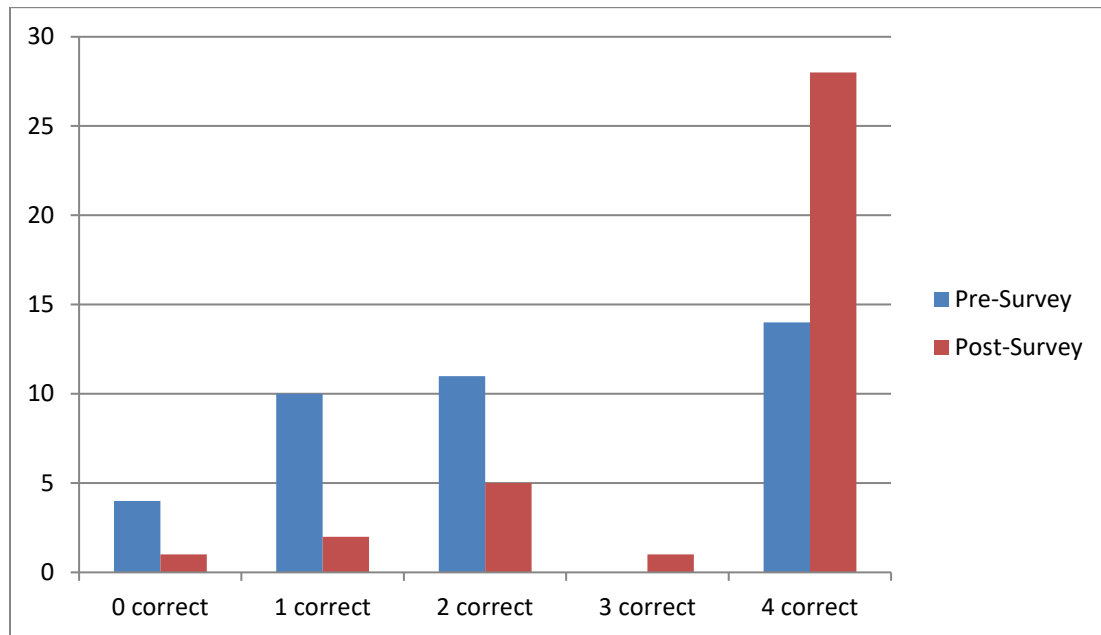


Figure 2. Knowledge of participants from pre- and post-survey

When analyzing the change in knowledge from pre- to post-survey, 54% of participants (21 students) increased their knowledge over the course of the program. Approximately one-third of participants ($n = 12$, 30%) retained the same high level of knowledge (4 out of 4 correct) from the beginning of the program to the end. Fifteen percent of participants (6 students) did not gain in knowledge and remained at two or fewer correct answers. Based on the data, there were no associations between change in knowledge and age ($\chi^2(2) = 0.12, p = .94$) or change in knowledge and gender ($\chi^2(1) = 0.21, p = .64$).

Self-Efficacy Results

The second research question addresses the change of self-efficacy levels over the course of the program in relation to increasing fruit and vegetable consumption, reducing

screen time, increasing physical activity, decreasing consumption of sugar-sweetened beverages, and following a consistent sleep schedule. Self-efficacy was measured through an 11-item scale. Cronbach's alpha was used to identify the internal consistency of the self-efficacy scale items. The alpha coefficient for the eleven items was .802 for the pre-survey and .858 for the post-survey. Both scores were above the recommended 0.7 limit that indicates a relatively high internal consistency and a reliable self-efficacy score for both the pre- and post-survey (Nunnally, 1978).

The self-efficacy scale had a possible score of -11 to 11. At the pre-survey, the study participants had a mean score of 4.45 ($SD = 4.7$). The post-survey mean score for all participants was 4.95 ($SD = 4.9$). A dependent sample t-test was conducted. The mean change in self-efficacy from pre- to post-survey was a 0.34 gain ($t = 0.58, p = .56$). The results of the t-test indicate that there was no significant change in self-efficacy over the course of the program for the sample as a whole.

Individual change in self-efficacy was also analyzed. The types of change in self-efficacy were divided into three categories of change. Figure 3 shows the number of students in each category during the pre-survey and the post-survey. The first category includes participants that had a low perceived self-efficacy or their score decreased to the low self-efficacy range over the course of the program. A low self-efficacy score is one that ranges from -11 to 0. The second category includes participants that had a medium perceived self-efficacy score between 1 and 6 at the beginning and end of the program. The third category includes participants that had a high perceived self-efficacy score (score from 7 to 11) at the beginning and the end of the program. The majority of participants ($n = 31, 79.5\%$) remained in the medium and high categories.

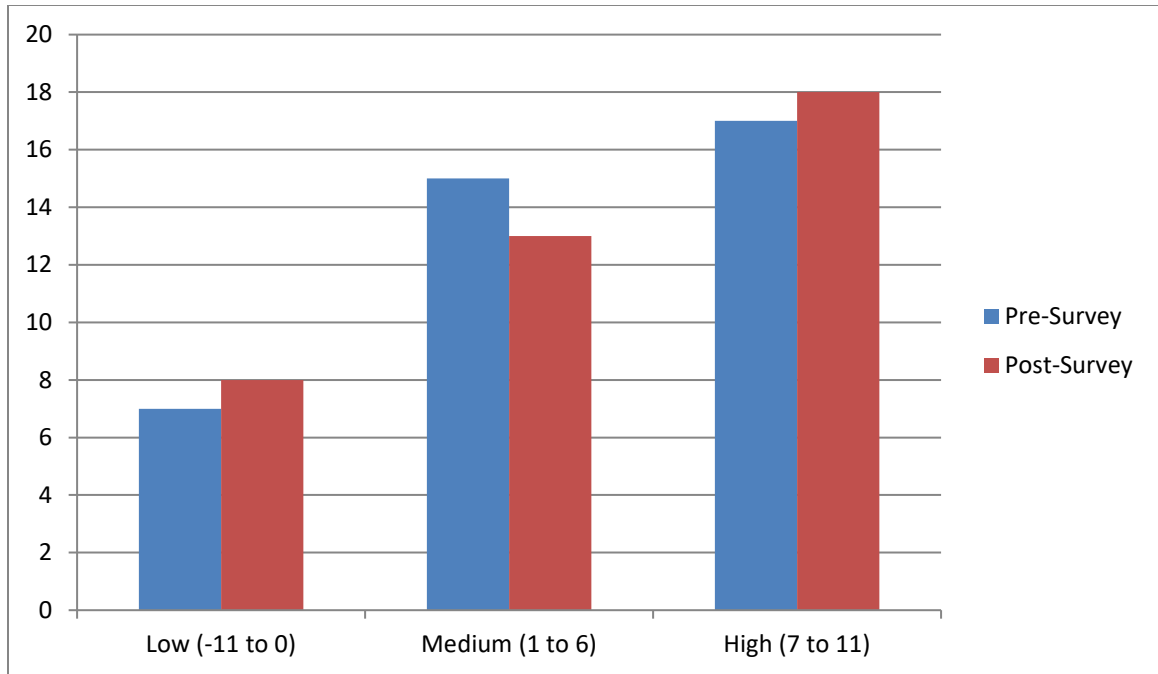


Figure 3. Change in Self-Efficacy of Participants

A change in self-efficacy was also analyzed by an overall increase or decrease in score without dividing the score into categories. The following figure (see Figure 4) depicts the individual score of participants that increased, decreased, or stayed the exact same from the pre-survey to the post-survey. This figure does not take into account a change from one category to another and only depicts the exact value. For example, a participant may have increased their score from a -11 to -1 and remained in the same category. However, this participant did increase their overall self-efficacy score and would be included with the group of participants that improved their score.

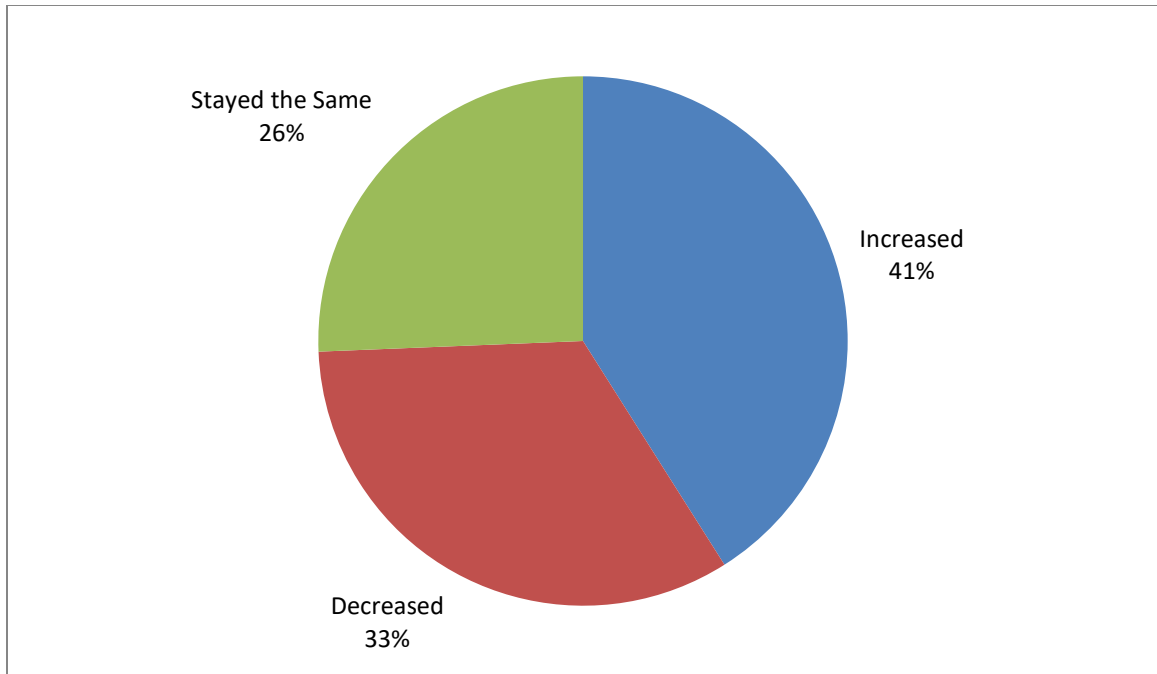


Figure 4. Program Results for Change in Self-Efficacy

The data do not reflect any relationship between gender and change in self-efficacy. When analyzing the relationship between age and a change in self-efficacy with a chi-square test of independence, there was an association between younger students and a change in self-efficacy scores ($\chi^2(3) = 6.3, p = .10$). The younger students (8-9 year olds) saw a greater improvement in perceived self-efficacy than the older students (10-11 year olds).

The third research question addresses the construct of proxy efficacy. Proxy efficacy was measured within the self-efficacy scale with two items that focused specifically on the proxy efficacy of participants regarding the capability of asking for fruit and vegetable availability in the home and at dinner. This subscale had a possible score of -2 to 2. Of the 39 participants, nine participants increased their proxy efficacy score and 30 participants saw no change. A chi-square test of independence was performed to examine the relationship between improvement in proxy efficacy and

increased fruit and vegetable consumption. There was no association between these two variables ($\chi^2(1) = 0.37, p = .54$). Similarly, there was no relationship between improvement in proxy efficacy and age ($\chi^2(1) = 0.004, p = .95$). When analyzing the data by gender, there was an association ($\chi^2(1) = 3.29, p = .07$) between gender and an increase in perceived proxy efficacy levels. Boys were more likely to have an increase in proxy efficacy levels than girls.

