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A Feasible and Tailored Nutrition Education Intervention for Middle-Schoolers: Coordination with School Nutrition Program and Preliminary Outcomes.

Heidi Karner
heidi.karner@uconn.edu

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A Feasible and Tailored Nutrition Education Intervention for Middle-Schoolers: Coordination with School Nutrition Program and Preliminary Outcomes.

Heidi Elise Karner, RDN, LDN
B.S., University of Connecticut, 2017

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2019
A Feasible and Tailored Nutrition Education Intervention for Middle-Schoolers: Coordination with School Nutrition Program and Preliminary Outcomes.

Presented by

Heidi E. Karner, BS, RDN, LDN

Major Advisor
Valerie B. Duffy, PhD, RD

Associate Advisor
Tina F. Dugdale, MS, RDN, RN, CD-N

Associate Advisor
Ellen Shanley, MBA, RD, CDN, FAND

Associate Advisor
Carolyn Lin, PhD

University of Connecticut

2019
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It is very important that I also thank Jim Palma, Sarah Santora and the entire Foodshare team who believed in our project enough to fund it through the Partnership Program Grant! Without the support from Foodshare’s Hunger Action Team in Windsor, none of this research could have been accomplished. I can’t even begin to tell you how much I appreciate your patience, understanding, advice, brainstorming, and tireless efforts to make this project a reality!

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I am so incredibly grateful to have had this opportunity to learn and grow with all of you. UConn has been my home for the last seven years, and I am so blessed that I was able to receive two degrees from this fantastic university.

Thank you for believing in me and allowing me to do what I love. Huskies forever!
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CHAPTER ONE

Introduction

Healthy eating and active living are two important prevention strategies in the Surgeon General’s Vision for a Healthy and Fit Nation (1). Unfortunately, the U.S. National Health and Nutrition Examination Survey from 1970-2012 revealed that child obesity rates tripled, with approximately 1 in 3 children having a body mass index (BMI) percentile falling within the overweight or obese range (2). In addition, the prevalence of adolescent obesity has increased the most with a 10.1% increase from 10.5% in 1994 to 20.6% in 2014 (3).

With this obesity epidemic at the forefront of public health concerns, this introduction explores the following topics: 1) the feasibly of an online screening tool used to assess health behaviors and perceived food security and give tailored messages; 2) the reinforcement of healthy behaviors through a fun, online, nutrition-focused computer game; 3) various school-based activities used to promote the access and acceptability of school nutrition programs in order to increase participation in these programs, decrease perceived food insecurity, and promote academic achievement.

1.1 Feasibility of an Online Health Behavior Screening in a School Setting

Little research has been published concerning the development of a cost effective, valid and reliable tool to assess diet quality and activity levels among adolescents (4,5). Previous research has found that, when it comes to diet recalls and food frequency questionnaires, students ages 8 – 11 years old are more accurate in their reporting than their parents (4). With the widespread use of various technological devices and media outlets today, technology is thought to be an effective avenue for reaching young people to communicate health promotion efforts.
The National Academy of Medicine believes that there is a need for more public health efforts with a focus on addressing the root causes of poor health known as the social and behavioral determinants of health (SBDOH). The World Health Organization has defined SBDOHs as “the conditions in which people are born, grow, live, work, and age that ultimately affect health outcomes” (6). Examples of SBDOHs include food insecurity, poverty, unsafe neighborhoods, etc. Those who live, learn, and work in these types of conditions are at a higher risk of obesity, poor academic achievement, developmental delays, poor health literacy, and poor health as a whole (7). By identifying and addressing specific SBDOHs through targeted referrals, it is possible that health outcomes can improve while health disparities are minimized (8,9).

While many environmental factors are associated with poor health outcomes, a particularly noteworthy paradox exists within social and economic relationships. Poverty contributes to food insecurity, and food insecurity in turn increases the risk of obesity (10). When food insecurity exists in a community, energy dense foods with low nutritional quality may be more accessible in sufficient or even excessive amounts (10). This allows for little diversity of foods in the diet which may not support a healthy nutritional status (10).

One population of particular concern when it comes to improving health outcomes and decreasing health disparities is children and adolescents. Many research studies have found that school-based interventions are, in fact, able to promote authentic behavior change among students (11,12). With dietary habits forming early in life, school-based nutrition interventions may be crucial in the prevention of chronic disease and poor health outcomes later in life (13). Since it is known that knowledge can modify and help to maintain behavior, numerous intervention studies have aimed to provide information regarding healthy behaviors and nutrition.
while assessing any change in knowledge as a predictor of intervention success and efficiency (14,15).