Behavior Change Results

The fourth research question addresses behavior change regarding the 5-2-1-0 behaviors and sleep. Each behavior was evaluated through separate items on the pre- and post-survey. The measurements for each behavior are presented with different ranges. Fruit and vegetable consumption was measured by a possible range of 0 to 5 or more fruits and vegetables a day. Screen time was measured in number of hours per day with a range from 0 to 24 hours. Physical activity was measured in number of minutes per day with a possible range from 0 to 1,440. Sugar-sweetened beverage (SSB) consumption was determined by combining the number of SSBs from fruit juice, sports drinks, soda/pop, lemonade, punch, and chocolate milk. The number of SSBs was divided by the total number of beverages consumed on a daily basis from SSBs and non-SSBs and multiplied by 100 to calculate the percentage of beverages that were from SSBs. Sleep was measured in number of hours per day with a possible range from 0 to 24 hours. The group mean for each behavior is listed in Table 4 with details for the pre-survey, post-survey, and the change in behavior.

Table 4. Reported Behaviors and Change over Time

Behavior	Pre-Survey		Post-Survey		Change	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Δ	<i>P</i>
Fruit and Vegetable Consumption (range 0-5)	3.4	1.7	3.3	1.7	-0.10	0.68
Screen Time (range 0-24)	3.75	3.7	3.43	3.6	-0.07	0.90
Physical Activity (range 0-1,440)	84.0	59.0	81.2	75.8	-3.25	0.82
Sugar-Sweetened Beverage Consumption (SSB) (range 0-100%)	38.2%	22.4%	31.4%	22.0%	-7.7%	0.08
Sleep (range 0-24)	8.97	1.8	8.64	2.3	-0.32	0.40

The average change in behaviors for fruit and vegetable consumption (-0.10), screen time (-0.07), physical activity (-3.25), and sleep (-0.32) show no significant difference. Screen time behavior decreased in the average number of hours that were watched per day; however, the positive behavior change was not statistically significant. Similarly, fruit and vegetable consumption, physical activity, and sleep decreased over the course of the program and these negative behavior changes were also not statistically significant. The difference between pre-survey SSB consumption and post-survey SSB consumption is close to significant ($p = .08$) and shows a decrease in consumption over the course of the program.

Change in behavior was also analyzed by identifying individual behavior changes that improved over the course of the program. Table 5 displays the number of individuals that showed an improvement in each separate behavior by the end of the program. Over half of the participants (54%) improved their sugar-sweetened beverage consumption by decreasing the number of SSB's they drank each day. Additionally, there were 33 of the

39 participants that improved in at least one of the five health behaviors that were studied.

Table 5. Positive Behavior Change for Participants

Behavioral Construct	Participants (<i>N</i> = 39)	%
Fruit and Vegetable Consumption	7	18
Screen Time	15	38
Physical Activity	16	41
Sugar-Sweetened Beverage Consumption	21	54
Sleep	4	10
Improvement in any 1 of the 5 behaviors	33	85

The following figure (Figure 5) displays how the number of behaviors that were improved by at least one individual. There were two participants that improved in four out of the five health behaviors. Approximately 85% of participants improved in at least one health behavior or more. The majority of participants improved between 1 and 3 health behaviors. There were six individuals that did not improve in any of the five behaviors. When analyzing the data with a chi-square test of independence, there was a significant relationship ($\chi^2(1) = 5.91, p = .02$) between girls and a decrease in screen time behavior. Girls saw a greater decrease in screen time behavior than boys. There were no other significant relationships between gender or age and the five health behaviors studied.

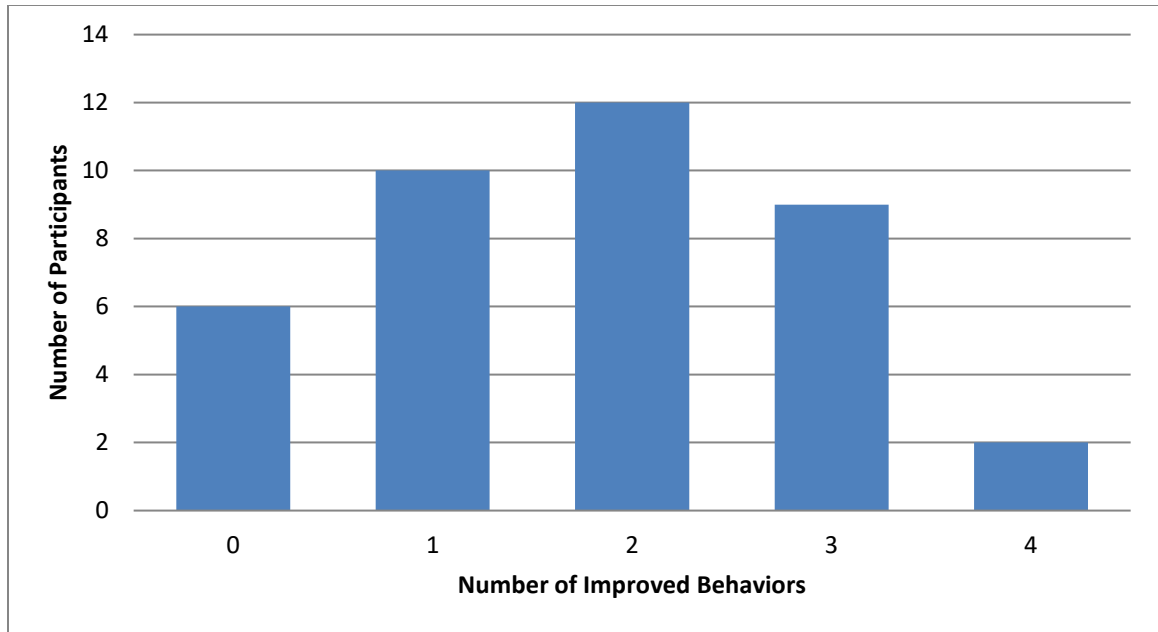


Figure 5. Number of improved health behaviors for program participants

Point-of-Decision Prompt Results

The final research question addresses behavior change and the impact of point-of-decision prompts on the study participants. The POD prompts were evaluated by three items on the post-survey. The first item asked participants to correctly recall the location of the POD prompts throughout the school. This item had a possible range of 0-12. The high end of the range represents a greater recall of correct locations for the POD prompts. There were 59% of participants that could correctly identify eight or more of the locations. Table 6 shows the frequency of correct answers. An analysis of variance was run to identify the difference of point-of-decision prompt awareness between age groups. There was a significant difference between groups ($F = 4.81, p = .03$). The younger participants, ages 8-9, had a higher percentage of correct recall ($M = 0.65, SD = 0.13$) for POD prompts than participants that were older (ages 10-11) ($M = 0.50, SD = 0.28$). There were no significant differences for gender.

Table 6. Point-of-Decision Prompt Awareness

Number of Correct Responses	Participants (N = 39)	%
0-3 correct	4	10
4-7 correct	12	31
8-12 correct	23	59

The second item asked participants to gauge how often they read the POD signs. The possible responses were on a 3-point Likert scale ranging from not at all, somewhat often, or very often. The majority of participants ($n = 28, 71.8\%$) read the POD prompts somewhat often. There were 7 participants (18%) that did not read the signs at all and there were 4 participants (10%) that read the signs very often.

The third item regarding POD prompts asked participants to respond with the amount of impact the POD prompts had on their behavior. The 3-point Likert scale included the following responses: not at all, somewhat, or very much. Over half of the participants ($n = 21, 53.9\%$) felt that the POD signs somewhat influenced their behavior. The responses for the other half of the participants were split evenly ($n = 9, 23\%$) between the POD signs not having any influence and the POD signs having a great deal of influence on their behavior change.

Correlated Variables and Correlational Model

This research contained multiple variables that were measured and analyzed. To understand the relationship between these variables, a Pearson product-moment correlation coefficient was computed for correlations between the following variables: change in knowledge, change in self-efficacy, overall improvement in any of the five behaviors, engagement in the program, and point-of-decision awareness. The overall improvement in any of the five behaviors was chosen as a way to incorporate the total

number of healthy behaviors from the pre- to post-survey. The model could have included separate correlations between each of the health behaviors; however, in order to simplify the model, an inclusion of all health behaviors in one variable was used to identify any correlations.

The first data analysis was executed to understand the relationship between knowledge, participant engagement, self-efficacy, and behavior. Table 7 shows the correlation between each variable. The correlational test shows a positive relationship between program engagement and behavior change. This shows that participants who felt highly engaged in the program also had a significant change in behavior. The remaining variables do not have a statistically significant relationship.

Table 7. Pearson Correlations among Program Components

	1. Knowledge	2. Engagement	3. Self-Efficacy	4. Behavior
1. Knowledge	-			
2. Engagement	.09 (<i>p</i> =.59)	-		
3. Self-Efficacy	.19 (<i>p</i> =.25)	.20 (<i>p</i> =.22)	-	
4. Behavior	.19 (<i>p</i> =.25)	.34 (<i>p</i> =.03)*	.25 (<i>p</i> =.13)	-

*Statistical significance at $p < 0.05$

This relationship can be depicted further by Figure 6 and Figure 7. The first figure shows the variables in a linear fashion where knowledge leads to engagement which leads to self-efficacy and then leads to behavior. A linear progression was chosen due to the connection between these variables. As described in a guidebook on health education theories published by the National Cancer Institute (2005), behavior is influenced by knowledge, a person’s attitude and level of confidence in performing a behavior, and the social environment. These three factors may lead to behavior. In this research study, the proposed relationship does not show a progression through the variables. The only

relationship that had a significant correlation was that between engagement and improved behavior change as depicted in the second figure. Overall, there was a moderate, positive correlation between engagement in the program and behavior change ($r = 0.34, p = .03$). When engagement in the program increased, behavior change also increased.

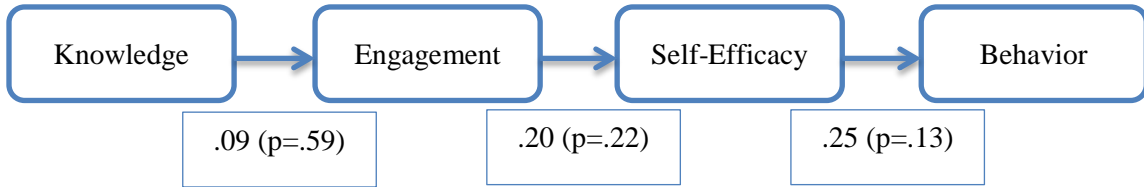


Figure 6. Linear progression of program variables

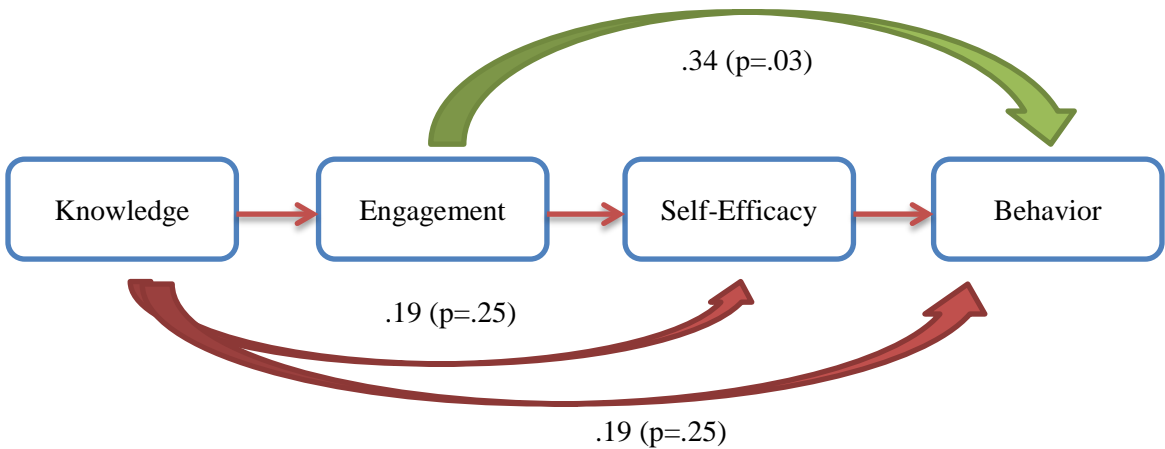


Figure 7. Correlational model of program variables.