Understanding the prevalence of food insecurity, as well as, the likes and dislikes concerning health behaviors among adolescents could be an important piece in developing and implementing relevant and effective health promotion interventions that address the specific needs of a community. Unfortunately, even the best health promotion interventions that increase access to healthy food choices and assist in obesity prevention tend not to reach adolescents and young adults (16,17).

Researchers and public health experts support directly asking students about food insecurity to improve the understanding of its effects and changes with the food environment (18,19). However, this questioning should use a method that is comfortable for a child without inducing embarrassment. Previous studies have shown that completing a survey by paper-and-pencil may result in more socially appropriate and less accurate responses when compared with computer-based survey formats (20). Therefore, children and teens may be more willing to accurately report their level of food security, as well as, diet and lifestyle behaviors using an online format. (16,17) Consequently, eHealth and mHealth interventions (i.e. web-based and mobile phone interventions, resp.) hold promise for reaching kids with tailored health interventions via their preferred mode of communication (21).

1.2 Tailored Messaging

Health communication or health messaging can take place through many mediums among several different populations and can be described as a transactional process through which health information is shared and received (22).
Health communication has been described as a ‘resource’ that allows health messages regarding risk awareness and chronic disease prevention to be used as versatile, educational tools for a “holistic approach” to health promotion (22).

Previous studies have found that tailored health messages can produce greater changes in diet behaviors than general advice (23) and can be delivered via computer software (24) or Internet (23). Although conventional in-person nutrition education interventions have shown to increase knowledge and help in moving participants towards health behavior change (25,26), online avenues can offer a more cost-effective, accessible, and time-efficient option for dispensing health messaging (27,28). A randomized control trial looking at impact of web-based computer-tailored nutrition education on personal awareness and intentions related to intake of fat, fruit and vegetables found significant differences in awareness and intention to change between the intervention and control group (29). The tailored, web-based intervention was appreciated better, was rated as more personally relevant, and had more subjective impact on opinion and intentions to change than the control (general nutrition information). These results imply that interactive, web-based computer-tailored nutrition education can, in fact, lead to changes in determinants of behavior (29). Additionally, roughly two-thirds of the world has online internet access (30), making the dissemination of health-related messaging more feasible than ever (31,32).
With this increase in internet accessibility, there is a need for better measures of self-reported behavior in order to generate more meaningful, online, tailored diet messaging (24). Grounded in concepts such as the Transtheoretical Model and Social Cognitive Theory, technology-delivered communications can provide advice, motivate and promote available healthy options (24). Traditional health interventions using behavior change theories as a framework have been successful in producing positive behavior changes and therefore, serve a basis for which to create future technology-based programing.

In order to effectively communicate tailored, health messaging, a thorough understanding of human behavior is essential. Fogg writes that in order for an individual to obtain a certain behavior, they must be motivated to make a change, able to perform the behavior, and be sufficiently triggered to behave in that way (33). All three components must transpire simultaneously in order for the behavior to occur and be maintained.

This concept of human behavior can be applied to the development and administration of health messaging techniques. In order for an individual to be able to make a change, barriers must be identified and eliminated. For instance, online health messaging breaks through numerous barriers by reaching individuals who have time constraints or reside in many different geographical locations. Additionally, tailored health messaging can inspire motivation to change behavior. In fact, studies have found that research subjects were more engaged, and the effectiveness of the intervention increased by providing tailored messaging based on individual intervention performance (34). Moreover, consistent, reoccurring health messages can offer reinforcing triggers to promote behavior change among individuals who are both able and motivated (33).
1.3 Reinforcing Healthy Behaviors via Gaming

With the increasing popularity of web-based education, there is an opportunity to create more accessible health and nutrition education programs for students. In fact, twenty-four percent of teens report being online “almost constantly” (35). Due to this increase in technology usage by students, eHealth and mHealth platforms focusing on dietary and fitness goals are now being incorporated into academic health curricula in schools (36). Previous research (37-39) has found that online approaches to relaying health information are feasible and effective health promotion tools that aid in the prevention of adverse health outcomes among participants. With mobile and online technologies now widely available, web-based interventions have the ability to reach individuals from many different backgrounds, including ethnic minorities and low-income populations (35,37,40). Since minorities and students from economically disadvantaged, and potentially food-insecure, households are even at an even higher risk of developing chronic disease and poor health outcomes later in life (41,42), mHealth approaches can be a substantial resource for reaching these typically underserved populations (37).

One method of web-based education (eHealth) is gaming. A study investigating various behavioral modeling approaches for educational gaming design among children with diabetes found significant results in usability measures of effectiveness and satisfaction. This study argues that while traditional diet and fitness education methods can be helpful in achieving positive health outcomes, adolescents need a much higher level of motivation (43). In fact, pediatricians are looking to disseminate health risk information and health messages directly to adolescents through mobile phones, video/computer games, and Websites due to the high use of media technologies that are designed to be extremely entertaining and interactive. Moreover, many healthcare providers and public health experts report feeling that they must compete with
computers, games, and social networking sites (e.g., Facebook© and MySpace©) when it comes to gaining the attention of young people. Consequently, the National Institute of Diabetes, Digestive and Kidney Diseases funded the development of games like “Escape from Diab” and “Nanowarm” in order to investigate whether or not it is possible to motivate school-age children to improve their diet and physical activity habits via online gaming (44,45).

1.4 School-Based Activities to Promote the Access and Acceptability of School Nutrition Programs

In 2010, the Healthy, Hunger-Free Kids Act guidelines sought to incorporate the Dietary Guidelines for Americans into the National School Lunch Program (NSLP) and School Breakfast Program (SBP). With these new school meal patterns, more fruits, vegetables, whole grains and a gradual reduction in sodium content were implemented (46).

Unfortunately, even with these new school nutrition program guidelines, children are not consuming enough fruits and vegetables. According to a study published by the National Cancer Institute on Usual Dietary Intakes from 2007 to 2010, 60% of children aged 1–18 years old did not meet the USDA fruit intake recommendation of 1-2.5 cups per day, and 93% did not meet the vegetable recommendation of 1-4 cups per day(47). Several epidemiological studies have examined the association between increased fruit and vegetable intake and improved obesity rates among children and adolescents. In addition, increased fruit and vegetable intake has been associated with better academic achievement (48). Although there are data to support increasing children’s intake of healthy foods such as fruits and vegetables in order to bring about better health outcomes, the question of how this should be done still remains.

Since students spend roughly 35 hours a week in school, schools play a critical role in cultivating healthy lifestyle behaviors among children and adolescents (49). According to the
CDC, schools have a responsibly to implement school-based and community-wide policies and practices in order to create an environment that is conducive to healthy eating and physical activity. Additionally, it is important for schools to incorporate opportunities for students to learn about healthy eating and daily physical activity into academic curricula (49).

An intervention study published back in 2015 sought to increase physical activity (PA) and improve the dietary habits of elementary school students using an integrated educational approach involving schools, families, community stakeholders, sports teams and public health officials (50). Over a span of two year, approximately 230 children participated in school-based activities promoting healthy dietary habits (i.e. cooking workshops, taste testing sessions, and recipe development) and daily PA (i.e. Moments of movement with parents in free time: “homework”, dog walking, home-school routes on foot/by bike). School administration participated in online training modules about promoting PA through local sports associations and healthy eating. A few expected outcomes of this study included: a significant increase in the percentage of children who have an adequate breakfast, eat fruit and vegetables 5 times or more a day, go to school on foot or by bike, practice moderate/vigorous motor and sport activities 5 times or more a week for at least an hour out of school, and do physical activity with parents and caregivers. A questionnaire was completed by students and parents at the beginning of the first year and at the conclusion of the study after the second year.

Upon analyzing the results, the researchers of the study found a 6.2% increase in breakfast consumption, a 4.9% increase in fruit and vegetable consumption, 9.5% increase in physical activity with parents, and a 14.8% decrease in the percentage of students who reported using computer and videogames in afternoon. Although not all outcomes were considered
statistically significant, the results of the study suggest that an integrated, school-based approach in developing healthy lifestyle interventions for students can be effective (50).

1.5 Research Team & Target Community

Our study proposed a unique collaboration between the Hunger Action Team (HAT) in Windsor, the Windsor Public School system, and faculty as well as students in Departments of Allied Health, Communication Sciences and Engineering at the University of Connecticut. The Collaboration aimed to leverage technology with a web-based, interactive, nutrition and physical activity intervention hoping to increase the consumption of healthy food through increasing participation in the school nutrition programs and assessing students’ perceived food insecurity in Windsor.