Data analysis was also performed to understand the relationship between the individual changes in knowledge, self-efficacy, and each of the five behavior changes along with engagement in the program and POD awareness. The Pearson product-moment correlation coefficient was computed and Table 8 shows the results for variables that were significantly correlated. Overall, there was a moderate, positive correlation between the variables listed in the table.

Table 8. Pearson Correlations among Research Variables

Research Variables	Pearson's <i>r</i>	<i>p</i>
Point-of-decision awareness and change in self-efficacy	+0.34	.03*
Engagement in program and improved screen time behavior	+0.35	.03*
Improved screen time behavior and decreased SSB consumption	+0.31	.06**
Increased physical activity and decreased SSB consumption	+0.35	.03*

*Statistical significance at $p < 0.05$

**Statistical significance close to significant at $p < 0.1$

Summary

The final sample size for this study contained 39 participants with a matched survey for the pre- and post-survey. This study analyzed the effect of the *5-2-1-0 Bingo on the Go!* program on knowledge, self-efficacy, and behavior change. There was a significant change in knowledge for the participants ($M = 1.19, p < .001$). There was no significant change in self-efficacy ($M = 0.34, p = .56$) over the course of the program for all participants as a whole. However, when the data was analyzed for individual change in self-efficacy, there were 85% of participants that had achieved a positive self-efficacy by the end of the program with 21% making substantial improvements from low self-efficacy to a mid-range or high-level self-efficacy score.

Behavior change was studied for a change in fruit and vegetable consumption, screen time behavior, physical activity, sugar-sweetened beverage consumption, and sleep. Data analysis for sugar-sweetened beverage consumption were close to significant ($p = .08$) for a positive behavior change. When analyzing the data for individual changes in behavior, there were 33 participants (85%) that improved in at a least one of the five health behaviors studied. Although the group findings did not show significant

differences for four out of the five health behaviors studied, the individual participants showed improvement in at least one behavior for the vast majority of participants.

The final purpose of the research was to identify the impact of point-of-decision prompts on behavior change. Over half of the participants were able to identify the majority of locations where the POD prompts were placed in the school. Over 70% of participants felt that they read the POD prompts somewhat frequently. The majority of participants felt that the POD prompts had an influence on their behavior change.

Chi-square tests of independence were performed to identify relationships between knowledge, self-efficacy, or behavior change and the age or gender of the participants. Significant findings showed an association between younger students and a change in self-efficacy, male participants and a change in proxy efficacy, and female participants and a change in screen time behavior. Additionally, a correlational model was tested to understand the relationship between knowledge, engagement, self-efficacy, and behavior change. The model did not show a linear progression between the four variables; however, there was an association between program engagement and behavior change.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

Introduction

The purpose of this research was to assess knowledge, self-efficacy, and behavior related to fruit and vegetable consumption, screen time, physical activity, sugar-sweetened beverage consumption, and sleep of fourth and fifth grade students at Hamilton Early Learning Center. The *5-2-1-0 Bingo on the Go!* program was developed to improve knowledge, self-efficacy levels, and healthy behaviors. The researcher studied the initial impact and effectiveness of the program.

Prevention work to address obesity prevalence among children is an increasing health priority in the United States. Childhood obesity has been termed an epidemic that if not curtailed, may result in shorter life expectancy for today's youth than that of their parents (Liebhart et al., 2008). The prevalence of obesity has been on the rise since the 1980s and affects over 12.7 million children and adolescents in the United States today (Division of Nutrition, Physical Activity, and Obesity, & National Center for Chronic Disease Prevention and Health Promotion, 2017, April). In the United States, childhood obesity prevalence rates are highest among adolescents at 20.5% and continue to rise into adulthood (Ogden et al., 2015). Wisconsin overweight and obesity prevalence rates are at 29.5% for youth ages 10-17 years old (Trust for America's Health & Robert Wood Johnson Foundation, 2018b). In the La Crosse area, there are similar trends with obesity rates being the highest for 6-13 year olds (Rooney, n.d.).

The effect of obesity is harmful to that of a growing body. Children who are overweight or obese have greater risk for comorbidities, such as hypertension, high cholesterol, type 2 diabetes, asthma, sleep apnea, and orthopedic or joint problems (Gonzalez et al., 2015; Office of the Surgeon General, 2010; Liebhart et al., 2008; Polacsek et al., 2009). Additionally, children who are overweight or obese may also be at a greater risk for social and emotional health issues such as low self-esteem, social stigmatization, anxiety, and depression (Division of Nutrition, Physical Activity, and Obesity & National Center for Chronic Disease Prevention and Health Promotion, 2016, December; Gonzalez et al., 2015). The multitude of childhood health risks may also lead to overweight and obesity in adulthood where the health risks may be more severe. Adults that are overweight or obese are at risk for comorbidities such as stroke, cancer, osteoarthritis, and a shorter life span (Gonzalez et al., 2015).

This research study included the development of a program called *5-2-1-0 Bingo on the Go!*. The program goal was to address knowledge, self-efficacy, and behavior change of program participants. The program was a 6-week bingo challenge along with point-of-decision prompts used as an environmental enhancement to the school environment. There was a pre-survey and post-survey to identify program effectiveness and to receive participant feedback about the program. The post-survey also evaluated the effectiveness of the POD prompts for impacting knowledge and behavior change.

Data analysis was performed by using descriptive and inferential statistics in SAS 9.4 (SAS Institute Inc., Cary, North Carolina). Descriptive statistics included frequencies, percentages, measures of central tendency, variability, and standard deviation. Inferential statistics included dependent sample t-tests, Cronbach's alpha, and Pearson product-

moment correlation coefficients. Statistical significance was accepted at an alpha level of $p < 0.05$ for sample sizes of 30 or greater and $p < 0.1$ for sample sizes of less than 30.

This chapter will cover the discussion of the results and key findings as well as recommendations for implementation, for improving the research, for future research, and implications for health professionals.

Conclusions and Discussion

Findings Related to Knowledge

The first research finding showed that there was a considerable increase in knowledge over the course of the program. At the beginning of the program, only 36% of the students were able to correctly identify the four messages that accompany the 5-2-1-0 mnemonic. After completion of the program, over 75% of the students were able to correctly identify all four messages. This shows a substantial change in knowledge over the course of the program. Students were able to engage in learning through weekly videos that were played in the classrooms. The videos served as a reminder about the main messages of the program in addition to giving insight and advice for changing behavior related to each topic. In the process evaluation, over half of the participants felt that the videos shown in class were helpful.

The point-of-decision prompts were also a program component that could assist in knowledge acquisition. There were eight locations around the classroom and school environment where the POD prompts were posted. These POD prompts repeated the key messages of 5-2-1-0 and encouraged healthy behavior change to match those messages. On the post-survey, over 80% of participants reported reading the POD prompt signs somewhat or very frequently. The constant presence of signs and reading of those signs

could have made a contribution to a gain in knowledge. Currently, there are no research-based findings in the literature that describe the effect of POD prompts on knowledge acquisition. However, the findings that POD prompts were frequently read and may have increased knowledge acquisition may be a potential research avenue in the future.

Findings Related to Self-Efficacy

Increasing the self-efficacy of participants was the second program goal. Overall, the group average did not reflect any significant changes in self-efficacy after the 6-week program. However, when individual changes in self-efficacy were analyzed, almost 80% of the participants achieved a positive self-efficacy score. When categorized, self-efficacy scores range from low self-efficacy with a negative score to high self-efficacy with a score of 7 or higher. There were over 45% of participants ($n = 18$) that held a high self-efficacy score by the end of the program and 33% ($n = 13$) that held a medium self-efficacy score. Regardless of the category that the participants fell into, there were 16 participants that were able to increase their self-efficacy score over the course of the program. There were also 13 participants that had a decrease in self-efficacy score.

Based on the increase in knowledge, it may have been a possibility that the program acted as an awareness raising event for the participants. Pre-survey data for self-efficacy demonstrated that over 80% of participants had a perceived self-efficacy in the medium to high range prior to the program. The participants felt fairly confident in their ability to perform healthy behaviors. The *5-2-1-0 Bingo on the Go!* program provided an opportunity for participants to practice these health behaviors. Individuals that had a perceived self-efficacy score that was high at the beginning of the program may have attempted a new health behavior throughout the six weeks that was not easy to perform.

Without positive reinforcement or resilience in problem solving, this could result in a decrease in perceived self-efficacy. Similarly, individuals that had a perceived self-efficacy score that was low at the beginning of the program may have attempted a new health behavior and found that it was easier to perform than expected. This could result in an increase in perceived self-efficacy.

While the findings from analyzing self-efficacy in this study do not show a statistically significant difference, the practical value of understanding changes in self-efficacy levels is important and could be a potential avenue for future research. As Lassetter et al. (2015) have stated, when the focus of a program is to increase the participant's confidence in performing healthy behaviors, the participant will be more likely to perform that behavior. It is possible that this program did not focus enough on building confidence for performing healthy behaviors; therefore, the results did not show a change in self-efficacy for the group as a whole.

Proxy efficacy was measured in the pre- and post-survey as a sub-scale of the self-efficacy scale. There was no significant difference for a change in proxy efficacy. However, nine participants ($n = 39$) saw an increased proxy efficacy score. With the slight increase in proxy efficacy, there were no associations between program participants feeling more confident about requesting fruits and vegetables from their parents and the actual consumption of fruits and vegetables. The one significant finding about proxy efficacy was that boy participants were more likely to increase their proxy efficacy score than girls. It is possible that the program had an additional impact on boy participants for gaining confidence in requesting fruits and vegetables in the home environment.

Findings Related to Behavior Change

The 6-week bingo program and POD prompts were studied for any impact on behavior change related to fruit and vegetable consumption, screen time, physical activity, sugar-sweetened beverage consumption, and sleep. Through data analysis, there were few findings of statistical significance for the entirety of the program participants. One finding showed a slight difference in sugar-sweetened beverage consumption that approached statistical significance for the group. When analyzing the data for individual changes in healthy behaviors, the results showed practical significance for the program results. According to the survey results, over half of the participants decreased the number of SSBs that they consumed each day. This finding was also corroborated by classroom teacher observations. The classroom teachers reported that their students had noticeably increased their water consumption over the course of the program.

Additionally, 40% of participants increased their physical activity and roughly 40% decreased their screen time over the course of the program. When looking at relationships between behavior variables, there were two significant associations. The first association was between increased physical activity and decreased SSB consumption. The second association was between decreased screen time and decreased SSB consumption. These findings showed that there was a positive relationship between improving two health behaviors at the same time. For example, a program participant who chose to be more physically active may have also chosen to drink more water as opposed to a sugar-sweetened beverage. Similarly, participants that chose to decrease the number of hours of screen time they watch each day may have also chosen to consume fewer SSBs.