From analysis published in 2012 by the Zwick Center for Food and Resource Policy and UConn Cooperative Extension System, Windsor residents have a higher than average food security risk (51). From the Windsor Public schools, 34% percent of children in 2017 are eligible for free and reduced school meals in the district.

The Windsor Hunger Action Team within the Foodshare umbrella aims to understand the root causes of hunger, promote self-sufficiency, and engage the whole community in solving the hunger problem. In Windsor, the HAT identified the need to increase participation in the School Breakfast and Lunch Programs and increase family’s awareness of affordable healthy food available in the community.

The Departments of Allied Health, Communication Sciences and Engineering have mission of teaching, research and outreach with students at the undergraduate, post-baccalaureate and graduate levels. Through this Partnership Program with Windsor HAT and
schools, there is an opportunity to bring together a novel and diverse team of researchers with extensive backgrounds in public health, communication strategies, and program development.

Carolyn A. Lin, Ph.D. has developed and conducted research on mobile technology applications in the past. Valerie B. Duffy (PhD, RD) offers a wealth of experience in food, nutrition, health promotion and public health nutrition. Lastly, Heidi Karner, RDN is a Graduate Research Assistant in the Department of Allied Health Sciences at UConn who is also a part time employee of Windsor Public Schools serving as their Registered Dietitian Nutrition Liaison delivering nutrition education and wellness resources to the district’s food service department. This unique dual-position is incredibly advantageous for this partnership in that she can serve as a liaison between UConn and Windsor Public Schools, allowing for the flow of productive communication and teamwork. This collaboration with Windsor Public Schools benefited both parties: first, to the UConn research team, as this school provided many appropriate participants, and second, to Windsor Public Schools and its students. Including the use of this online health intervention among students allowed them to be exposed to more nutrition education than would normally be delivered. It also provided opportunities for classroom discussion about daily practices that affect students’ health.
CHAPTER TWO

Testing the Feasibility of a School-Based Online Survey to Assess Middle Schoolers’ Food and Activity Behaviors, Provide Tailored Health Messages, and Provide Direction for School-Based Messages

2.1 Introduction

With obesity, sedentary lifestyles, and chronic disease prevalence on the rise, researchers and public health experts continue to direct prevention strategies towards school-aged children and adolescents. With children and adolescents spending an average of six to seven hours of their day at school (52), schools are encouraged to create supportive, healthy environments in which students can learn and play through positive experiences that simultaneously promote and protect their health (53).

The CDC recommends a comprehensive approach when developing school-based prevention strategies. In other words, school-based health promotion efforts should address both nutrition and physical activity through interactive activities involving school administration, active community members, and caregivers (54,55).

Additionally, schools need rapid, useful and acceptable methods to assess health behaviors and correlates in the school setting to develop tailored health promotion messages and school-wide health promotion messages. Previous studies have supported that simply asking children what they like or dislike for foods and activities can meet this need in a clinical setting (56).

Asking children or adults what they like is simple. Based on the concept that we generally eat or do what we like and avoid what we do not, reported liking/disliking can reflect usual behaviors (57-59). Survey-reported liking is a practical and valid way to assess dietary and physical behaviors in children and adults (57,58,60). Previous research found that reported liking correlates with self-reported intake (61-64) and with biomarkers of dietary intake and/or
adiposity in children (64) and young adults (65). Furthermore, these liking surveys can capture a broader group of children due to their ease and time efficient nature when compared to other dietary assessment tools such as food frequency questionnaires and 24-hour dietary recalls (56). An online liking survey can screen for usual diet and activity behaviors, and based on the participants responses, generate tailored and encourage health messages (66).

With an increasingly high prevalence of adolescent obesity, it is clear that more effective and feasible obesity prevention and intervention strategies are needed, and therefore, technology-based programs may be an effective way to disseminate information and promote self-directed healthy behavior ideas to this population.

This study aimed to assess the feasibility of a web-based diet and activity screener and delivery of tailored health promotion messages within a middle-school classroom setting. The screener included liking/disliking of foods and activities as well as questions about the school meals, barriers to meal participation, food insecurity. Previous research has shown that young adolescents are able to report sensitive information feasibly and reliably in a web-based survey (67). As well, middle-schoolers may be more accurate in reporting online versus a paper/pencil survey as there is anonymity without the researcher watching the child’s specific responses (68). The specific hypotheses were that: 1) the online survey will be acceptable to students and will report that it made them think about their own health behaviors; 2) the students will like the tailored messages and report a willingness to try changing their health behaviors based on these messages; and 3) students will report their perceived food security status through a safe, confidential platform.
2.2 Design

This was a school-based, observational study with an online survey completed by students with online health messages tailored to the student’s survey responses. The goal was to recruit the entire 7th grade through an academic class. This study sample was chosen based on the shared goals of the school, community and research team. First, the school administration and Foodshare’s Hunger Action Team in Windsor identified poor health habits among this population and were concerned that students were not receiving the proper nutrition they need to learn and grown at Sage Park Middle School. Second, the Food Service Department for the Windsor School District saw low school nutrition participation in the National School Breakfast and Lunch Programs and wanted to help increase the access and acceptability of school food. Lastly, the research team wanted to assess the feasibility of moving a clinically-based, previously validated survey into a school environment by aligning it with educational goals and state standards.

2.3 Participants/Sample

The study was reviewed and approved by the University of Connecticut IRB (Appendix A). All 7th grade students were recruited through a science class. Each science class was between 10 to 20 students with 15 total science classes. This sample of students was chosen based on convenience and feasibility within the school. Students were recruited for this study by their teacher during their science instructional period at the beginning of October 2018. Teachers announced the opportunity to be a part of the study during instructional time, and Parental Notification Forms were sent home to inform parents and guardians about the study. Parents and/or students who did not wish to participate in the study were instructed to submit a Notification of Refusal Form (see Appendix A) and/or inform their science teacher. Students also
could decide not to participate by failing to assent to the study on the face page of the online survey. Students who did not participate were provided a supplemental online assignment determined by the science teacher during the science periods that survey was administered.

2.4 Methods

Technology offers adolescents familiar communication channels to encourage accurate reporting and provide tailored messages. We assessed the feasibility (completion rate, acceptability) and utility (reliable, valid information) of an online health behavior screening and motivational messages for adolescents in a classroom setting. Using school-provided Chromebooks, 7th graders (n=202) from all science classes (53% male) were asked to complete the online pediatric-adapted liking survey (PALS), questions about sleep, school meals, media use, food security, and survey usability/usefulness/satisfaction (Table 2). PALS-responses triggered tailored healthy reinforcement/encouragement messages via online algorithms (66). Adolescents then reported their feelings about the messages and how much they would like to try changing the target behavior.

Table 2: Components on the web-based diet and activity screener for middle-schoolers in a classroom setting

<table>
<thead>
<tr>
<th>Topics</th>
<th>Survey Question Examples</th>
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<tr>
<td>Liking of foods, beverages and activities</td>
<td>- Preferences for 26 foods and beverages and 7 non-foods on horizontal visual analog scale with 7 faces. The foods/beverages represent fruits, vegetables, protein, high fiber, salty, sugary.&lt;br&gt; - The non-food items are sedentary and physical activities, oral health habits such as teeth brushing.</td>
</tr>
<tr>
<td>School Nutrition Participation</td>
<td>Where do you usually eat breakfast? How many days a week do you usually eat breakfast? What is the number one reason that you don’t eat school breakfast?</td>
</tr>
<tr>
<td>Sleep Habits</td>
<td>What time do you usually go to bed at night? What time do you usually wake up in the morning?</td>
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</table>
| Perceived Food Security         | I felt worried that our food at home would run out before we could get more. (yes/no)  
I ate less than I wanted to because there wasn’t enough food at home. (yes/no)  
I was hungry but didn’t eat because there wasn’t enough food at home. (yes/no) |
| Media Use                       | Do you use the internet at home? How do you go on the internet? How often do you go on the internet?                                                   |
| Oral Health                     | How many times a day do you brush your teeth? How many cavities do you think you have had?                                                              |
| Usability/usefulness/satisfaction | I could answer the questions in this survey quickly.  
The questions made me think about what I eat and what I do  
I could complete the survey without help |
2.4.1 Online Pediatric-Adapted Liking Survey (PALS)

The PALS has been tested with over nine-hundred children in a healthcare setting who report the survey was easy, fun, and increased awareness of what they eat and do (56). The PALS was put online for delivery of tailored messages to child and parent dyads in a clinical setting (66). For the school-based setting, the online PALS was the same as the clinical setting with 26 foods and beverages and 7 activities to rate on a 7-point horizontal, face scale or never tried/done (see below).