A surprising finding from the data was the number of individuals that improved at least one of the five health behaviors over the course of the program. Approximately 85% of the participants were able to improve at least one health behavior. According to one study, weight gain could be prevented by making small changes in diet and physical activity (Rodearmel et al., 2006). Small lifestyle changes can produce a great impact on weight management or weight loss. This program was able to create small lifestyle changes in the majority of participants. These small changes may have a positive impact on overweight, obesity and overall healthy behavior attainment. As a multicomponent program, the *5-2-1-0 Bingo on the Go!* program addressed multiple health behaviors. In the literature, multicomponent programs that address obesity prevention strategies have been shown to “increase physical activity, improve weight status, and improve dietary habits” (County Health Rankings, 2017a). This current research, while not statistically significant for the whole group, demonstrated that a multicomponent program was able to create small changes in the majority of participants that may, in turn, lead to positive health outcomes.

Additional research involving the 5-2-1-0 program has been completed in the past. One study researched the impact of a 4-month educational program on health behavior (Lynch et al., 2016). The program focused on teaching knowledge to second and third-grade children over the course of the program. The findings concluded that there was no difference in health behaviors between the control group and the intervention group. The findings from this study are similar when considering the group of participants as a whole. However, this research was able to show individual changes among each of the behaviors being studied (fruit and vegetable consumption, physical

activity, screen time, SSB consumption, and sleep). While the *5-2-1-0 Bingo on the Go!* program was unable to show improvement in all five behaviors across the group, there was improvement for the vast majority of participants in at least one of the health behaviors.

The POD prompts may have played a role in improving health behavior during the program as well. According to participant self-report, the majority of participants read the prompts somewhat or very frequently. They also felt that the prompts had an influence on their behavior throughout the program. This type of gentle nudging is gaining popularity among public health strategies as a way to influence behavior through small environmental changes (Kaczynski et al., 2014). This research demonstrated the usefulness of POD prompts among a child priority population.

In addition, the *5-2-1-0 Bingo on the Go!* program was able to address multiple levels of behavioral influence for the program participants. The Social Ecological Model portrays the importance of affecting behavior throughout the levels of influence (McLeroy et al., 1988). The bingo challenge was designed to influence the individual through an increase in knowledge and skill at the intrapersonal level. The POD prompts acted as an environmental change to the school and influenced behavior at the organizational level. Additionally, the two classrooms of students and their teachers influenced one another at the interpersonal level. With this research, it is not possible to determine to what extent each program component was able to influence behavior change and program results. The program participants reported that the POD prompts had an impact on their own behavior. Considerable research has been done for evaluating the effectiveness of POD prompts with an adult population (County Health Rankings,

2017b); however, there is not much research to support the effectiveness of POD prompts with a youth population. This finding may be a potential avenue for additional research.

Findings Related to Variable Correlations

According to multiple health education theories, self-efficacy is a construct that connects knowledge and health behavior. Self-efficacy affects behavior change on a continuum from initiating a new behavior, to adopting the behavior, and to maintaining the behavior (Bandura, 2006). The current study focused on changing knowledge, self-efficacy, and behavior. In order to understand the relationship between these variables, a correlational test was calculated between each variable. As discussed in Chapter IV, the three constructs (knowledge, self-efficacy, behavior) and one additional component (program engagement) were placed in a linear model to assess if the correlation between variables led from one to the next. The only statistically significant association was between program engagement and improved health behaviors. This relationship demonstrated that if a participant felt engaged in the program, they were also more likely to improve at least one health behavior.

As self-efficacy has been shown to lead to sustained behavior change (Bandura, 2006), the improvement in behavior from this study may be temporary. The self-efficacy levels did not improve across the group; therefore, the change in behavior may not have a lasting effect once the program was complete. Shortly after the program ended, behavior change may have reversed to pre-program levels. This cannot be assumed without additional research or a secondary post-survey administration. However, if program participants were unable to improve their self-confidence in performing a health behavior, the effects of the 6-week program may not have a lasting impact.

In addition, participants reported that they were influenced by the program incentives. The program included multiple incentives for each student throughout the course of the program. The prizes were of a nominal value and encouraged healthy behaviors. For example, participants were provided a reusable water bottle at the beginning of the program to encourage water consumption. They also received a frisbee at the mid-point of the program to encourage more physical activity. The majority of participants also reported further motivation from the grand prize drawing. The students were given multiple opportunities to earn additional entries into the prize drawing by participating in the program. Program engagement could have been driven by program incentives which may have an impact on healthy behavior change as well.

Recommendations

This study demonstrated the value of a school-based intervention aimed at preventing overweight and obesity through a multicomponent approach with environmental changes. The findings from this study may provide insight into additional strategies for future programs in elementary schools.

Recommendations for Implementation

The process for gaining support of a program is an essential component for successful implementation of a program at elementary schools. It is necessary to gain support from all levels of involvement before implementation of the program. In order to implement this research and the accompanying program, support was garnered from the school principal, teachers, school staff, and parents of the students that would participate. As teachers are the core link between outside program developers and their students, they create the foundation for motivating their students and on-site program coordination. The

teachers in this research study were key personnel for providing program resources through videos, prizes, and the weekly bingo cards. Additionally, the classroom teachers motivated the students to participate and try new activities from the bingo cards in order to actively participate throughout the six weeks.

To improve upon future programs, assessment of the priority population should be completed prior to program implementation. Assessing the knowledge level and desire to change of the participants should be a critical component for guiding program interventions. This type of assessment may also provide program coordinators with the information they need in order to tailor a program to the specific population. Knowledge acquisition was easily changed with little effort for the majority of the students. Self-efficacy was a key program component that would benefit from additional program focus. When knowledge about healthy behaviors is the first component of the program, the children are exposed to an awareness raising event that demonstrates the need for changing a behavior. However, without emphasis on building the confidence of those children, the program may not be as effective.

According to the Social Cognitive Theory, self-efficacy can be built through observational learning, changing the environment to influence behavior, and reinforcement (Bandura, 2006). Programs that address behavior change for children should focus on demonstrating the skills that are necessary to change behavior and should also positively reward the children for displaying a positive behavior change. Programs that focus on building confidence and self-efficacy for behavior change may be more effective and produce more successful outcomes.

Recommendations for Improving the Research

The limitations of this research could be addressed in a variety of ways to improve upon the current study. As this study was limited by the cognitive and behavioral limits of the youth participants, one-on-one survey administration is recommended for future consideration. The principle researcher or trained research assistants could provide individual administration to each student as a way to enhance comprehension of the survey questions and limit confusion. Individual administration of the survey may produce more accurate responses and may be of benefit to students that are English language learners or students with lower literacy levels. This type of survey administration is resource-intensive and may not be feasible for future research. For this research, the principle researcher attempted to minimize confusion by reading each survey item aloud to the classroom and responding to student questions as they arose to provide additional clarification.

Another recommendation for improving the current research would be to address the validity of the survey instrument. The current survey instrument was created by utilizing pre-existing questionnaires from the *5-2-1-0 Let's Go!* program and from previous research on a validated and reliable self-efficacy instrument from Lassetter and colleagues (Lassetter et al., 2015). As the survey instrument for this research was a combination of tools, the current research could be improved by establishing a valid tool. Elementary classroom teachers could provide content expert knowledge about fourth and fifth grade comprehension levels and could review the survey for appropriateness. Additionally, the survey instrument could be piloted with the priority population. This pilot test would have ensured that the messages in the survey were appropriate and easy

to understand and could have provided recommendations for strengthening and revising the survey.

Recommendations for Future Research

Future studies that are examining the effects of a multicomponent program could use an experimental design with a control group for comparison. There are a variety of ways to plan an experimental study. One suggestion would be to compare two schools with one intervention group and one control group with similar priority populations. Research could also be done to identify if this type of program is beneficial in schools with varying degrees of socioeconomic levels. For example, a study could be conducted to compare program outcomes between schools in low socioeconomic areas and schools in high socioeconomic areas. Differences could also be studied for schools that are in an urban setting versus a rural setting. These types of experimental designs would provide for a greater generalizability of the results.

Another recommendation would be to adapt the program to include parents in the program. Children may be influenced by their parents and the resources that their parents are able to provide. A program that includes educational sessions or incentives for parent participation may identify if parental involvement adds to the impact of the program and can produce additional positive health outcomes.

A final recommendation for future research is to investigate the impact of POD prompts with younger populations. The results of this study demonstrated that the participants were reading the signs and also felt their behavior change was somewhat due to the POD prompt. This type of gentle nudging is becoming a popular practice for health education specialists to influence their priority populations (Kaczynski et al., 2014).

However, the majority of available research literature focuses on the effect of POD prompts with an adult population. Future research could be done to identify what type of effect POD prompts have on children without any additional programming attached to the intervention. The research could also be adapted to identify if there is any impact on other students that are not a part of the program. For example, future research could also include the impact of environmental changes, like the POD prompts, on first, second, and third grade students even though they are not the intended audience of the program.

Implications for Health Professionals

While the results of this study did not find statistical significance for each component, there are three implications that can be learned from the results. The first lesson is that behavioral changes may be difficult to achieve for an entire group in multicomponent programs. In this research, every individual did not achieve behavior change for each health behavior that was being studied. However, the vast majority of participants were able to change at least one behavior, with many participants achieving a change in multiple behaviors. If the program had focused on just one health behavior, it would be possible that some of the students would not have changed at all due to lack of skill, willingness to change, or some other barrier related to that specific health behavior. However, this multicomponent program focused on many pathways to influence the array of health behaviors that are linked to the risk factors for obesity. Multicomponent programs provide the opportunity to make small changes in behavior with a variety of ways to change and develop healthier behaviors.

The second lesson is that POD prompts are a low-cost and effective method for increasing positive behavior change among children. This study demonstrated that

schools should use this method for changing the school environment and influencing healthy behaviors among students. The majority of study participants read the POD prompts often and felt that they helped change their behavior. POD prompts have the potential to make an impact with a small effort from schools to enhance the environment and influence youth to make healthy choices throughout their day at school.

The final implication is a lesson for societal change. In order to effectively change health behaviors and make an impact on obesity levels in a community, it is important for a variety of organizations to work together to influence behavior change. Health care systems may be able to assess patient knowledge and behavior regarding risk factors for overweight and obesity. However, in order to create change among patients, there needs to be a concerted effort for increasing self-efficacy and teaching healthy skills. This type of effort should be available and used with all children and their families to make the greatest impact on the overall community. Health care systems, public health entities, and schools have an opportunity to partner with one another to identify risk factors, increase knowledge and self-efficacy, teach healthy behaviors, and change the environment for children and their families. A collaborative approach with multiple levels of influence has the capability of creating a long-lasting and trend-changing impact on obesity levels in the community.

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APPENDIX A

5-2-1-0 BINGO ON THE GO! BINGO BOARDS

5-2-1-0 BINGO CHALLENGE

Add fruit to your breakfast (in cereal, oatmeal, or pancakes)	Turn on music and have a dance party	Drink 1 glass of water when you wake up for the day	No TV during meal times	Pair-Up Challenge: Take a trip to the library and pick out books for the whole week
Walk or ride your bike to school two times this week	Pair-Up Challenge: Make a homemade smoothie with frozen fruits or veggies	After school snack—pick your favorite veggie and dip	Switch to white milk at lunch today	Put together a puzzle
Drink water or white milk for all three meals today—breakfast, lunch, and dinner!	Play a game—board game, card game, but no screens	Go to bed at the same time every night this week	Run a lap around the entire playground area	Try a new vegetable with dinner
Play outside for 30 minutes before any screen time today	Add your favorite vegetable to your lunch (pack it or pick it from the lunch line)	Make a sidewalk chalk obstacle course or maze	Pair-Up Challenge: Go to a Farmer's Market and explore the fruit and veggie stands	Skip the sports drink and have water and a piece of fruit instead
Pair-Up Challenge: Take a walk after dinner with a buddy	Make fun flavored water by adding your favorite fruit, veggie, or herbs (Ex. Apple slices and cinnamon)	Have a "TV-free" day—switch off the TV for the whole day	Write a list of your favorite fruits and vegetables	Go outside and run or skip around your house 4 times

Complete a line of challenges – up/down, sideways or diagonal



SWAP BOX –
change out one challenge for one of the same color

Pick a fruit or veggie and add it to your lunch today	Read a book for 15 minutes	Do 30 jumping jacks and run in place for 1 minute	Drink a tall glass of water
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A portion of this program has been funded by Gundersen Medical Foundation



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5-2-1-0 Bingo on the Go!



5 or more
fruits and
vegetables



2 hours or less
recreational
screen time*



1 hour or more
of physical
activity



0 sugary
drinks,
more water

**Keep TV/Computer out of the bedroom. No screen time under the age of 2.*

How to Play:

Your child will receive one bingo card each week for the next six weeks.

- The goal is to get one line of boxes filled in any direction each week but you can try to do more than that too!
- Make an X through the square once you have finished the activity.
- Turn in your bingo cards to your classroom teacher and your child will receive an extra entry into the grand prize drawing at the end of the challenge.

Pair-Up Challenges!

- Each Bingo card has four boxes with a "Pair-Up Challenge".
- These boxes should be completed with a buddy. The buddy can be a parent/guardian, brother or sister, a friend, a grandparent or anyone who wants to play along!

Swap Box

- Some activities on the Bingo board may seem too difficult to complete. The Swap Box can be used to trade out a hard activity for one that is easier to complete.
- Swap one activity for the same color of activity on the board. You can mark the square as finished after completing the swapped activity.

Prizes

All students will receive a water bottle and drawstring bag just for participating!

The grand prize drawing will be held the week of Sept. 7, 2018. All students will have a chance to win. Earn extra entries by turning in your completed bingo cards. Grand prizes include: free passes for Jump Start Adventure Park, Shenanigan's and more!

Student's name _____

Week 1 2 3 4 5 6

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HEALTH SYSTEM®

5-2-1-0 BINGO CHALLENGE

Eat fruit with breakfast or make a yogurt parfait	Set up an obstacle course and run through it	Choose water for dinner tonight	Read a book for 20 minutes	Pair-Up Challenge: Enjoy an "electronic-free" meal. No TV, cell phones, or any other electronics during the meal
Play your favorite sport	Pair-Up Challenge: Find a juice with the lowest grams of sugar on the nutrition label	Make your own trail mix and add in dried fruits.	Make fancy ice cubes with frozen fruit for your water	Start a journal or draw a picture about your day
Ask for water at snack time today	Set a timer for 30 minutes and turn the TV off after the time is up	Make your bedroom a cozy place where you want to be	Play tag with a group of friends or your family	Add your favorite fruit for dessert after dinner
Read books before bedtime instead of watching TV or using electronics	When eating away from home, choose a meal with fruits or veggies as the side dish	Walk or ride your bike to school	Pair-Up Challenge: Explore the grocery store and find a fruit or vegetable for every color of the rainbow	Enjoy 1 cup of 100% fruit juice (4-6 oz.)
Pair-Up Challenge: Go on a nature hike	Drink water or white milk for all 3 meals today—breakfast, lunch, and dinner!	Switch off all electronics during homework every day this week	After school snack—pick your favorite fruit and dip (peanut butter, yogurt, etc.)	Collect rocks, seashells, or leaves from a local park or beach

Complete a line of challenges – up/down, sideways or diagonal



SWAP BOX –
change out one challenge for one of the same color

Pick a fruit or veggie and add it to your lunch today	Read a book for 15 minutes	Do 30 jumping jacks and run in place for 1 minute	Drink a tall glass of water
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A portion of this program has been funded by Gundersen Medical Foundation



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5-2-1-0 Bingo on the Go!



5 or more
fruits and
vegetables



2 hours or less
recreational
screen time*



1 hour or more
of physical
activity



0 sugary
drinks,
more water

**Keep TV/Computer out of the bedroom. No screen time under the age of 2.*

How to Play:

Your child will receive one bingo card each week for the next six weeks.

- The goal is to get one line of boxes filled in any direction each week but you can try to do more than that too!
- Make an X through the square once you have finished the activity.
- Turn in your bingo cards to your classroom teacher and your child will receive an extra entry into the grand prize drawing at the end of the challenge.

Pair-Up Challenges!

- Each Bingo card has four boxes with a "Pair-Up Challenge".
- These boxes should be completed with a buddy. The buddy can be a parent/guardian, brother or sister, a friend, a grandparent or anyone who wants to play along!

Swap Box

- Some activities on the Bingo board may seem too difficult to complete. The Swap Box can be used to trade out a hard activity for one that is easier to complete.
- Swap one activity for the same color of activity on the board. You can mark the square as finished after completing the swapped activity.

Prizes

All students will receive a water bottle and drawstring bag just for participating!

The grand prize drawing will be held the week of Sept. 7, 2018. All students will have a chance to win. Earn extra entries by turning in your completed bingo cards. Grand prizes include: free passes for Jump Start Adventure Park, Shenanigan's and more!

Student's name _____

Week 1 2 3 4 5 6

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APPENDIX B

POINT-OF-DECISION PROMPTS



Every day!

GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Got your 5 for the day?
Fill up with fruits
and vegetables.



GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Choose water and low-fat milk!



GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Physical activity makes your heart happy.



GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Read More, Watch Less



Every day!

GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Get active and have fun.



Every day!

GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Quench your thirst with water.



GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

Less screen time for a healthy body.



GUNDERSENHEALTH.ORG/5210

GUNDERSEN
HEALTH SYSTEM®

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd. | 27138_0318

APPENDIX C
PRE- AND POST-SURVEY

Pre-Survey
5-2-1-0 Bingo on the Go!

- You are being asked to answer this survey to help us learn about your thoughts about being healthy.
- Your parent's were asked if it was okay for you to do this survey and the Bingo game. They haven't told us no, but if you decide you don't want to do this survey that is okay. You may also skip any question that you do not want to answer.
- Your name is on this survey so we can match this with one we will have you answer at the end of the Bingo game. We won't share your answers with your parents, teachers or anyone else.

For each question choose the answer that best fits you. Please tell the truth.

1. What is your current age? (please check one)

- 9 years old
- 10 years old
- 11 years old
- 12 years old

2. Are you: Boy Girl

3. Draw a line to correctly match the number on the left to the message listed on the right.

5
2
1
0

Hours or more of physical activity
Sugary drinks, more water and low fat milk
Hours or less of recreational screen time
Fruits and vegetables every day

4. In the past week, how many servings of fruits or vegetables did you have a day? *One serving is most easily identified by the size of the palm of your hand.*

- 0 1 2 3 4 5 or more

5. In the past week, how many times did you eat dinner at the table together with your family? Check one number.

- 0 1 2 3 4 5 6 7

6. In the past week, how many times did you eat breakfast? Check one number.

- 0 1 2 3 4 5 6 7

7. In the past week, how much recreational (*outside of school work*) screen time did you have daily?

_____ Hours

8. Is there a television set or Internet-connected device in your bedroom? Check one response.

- Yes No

If you marked yes, please circle all of the devices that apply.

Television	Tablet (ex. iPad)	Gaming system (X-box)
Cell phone	Other (please list):	

9. In the past week, how many hours did you sleep each night?

_____Hours

10. In the past week, how much time a day did you spend being active? (*faster breathing/heart rate or sweating*)

_____Minutes

11. In the past week, how many glasses of the following did you drink a day?

Fruit Juice _____	Water _____
Sports Drink _____	Whole Milk _____
Soda/Pop, Lemonade, or Punch _____	Chocolate Milk _____
Skim, 1%, or 2% Milk _____	

Directions for the next section: We are interested in your “self-efficacy.” Self-efficacy is more than simply believing in yourself. It is believing you can actually do a task or handle a situation.

I will eat healthy food even when my friends eat food that is not healthy.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will eat healthy foods when I eat out with my family.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will eat at least 4 servings of vegetables every day.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will eat at least 3 servings of fruits every day.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will <u>not</u> drink soda pop more than one time a week.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will be physically active even when my friends choose to sit still and hang out.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will be physically active for 60 minutes every day.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will go to sleep at the same time every night.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will use electronics for two hours or less during my free time.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.

I will ask someone in my family to buy my favorite fruit or vegetable.

There is no way I can do this.

This could be hard for me.

I believe I can do this.

I will ask someone in my family to serve my favorite fruit or vegetable at dinner

There is no way I can do this.

This could be hard for me.

I believe I can do this.

Post-Survey
5-2-1-0 Bingo on the Go!

- You are being asked to answer this survey to help us learn if any of your thoughts about being healthy have changed and if you liked the 6-week Bingo game.
- Your parent's were asked if it was okay for you to do this survey. They haven't told us no, but if you decide you don't want to do this survey that is okay. You may also skip any question that you do not want to answer.
- Your name is on this survey so we can match this with the one from the beginning. We won't share your answers with your parents, teachers or anyone else.

For each question choose the answer that best fits you. Please tell the truth.

1. Draw a line to correctly match the number on the left to the message listed on the right.

5
2
1
0

Hours or more of physical activity
Sugary drinks, more water and low fat milk
Hours or less of recreational screen time
Fruits and vegetables every day

2. In the past week, how many servings of fruits or vegetables did you have a day? *One serving is most easily identified by the size of the palm of your hand.*

0 1 2 3 4 5 or more

3. In the past week, how many times did you eat dinner at the table together with your family? Check one number.

0 1 2 3 4 5 6 7

4. In the past week, how many times did you eat breakfast? Check one number.

0 1 2 3 4 5 6 7

5. In the last week, how much recreational (*outside of school work*) screen time did you have daily?

_____ Hours

6. Is there a television set or Internet-connected device in your bedroom? Check one response.

Yes No

If you marked yes, please circle all of the devices that apply.

Television	Tablet (ex. iPad)	Gaming system (X-box)
Cell phone	Other (please list):	

7. In the past week, how many hours did you sleep each night?

_____ Hours

8. In the past week, how much time a day did you spend being active? (*faster breathing/heart rate or sweating*)

_____ Minutes

9. In the past week, how many glasses of the following did you drink a day?

Fruit Juice _____	Water _____
Sports Drink _____	Whole Milk _____
Soda/Pop, Lemonade, or Punch _____	Chocolate Milk _____
Skim, 1%, or 2% Milk _____	

Directions for the next section: We are interested in your "self-efficacy." Self-efficacy is more than simply believing in yourself. It is believing you can actually do a task or handle a situation. Choose one response for each statement.

I will eat healthy food even when my friends eat food that is not healthy.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will eat healthy foods when I eat out with my family.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will eat at least 4 servings of vegetables every day.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will eat at least 3 servings of fruits every day.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will <u>not</u> drink soda pop more than one time a week.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will be physically active even when my friends choose to sit still and hang out.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will be physically active for 60 minutes every day.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will go to sleep at the same time every night.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.

I will use electronics for two hours or less during my free time.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will ask someone in my family to buy my favorite fruit or vegetable.	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.
I will ask someone in my family to serve my favorite fruit or vegetable at dinner	<input type="checkbox"/> There is no way I can do this.	<input type="checkbox"/> This could be hard for me.	<input type="checkbox"/> I believe I can do this.

10. Your school posted signs about the 5-2-1-0 healthy behaviors. Which spots in your school do you remember seeing the 5-2-1-0 posters? Circle all that apply.

Bathrooms	Stairs	Library	Classroom
Drinks station in the lunch room	Gym	By my locker	Computer Labs
Lunch Room	Playground	Drinking fountains	Doors heading outside

11. How often did you read the signs? Check one response.

- Not at all Somewhat often Very often

12. How much do you feel you have changed your behavior because of the signs placed around the school? Check one response.

- Not at all Somewhat Very much

Please choose one response for each statement. Be honest with your answers.


I feel the Bingo game was easy to play.	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not agree or disagree	<input type="checkbox"/> Agree
I enjoyed the program incentives (water bottle and drawstring bag).	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not agree or disagree	<input type="checkbox"/> Agree
I tried to complete one line of Bingo activities each week of the program.	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not agree or disagree	<input type="checkbox"/> Agree
I feel the videos shown in class were helpful.	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not agree or disagree	<input type="checkbox"/> Agree
I tried harder because I wanted to win the grand prize.	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not agree or disagree	<input type="checkbox"/> Agree

APPENDIX D

HEALTHY EATING AND PHYSICAL ACTIVITY SELF-EFFICACY

QUESTIONNAIRE FOR CHILDREN

Psychometric testing of the healthy eating and physical activity self-efficacy questionnaire and the healthy eating and physical activity behavior recall questionnaire for children

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Abstract

Purpose: The purpose of this study was to develop and assess the psychometric properties for two related questionnaires: the Healthy Eating and Physical Activity Self-Efficacy Questionnaire for Children (HEPASEQ-C) and the Healthy Eating and Physical Activity Behavior Recall Questionnaire for Children (HEPABRQ-C).

Design and Methods: HEPASEQ-C and HEPABRQ-C were administered to 517 participating children with 492 completing. Data were analyzed to evaluate for reliability and validity of the questionnaires.

Results: Content validity was established through a 10-person expert panel. For the HEPASEQ-C, item content validity index (CVI) ranged from 0.80 to 1.00. The CVI for the total questionnaire was 1.0. All HEPASEQ-C items loaded on a single factor. Cronbach's alpha was deemed acceptable (.749). For the HEPABRQ-C, item CVI ranged from 0.88 to 1.00. CVI for the total questionnaire was 1.0. Pearson product moment correlation between HEPASEQ-C and HEPABRQ-C scores was significant ($r = .501, p = .000$).

Practice Implications: The HEPASEQ-C and HEPABRQ-C are easily administered and provide helpful insights into children's self-efficacy and behavior recall. They are easy to use and applicable for upper elementary school settings, in clinical settings for individual patients, and in health promotion settings.

KEYWORDS

child-centered, children, instrument, instrument development, nutrition, physical activity, psychometric testing, questionnaire, self-efficacy

1 | INTRODUCTION

Recently a major focus of school-based health promotion efforts has been on preventing childhood obesity. This focus is justified given that 17% of children between the ages 2 and 19 in the United States are obese (Centers for Disease Control and Prevention, 2017), and physical activity and dietary patterns are imprinted during their school-age years (Ides, McMullen, Halder, & Sharma, 2014). However, knowledge of healthy lifestyles, on its own, does not readily translate into healthy behavior patterns. Self-efficacy is a psychosocial determinant of health, which helps translate knowledge into healthy behavior patterns (Bandelli, Lee Gray, Paul, Contento, & Koch, 2016; Elmore, & Sharma, 2014). Self-efficacy is the confidence or belief in

one's own ability to engage in a desired behavior and overcome barriers to that behavior (Bandura, 1997). Consistent with Bandura's (1998) social cognitive theory, some school-based interventions aim to improve children's knowledge as well as their self-efficacy related to healthy eating and physical activity. By doing so, they anticipate improved patterns of healthy behaviors (Bandelli et al., 2016; Elmore & Sharma, 2014). Researchers hypothesize that improved behaviors ultimately will translate into a reduced prevalence of childhood obesity.

Bandura's (1998) social cognitive theory provided the framework for our school-based intervention. We hoped to improve children's self-efficacy through hands-on learning activities, mastery experiences, and social modeling. However, we faced a hurdle when we were unable

to locate a tool designed with and for children to measure their self-efficacy related to healthy eating and physical activity. We also wanted an assessment that could be completed in a short amount of time, preferably in about 10 min to minimize participant burden.

We were keenly aware of the National Institutes of Health's initiative, *No More Hand-Me-Down Research*, which primarily focuses on improving the clinical care of children by developing tools, treatments, medications, and devices specific to children through engagement of children in research (National Institutes of Health, 1998; 2015; National Institutes of Health, National Heart, Lung, and Blood Institute, 2015). With this awareness, we devised a research plan to directly engage children in the development of a self-efficacy questionnaire and a corresponding behavior recall questionnaire. Through five focus groups with different children, we developed and refined the Healthy Eating and Physical Activity Self-Efficacy Questionnaire for Children (HEPASEQ-C) and the corresponding Healthy Eating and Physical Activity Behavior Recall Questionnaire for Children (HEPABRQ-C). The purpose of this study was to further develop and assess the psychometric properties of the HEPASEQ-C and HEPABRQ-C.

2 | METHODS

2.1 | Procedure

2.1.1 | Ethical considerations

Our university's institutional review board approved this study. To protect participants' identities, we did not collect identifying information. Participants were not compensated for their time.

2.1.2 | Recruitment, consent, and assent

Any child in fourth, fifth, or sixth grade participating in a 7-week, school-based intervention called "Anatomy Academy" was eligible to participate in this study. Children in grades four through six have had basic education about what constitutes healthy eating and activity; thus, we did not provide a definition of "healthy" foods in the questionnaires. Anatomy Academy was designed to add to children's basic knowledge of how anatomy and physiology principles relate to their patterns of eating and physical activity along with how to establish healthy patterns of eating and physical activity. Several days prior to the beginning of Anatomy Academy, a packet of information about the study was sent home. The packet included a cover letter with the research team's contact information and an explanation of the study, two copies of the "Parental Permission for a Minor," and two copies of the "Child Assent." Children who returned a completed and signed set of consent and assent forms were eligible to participate. Completed forms were securely stored in a research team member's office.

Expert opinions vary over the sample size needed for factor analysis studies (Pett, Lackey, & Sullivan, 2003). A minimum recommended number is generally 10 participants per initial instrument item with a larger number of participants considered more desirable (Pett et al,

TABLE 1 Demographic characteristics

	Characteristic	N(%)	
Age	Mean (SD)	10.6 (0.86)	
	9 years	54 (10.4)	
	10 years	129 (25.0)	
	11 years	226 (43.7)	
	12 years	59 (11.4)	
	13 years	2 (0.4)	
	Missing	47 (9.1)	
	Total	517	
Race	White	256 (49.5)	
	Latino	84 (16.2)	
	Native American	24 (4.6)	
	Pacific Islander	22 (4.3)	
	Asian	10 (1.9)	
	African American	7 (1.4)	
	Other	51 (9.9)	
	Missing	63 (12.2)	
		Total	517

2003). The large number of participants who completed the questionnaires is a strength of this study.

2.1.3 | Data collection

The two questionnaires with clearly written instructions were administered electronically through Qualtrics (2013). Each child was assigned a code using a random number generator. On the first day of Anatomy Academy, participants entered their code numbers and then most completed the questionnaires in 4–12 min. Research assistants were on hand to provide instruction and help with technical difficulties.

2.1.4 | Setting

Data were collected in computer laboratories and classrooms from 30 cohorts of fourth, fifth, and sixth graders in 12 schools in California and Utah. The schools represented a diversity of ethnicities and socioeconomic backgrounds, including a charter school primarily for Pacific Islander and Hispanic children and Title-1 schools, which receive federal funding for supplemental services due to their students'/neighborhoods' high levels of poverty (Salt Lake City School District, 2017).

2.1.5 | Sample description

Descriptive statistics for demographic variables are reported in Table 1. Five hundred seventeen children participated, and 492 of them completed data collection. The average age for the 517 participating children was 10.6 (SD = 0.86) years. About half of them reported being White (256 (49.5%)).

2.2 | Questionnaires

2.2.1 | Item development

The earliest version of our items were adapted with permission from Decker's (2012) questionnaire evaluating parents' self-efficacy related to enacting healthy eating and activity behaviors in their children. Decker's (2012) original 35 items were based on USDA guidelines for healthy eating and physical activity. After simplifying the original language to ensure it was appropriate for school age children, five focus groups were conducted with children, as our future "end users," to further refine the items and establish face validity and understandability, as well as provide additional input and clarification. Based on the children's input, we changed the item format from questions to statements because the children indicated statements were easier to understand (Lassetter, Ray, Driessnack, & Williams, 2015).

Then collaborating with an expert in the development of research questionnaires for children (author #4), we recognized a need to reduce the number of items from Decker's (2012) original 35 as well as change the response options from a 10-point Likert-type scale to three options in the HEPASEQ-C. Although we reduced the number of items from 35 to 19, the original content domains were retained. While the reduction in response options diminished the ability to discriminate, having three response options was age appropriate and easier for the children to understand. The final versions of the questionnaires had Flesch-Kincaid grade levels of 1.8 for the HEPASEQ-C and 4.0 for the HEPABRQ-C (Lassetter et al., 2015).

Theoretically, it was important to assess whether the participants' self-efficacy was correlated with the children's self-reported behaviors. Originally the self-efficacy and behavior recall items were together in one questionnaire; however, the children told us it was confusing to have the self-efficacy and behavior recall items together. They suggested separating them to make them easier for children to follow and complete (Lassetter et al., 2015). Finally, we worried that children might respond to the behavior questions the way they thought we wanted them to rather than with an honest recall of their behavior. When we asked our focus groups about this concern, the children's answer was simply to ask participants right upfront to "Please tell the truth." Then, they told us, children will be honest (Lassetter et al., 2015).

2.2.2 | Healthy eating and physical activity self-efficacy questionnaire for children

HEPASEQ-C consists of nine items with response options on a 3-point Likert-type scale (1 = There is no way I can do this, 2 = This could be hard for me, 3 = I believe I can do this). Seven items focus on self-efficacy related to healthy eating. For example, one item says, "I will eat healthy food even when my friends eat food that is not healthy." See Figure 1 for the complete HEPASEQ-C.

2.2.3 | Healthy eating and physical activity behavior recall questionnaire for children

The HEPABRQ-C consists of 10 items, two of which are in an open-response format allowing children to write the actual foods they ate.

For example, one of these two items states, "The last time I ate a snack at a friend's house, I ate _____." The other eight items include two yes/no items, and the remaining six items had response options that were presented using an ordinal scale. See Figure 2 for the complete HEPABRQ-C.

2.3 | Data analysis

Data were entered into Qualtrics (2013) online survey software and then exported to SPSS version 22 for analysis (IBM Corporation, 2013). Accuracy of the data was assessed by checking for outliers and anomalous values using appropriate descriptive statistics and graphs before further analysis.

Content validity assessment was based on Lynn's (1986) process. Our panel of 10 content experts included four dietitians who teach at a university, three dietitians who practice at a large children's hospital, and three pediatric nurse educators who teach at a university. Their educational level included five experts with Ph.D.s and five master's-prepared experts. Their years of experience ranged from 9 to 37 years ($M = 17$ years), and years in their current role ranged from 3 to 19 years ($M = 7$ years). The experts rated all items in both questionnaires using a 4-point rating scale (4 = very relevant and succinct, 3 = relevant but needs minor revision, 2 = unable to assess relevance, 1 = not relevant). They were asked to provide suggestions for revision and to identify any areas omitted from the questionnaire that should be included.

The index of content validity (CVI) was determined for each item as well as both questionnaires. The CVI for each item was determined by the proportion of experts who rated it as content valid (a rating of 3 or 4), and the CVI for the entire questionnaire is the proportion of total items judged content valid. According to Lynn (1986), the minimal acceptable CVI for items is based on the number of experts. In this study, 10 experts were used. Lynn (1986) indicates that 8 of the 10 experts' endorsements are required to establish content validity beyond the .05 level of significance.

Construct validity of the HEPASEQ-C was assessed by exploratory factor analysis using steps described by Pett and colleagues (2003). This was appropriate because attitudes and beliefs, such as those associated with self-efficacy, conform to the theoretical underpinnings of exploratory factor analysis (Bollen & Bauldry, 2011). Reliability of the HEPASEQ-C was assessed by calculating Cronbach's alpha.

The HEPABRQ-C was assessed by concurrent validity. HEPABRQ-C includes clinically relevant behavior patterns that may not be closely related. In such cases, exploratory factor analysis and internal consistency are inappropriate (Bollen & Bauldry, 2011; Fayers & Hand, 1997, 2002; Juniper, Guyatt, Streiner, & King, 1997; Streiner, 2003a, 2003b). Thus, neither exploratory factor analysis nor calculation of Cronbach's alpha was done for the HEPABRQ-C.

3 | RESULTS

Five hundred seventeen children started the electronic questionnaires, and 492 (95.2%) responded to all of the questions. Over half

Healthy Eating and Physical Activity Self-Efficacy Questionnaire for Children

We are interested in your self-efficacy. Self-efficacy is more than simply believing in yourself. It is believing you can actually do a task or handle a situation.

Directions: Click the answer that best fits you. Please tell the truth.

1. I will say no when my friends offer me junk food or food that is not healthy.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
2. I will eat healthy food even when my friends eat food that is not healthy.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
3. I will eat healthy foods when I eat out with my family.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
4. I will eat at least 4 servings of vegetables every day.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
5. I will eat at least 3 servings of fruits every day.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
6. I will eat or drink 3 servings of milk, cheese, yogurt, or cottage cheese every day.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
7. I will not drink soda pop more than one time a week.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
8. I will be physically active even when my friends choose to sit still and hang out.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.
9. I will be physically active for 60 minutes every day.
 - There is no way I can do this.
 - This could be hard for me.
 - I believe I can do this.

FIGURE 1 Healthy eating and physical activity self-efficacy questionnaire for children

(53.4%) of the participants completed the questionnaires in 4 min or less, with 95% of participants completing them in 12 min or less. About half of the participating children reported being white, and the other half reported diverse racial backgrounds.

3.1 | Content validity for HEPASEQ-C and HEPABRQ-C

For the HEPASEQ-C, the item CVI ranged from 0.80 to 1.00, indicating all items were judged content valid. The CVI for the total questionnaire

was 1.00. For the HEPABRQ-C, item CVI ranged from 0.88 to 1.00. The CVI for the total questionnaire was 1.0. Comments of the experts were reviewed for both questionnaires, and no changes on the items were needed.

3.2 | Construct validity and reliability for HEPASEQ-C

All self-efficacy item means and standard deviations were at the upper range of the scale, indicating greater self-efficacy (Table 2).

Healthy Eating and Physical Activity Behavior Recall Questionnaire for Children

Directions: Click the answer that best fits you. Please tell the truth.

1. The last time I ate a snack at a friend's house, it was a healthy snack.
 - Yes
 - No
2. The last time I ate a snack at a friend's house, I ate _____
3. The last time I ate out with my family, I chose a healthy option.
 - Yes
 - No
4. The last time I ate out with my family, I ate _____
5. Yesterday I ate ___ servings of vegetables.
 - 0
 - 1
 - 2
 - 3
 - 4 or more
6. Yesterday I ate ___ colors of vegetables
 - 0
 - 1
 - 2
 - 3 or more
7. Yesterday I ate ___ servings of fruit.
 - 0
 - 1
 - 2
 - 3 or more
8. Yesterday I ate or drank ___ servings of milk, cheese, yogurt, or cottage cheese.
 - 0
 - 1
 - 2
 - 3 or more
9. In the last 3 days I drank ___ soda pop.
 - 0
 - 1
 - 2
 - 3 or more
10. Yesterday I was physically active for ___ minutes.
 - 0
 - 15
 - 30
 - 60 or more

Thank you for answering our questions.

FIGURE 2 Healthy eating and physical activity behavior recall questionnaire for children

Interitem correlations were reviewed to assess for extremely high or low values. No correlations between items were deemed too high (>0.8); however, correlations between item six (about dairy consumption) and other items were somewhat low (≤ 0.3), indicating potential issues. Bartlett's Test of Sphericity was significant ($\chi^2 = 735.6$, $df = 36$, $p = .000$), indicating the correlation was not an identity

matrix and, accordingly, was able to be factored. The Kaiser-Meyer-Olkin test, which tests overall sampling adequacy, was deemed adequate ($KMO = .809$) to proceed with factor analysis (Pett et al, 2003). Individual measures of sampling adequacy (MSAs), reported in Table 2, ranged from .76 to .84 also indicating adequacy to proceed.

TABLE 2 Self-efficacy item descriptive statistics

Item	Mean (SD)	MSA ^a
1. I will say no when my friends offer me junk food or food that is not healthy.	2.4 (.68)	.81
2. I will eat healthy food even when my friends eat food that is not healthy.	2.5 (.62)	.83
3. I will eat healthy foods when I eat out with my family.	2.5 (.66)	.79
4. I will eat at least 4 servings of vegetables every day.	2.4 (.70)	.84
5. I will eat at least 3 servings of fruits every day.	2.8 (.49)	.82
6. I will eat or drink 3 servings of milk, cheese, yogurt, or cottage cheese every day.	2.7 (.59)	.80
7. I will not drink soda pop more than one time a week.	2.5 (.71)	.83
8. I will be physically active even when my friends choose to sit still and hang out.	2.6 (.61)	.76
9. I will be physically active for 60 minutes every day.	2.7 (.58)	.79

SD, standard deviation.

^aIndividual measures of sampling adequacy.

TABLE 3 Factor loadings with principal axis factoring and quartermax rotation

Item	Two factor solution		One factor solution
	1	2	1
1	.564 ^a	.403	.568
2	.542 ^a	.248	.560
3	.503 ^a	-.007	.506
4	.557 ^a	.052	.570
5	.482 ^a	-.010	.487
6	.305 ^a	-.088	.297
7	.486 ^a	.220	.503
8	.573 ^a	-.301	.512
9	.526 ^a	-.188	.496

^aHighest loading factor.

Principal Axis Factoring (PAF) was used for factor extraction because it uses shared variance and emphasizes the latent construct over total variance (Pett et al., 2003). Initial factor extraction using an eigenvalue of greater than 1 as a cutoff indicated a two-factor solution. Different rotations were then examined to clarify factor loadings and theoretical utility. Both orthogonal and oblique factor rotations were attempted; however, oblique rotation solutions resulted in high correlations (>0.3) between factors and did little to help items load strongly on a single factor. Pett and colleagues (2003) noted, "Factors with correlations that are too high should be rejected because they are undoubtedly measuring the same construct" (p. 164). A quartermax rotation was then performed to assess factor loadings with orthogonal rotation, with the assumption a general factor may be present, as evidenced by high factor correlations with oblique rotations. Item loadings under the two-factor solution are reported in Table 3. All items loaded the highest on factor 1, so factor loadings were then recalculated using a single factor solution. All items, except item six, loaded above a cutoff value (.4). While item six loaded highest on factor 1, the loading was still considered very low (.305). Due to low factor loadings, we considered dropping item six from the questionnaire; however, we opted to retain the item in interest of theoretical completeness. Final factor loadings for the one-factor solution with PAF are also reported in Table 3.

Internal consistency, or reliability, was assessed for HEPASEQ-C. Cronbach's alpha was deemed acceptable with a value of .749. Item-total correlations then were reviewed. All items, except item six, were moderately correlated with the total ($r = .422-.481$). As expected, item six demonstrated a low item-total correlation ($r = .257$). Retaining item six did not significantly lower the Cronbach's alpha, so the final decision was made to retain item six as an important component of healthy eating. A summary score ($M = 23.1, SD = 3.3$) for the questionnaire was calculated by summing the nine individual items. Total scores ranged from a low of 9 to a high of 27 with the distribution for the overall score negatively skewed (more students reporting higher self-efficacy).

3.3 | Concurrent validity for HEPABRQ-C

Descriptive statistics for the quantitative recall items are reported in Table 4. Response format for these items vary, with open-response format for items two and four, allowing researchers and clinicians to assess children's understanding of healthy eating in multiple ways. The summary score was calculated by summing the seven healthy eating and activity items and the reverse-coded "soda pop" item (#9). The summary score ($M = 12.7, SD = 4.3$) ranged from 1 to 21. Recall questionnaire items corresponded with self-efficacy questionnaire items and allowed for comparison between self-efficacy and self-reported behaviors. The Pearson product moment correlation between self-efficacy and recall was significant ($r = .501, p = .000$) with children with higher self-efficacy scores reporting more healthy behaviors. The nonparametric Spearman's rho yielded a similar result ($\rho = .453, p = .000$).

4 | DISCUSSION

Development of the HEPASEQ-C and HEPABRQ-C fill an important gap in child health and behavior research by providing researchers and clinicians with tools that demonstrate acceptable face, content, construct, and concurrent validity, as well as acceptable internal consistency. The sequential steps taken in developing the HEPASEQ-C and HEPABRQ-C were essential for establishing reliable and valid questionnaires for

TABLE 4 Recall item descriptive statistics

Item	Response format	Mean (SD)
1. The last time I ate a snack at a friend's house, it was a healthy snack.	0 = "no," 1 = "yes"	.55 (.50)
2. The last time I ate a snack at a friend's house, I ate _____.	Open ended	N/A
3. The last time I ate out with my family, I chose a healthy option.	0 = "no," 1 = "yes"	.52 (.50)
4. The last time I ate out with my family, I ate _____.	Open ended	N/A
5. Yesterday I ate ___ servings of vegetables.	0 = "0," 1 = "1," 2 = "2," 3 = "3," 4 = "4 or more"	1.9 (1.3)
6. Yesterday I ate ___ colors of vegetables.	0 = "0," 1 = "1," 2 = "2," 3 = "3 or more"	1.6 (1.0)
7. Yesterday I ate ___ servings of fruit.	0 = "0," 1 = "1," 2 = "2," 3 = "3 or more"	1.8 (1.0)
8. Yesterday I ate or drank ___ servings of milk, cheese, yogurt, or cottage cheese.	0 = "0," 1 = "1," 2 = "2," 3 = "3 or more"	1.7 (.96)
9. In the last 3 days I drank ___ soda pop.	0 = "0," 1 = "1," 2 = "2," 3 = "3 or more" (reverse code for scoring)	2.2 (1.0)
10. Yesterday I was physically active for ___ minutes.	0 = "0," 1 = "15," 2 = "30," 3 = "60 or more"	2.3 (.91)
Total	Minimum = 0, maximum = 21	12.7 (4.3)

SD, standard deviation.

children. Perhaps most important was to involve children during questionnaire development and testing. Failure to do this may result in a tool that is inappropriate to use with children due to the potential for them to misunderstand the concepts, words, instructions, and/or format, which will then produce flawed results.

Validity is a key concern when considering questionnaires for use in health care and healthcare research (American Educational Research Association [AERA], American Psychological Association [APA], & National Council on Measurement in Education [NCME], 2014; Streiner & Norman, 2003). One aspect of validity is the adequacy of the test content in representing the domain of interest (AERA et al., 2014). Additionally, our sample is racially diverse, strengthening its reliability and validity in other populations. Content validity for both questionnaires was assessed and deemed adequate by content experts. Other validity evaluations performed in this study were driven by the theoretical underpinnings of our two questionnaires.

When developing a tool to measure a psychometric construct, such as self-efficacy, it is important to report the theoretical underpinning for selection of various methods to assess reliability and validity. For example, when establishing validity from a proposed unified construct, it is important to assess the internal structure and relationships between items proposed to measure that construct (AERA et al., 2014). Exploratory factor analysis was used to examine construct validity of HEPASEQ-C. Bollen and Bauldry (2011) suggest that attitudes and beliefs, such as those associated with the construct of self-efficacy, tend to conform to theoretical underpinnings of exploratory factor analysis. The HEPASEQ-C items were found to belong to a single factor and demonstrated internal consistency above 0.7, which is considered acceptable.

Exploratory factor analysis and metrics, like internal consistency, may not be appropriate or necessary for evaluating all collections of measurement items, particularly when items may not be closely related but are considered clinically useful (Bollen & Bauldry, 2011; Fayers & Hand, 1997, 2002; Juniper et al., 1997; Streiner, 2003a, 2003b). Such is the case with HEPABRQ-C, which includes clinically relevant behavior patterns.

Therefore, the validity of the scores derived from the HEPABRQ-C was not evaluated using exploratory factor analysis and internal consistency; however, other validity assessments were performed. Content validity scores from HEPABRQ-C were assessed and determined to be good. Validity evidence for such test scores may also be provided by examining the relationships of test scores with other variables (AERA et al., 2014). Convergent evidence examines the relationship between test scores and scores from other variables intended to measure similar constructs (AERA et al., 2014). We examined the HEPABRQ-C score evaluating healthy behaviors and the HEPASEQ-C score for healthy eating and activity self-efficacy and found a positive relationship that was also statistically significant, providing convergent evidence between self-efficacy and behavior.

Although HEPASEQ-C and HEPABRQ-C show acceptable reliability and validity, additional psychometric testing is needed. Cross validation studies are needed representing more racial and ethnic groups, varying socioeconomic levels, and related educational factors. For example, using the questionnaires in a school setting with a significant portion African American children would be helpful in further assessing reliability and validity. Further investigation is needed to determine the relationship of healthy eating and physical activity self-efficacy and behavior recall. Additionally, longitudinal studies should be conducted to determine the predictive validity of the two questionnaires in determining the rates of obesity. Finally, controlled intervention studies should be conducted to assess the questionnaires' sensitivity to change in self-efficacy and behavior recall based on health promotion programs focusing on healthy eating and physical activity. Many children had high self-efficacy scores. This may indicate that many children feel capable of making good eating choices. However, it leaves little room to measure improvements in self-efficacy. During instrument development, we reduced the response options from 10 to 3 on the HEPASEQ-C, which limits the potential variability as well as sensitivity to change; however, this compromise was intentional to tailor this instrument for usability with children. Ceiling effects may be a limitation of the current version of the instrument.

5 | HOW MIGHT THIS INFORMATION AFFECT NURSING PRACTICE?

Nearly one in five children in the United States is obese (Centers for Disease Control and Prevention, 2017), causing some to refer to childhood obesity as an epidemic. While interventions aimed at reversing this unhealthy trend can be developed, they are not able to be refined and/or evaluated without reliable and valid questionnaires to assess children's self-efficacy and/or recall of healthy eating and physical activity. This study shares the initial development and psychometric evaluation of two questionnaires that measure these concepts. Children's input during questionnaire development helped establish reliability and validity by assuring wording and formatting were understandable to children. Our experience reiterates the need to involve children in developing questionnaires, rather than simply adapting questionnaires developed with and for adults. The HEPASEQ-C and HEPABRQ-C are easily administered and provide helpful insights into children's self-efficacy and behavior recall. They are easy to use and applicable for upper elementary school settings, in clinical settings for individual patients, and in health promotion settings.

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CONFLICT OF INTEREST

The authors report no actual or potential conflicts of interests.

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APPENDIX E

HEALTHY HABITS QUESTIONNAIRE

We are interested in the health and well-being of all our patients. Please take a moment to answer these questions.



5210 Healthy Habits Questionnaire ages 10+

Your Name: _____

Age: _____ Today's Date: _____

1. How many servings of fruits or vegetables do you have a day? _____
One serving is most easily identified by the size of the palm of your hand.
2. How many times a week do you eat dinner at the table together with your family? _____
3. How many times a week do you eat breakfast? _____
4. How many times a week do you eat takeout or fast food? _____
5. How much recreational (*outside of school work*) screen time do you have daily? _____
6. Is there a television set or Internet-connected device in your bedroom? _____
7. How many hours do you sleep each night? _____
8. How much time a day do you spend being active? _____
(faster breathing/heart rate or sweating)?
9. How many 8-ounce servings of the following do you drink a day?

100% juice _____	Whole milk _____
Water _____	Soda or punch _____
Fruit or sports drinks _____	Nonfat (skim), low-fat (1%), or reduced-fat (2%) milk _____
10. Based on your answers, is there ONE thing you would be interested in changing now? Please check one box.
 - Eat more fruits and vegetables.
 - Eat less fast food/takeout.
 - Drink less soda, juice, or punch.
 - Drink more water.
 - Spend less time watching TV/movies and playing video/computer games.
 - Take the TV out of the bedroom.
 - Be more active – get more exercise.
 - Get more sleep.

Please give the completed form to your clinician. **thank you!**

APPENDIX F

RESEARCH APPROVAL FROM THE UNIVERSITY OF WISCONSIN-LA CROSSE,
GUNDERSEN HEALTH SYSTEM, AND THE SCHOOL DISTRICT OF LA CROSSE

UNIVERSITY of WISCONSIN
LA CROSSE

To: Rachel King

From: Bart Van Voorhis, Coordinator
Institutional Review Board (IRB) for the
Protection of Human Subjects
bvanvoorhis@uwlax.edu
5-6892

Date: April 27, 2018

Re: RESEARCH PROTOCOL SUBMITTED TO IRB

The IRB Committee has reviewed your proposed research project: *"The Impact of a Healthy Living Challenge and Point of Decision Prompts on Health Behavior and Self-Efficacy Levels Among Elementary-Aged Students."*

Because your research protocol will place human subjects at minimal risk, it has been approved under the expedited review category in accordance with 45CFR46, 46.110(a)(b). In addition, a waiver of signed parental consent has been granted in accordance with 46.117(c)(1)(2).

Since you are not seeking federal funding for this research, the review process is complete and you may proceed with your project. Remember to provide participants a copy of the consent form and to keep a copy for your records. Consent documentation and IRB records should be retained for at least 3 years after completion of the project.

Please note that this approval is for a one year period only, from the date of this letter. If the project continues for more than 12 months, an IRB renewal must be requested using Attachment C on the IRB website. Please submit Attachment C one month prior to the date on this letter. Continued data collection beyond this date will place your project in non-compliance. The IRB is required to report instances of noncompliance to the Federal Office of Human Research Protections.

Good luck with your project!



cc: IRB File

GUNDERSEN HEALTH SYSTEM®

DATE: 3 / 29 / 2018

Rachel King
Brenda Rooney, Ph.D.
Gundersen Clinic, Ltd.
La Crosse, WI 54601

Dear Ms. King and Dr. Rooney,

The Human Subjects Committee using the expedited review process gave approval for the following protocol on (Date) 3 / 29 / 2018. A progress report for this study will be due in one year.

2-18-03-011 THE IMPACT OF A HEALTHY LIVING CHALLENGE AND POINT OF DECISION PROMPTS ON HEALTH BEHAVIOR AND SELF-EFFICACY LEVELS AMONG ELEMENTARY-AGEND STUDENTS

As mandated by federal guidelines, we remind you of the following requirements:

- a. That the researcher report any proposed changes in the research and any unanticipated problems involving risks to the subjects or others promptly to the Committee;
- b. That the researcher promptly report any such problems, including adverse reactions to biological drugs, radioisotope labeled drugs, or to medical devices to the Department of Health and Human Services and/or other participating agencies or organizations; and
- c. That the researcher report to the Committee concerning approved research no less than annually and in addition on the termination of the research project.

We wish you success in your work. If you have further questions, please feel free to contact me.

Sincerely,



Thomas Harter, Ph.D.
Chair, Human Subjects Committee/IRB

Gundersen Lutheran Medical Center, Inc. | Gundersen Clinic, Ltd.

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School District of La Crosse, 807 East Avenue South, La Crosse, WI 54601

Phone: (608) 789-7664 FAX: (608) 789-7093 Email: mlichuck@lacrosseed.org

May 25, 2018

Rachel King
304 Larch Avenue
Onalaska, WI 54650

Dear Ms. King,

Thank you for your recent proposal, **"The Impact of a Healthy Living Challenge and Point-of-Decision Prompts on Health Behavior and Self-Efficacy Levels Among Elementary-Aged Students."** The School District of La Crosse's Research and Development Committee reviewed and approved your proposal on May 25, 2018.

You indicated the completion of your project would be September 30, 2018 and final results will be shared with the involved schools and the Research & Development Committee by December 31, 2018. Please contact me so we can set up a time for you to present your findings.

Also, know that the Research and Development Committee must approve any publication of the results of your data collection and research in advance.

Should you have any questions concerning this letter, please do not hesitate to give me a call at (608) 789-7664.

Respectfully,

Dr. Michael Lichucki
Chair, Research and Development

APPENDIX G

5-2-1-0 BINGO ON THE GO! PROPOSED BUDGET

Budget for 5-2-1-0 Pilot Program

Budget Item	Quantity	Individual Cost	Group Cost
Water Bottle (two-sided print)	200	\$0.82	\$164.00
Drawstring Backpack	100	\$3.50	\$350.00
Frisbee	250	\$0.89	\$222.50
Magnets	500	\$0.25	\$125.00
Prize Drawing-Jump Start Adventure Park	8	\$28.50	\$228.00
Prize Drawing-Shenanigan's	4	\$35.00	\$140.00
Prize Drawing-Subway gift certificate	10	\$20.00	\$200.00
Printing-registration and parental consent forms	150	in-kind	\$0.00
Printing-Bingo cards	400	in-kind	\$0.00
Printing-Pre and post survey	150	in-kind	\$0.00
Printing-POD prompt posters	30	in-kind	\$0.00
		TOTAL	\$1,429.50

*Total Cost Requested from Gundersen Medical Foundation