Figure 2: The seven-point facial hedonic scale used for reporting level of liking/disliking for the online PALS with ±100 as love it/hate it, ±60 as really like it/really dislike, ±29 like it/dislike it, 0 it’s ok.

The face scale above is an example of a horizontal visual analog line scale (HVALS) and it ranged from -100 to +100, with -100 being (he/she hates it) and +100 being (he/she loves it). Extreme ends of the scale signify “the strongest liking or disliking of any kind”. The foods/beverages featured in the survey had at least 3 items for each fruit, vegetable, dairy, protein, high fiber, salty, and sugary food/beverage group. The non-food items are both sedentary and physical activities and oral health habits in terms of teeth brushing.

PALS responses were coded into groups and an index of diet quality or healthiness was calculated. The index is similar to the Healthy Eating Index (HEI) (56,61). To calculate these indexes, the foods, beverages and activities are sorted into conceptual groups and multiplied by weights consistent with the Dietary Guidelines: vegetables (+3), fruits (+2), protein (+2), sweets (-3), sugary drinks (-3), fiber (+2), salty (-2), dairy (+2), physical activity (+2) and technology
(-3). The final indexes are the average of weighted groups. Previous research supports that the formed indexes are internally reliable, variable, and distinguish groups with known differences in diet quality (56) (Figure 3).

Figure 3: Construction of Health Behavior Index – depiction of weighted food and activity groups

2.4.2 Tailored Message Program

The messages used in the present study were developed from interactions with middle schoolers from a separate school district about sugary beverages, water, fruit, physical activity and screen time were refined to encourage healthy foods and activities offered in the school environment (66). These tailored messages work within the constructs of the social cognitive theory, supporting intentions to change behavior and subsequent changes in behavior (60,61). They are also consistent with the Theory of Planned Behavior, which posits that a person’s attitude towards a behavior, various social norms, and their own perceived control over their behaviors all contribute to that person’s intentions and actions (69,70). More specifically, how a person perceives and feels about a behavior, either positively or negatively, can affect whether or not they actually perform that behavior. Factors such as these can contribute to a person’s overall “readiness” to change a behavior which, in turn, impacts whether or not they end up making that change (69,70). Theories such as these were incorporated into the development of the tailored message program through algorithms based on online PALS responses that administer messages.
More specifically, those who report less liking of certain healthy behaviors receive information to raise consciousness and promote acceptance and readiness of dietary change, while those who report more liking of healthy behaviors are provided self-reevaluation and self-liberation strategies to increase self-efficacy or are given reinforcements to aid in maintaining existing healthy behaviors (59). The algorithms for message delivery in this present study was modified from the original study (66) to deliver approximately 3 messages per child and with follow-up questions on how much they would like to change the target behavior of the messages.

2.4.3 Data Analysis

Statistical analysis tests were completed using SPSS version 25.0.0.0. and Microsoft Excel version 15.13.1 with a significance level of p ≤ 0.05 used for all significance tests. First, descriptive statistics (frequencies, percentages, means) were used to describe basic variables such as demographics. Internal reliability and consistency of the PALS food/activity groups was evaluated using Cronbach’s alpha where an α > 0.7 was considered acceptable. An exploratory principal component analysis (PCA) was conducted to the number of constructs measured by PALS (i.e., construct validity).

2.5 Results and Discussion

Most of the students completed the survey (89%). Upon adjusting for participants with missing data (n=17), a total of 202 student responses were included in analysis. Most were twelve years old (80%), 53% were males and diverse in race/ethnicity (Table 3).
Table 3: The age and race/ethnicity distribution of 202 middle-schoolers

<table>
<thead>
<tr>
<th>Age</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eleven</td>
<td>10.5</td>
</tr>
<tr>
<td>Twelve</td>
<td>80</td>
</tr>
<tr>
<td>Thirteen</td>
<td>8.5</td>
</tr>
<tr>
<td>Fourteen</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th># of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>45</td>
<td>22.50</td>
</tr>
<tr>
<td>Black or African American</td>
<td>68</td>
<td>34</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Asian</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>1</td>
<td>0.50</td>
</tr>
<tr>
<td>Multiple</td>
<td>43</td>
<td>21.50</td>
</tr>
<tr>
<td>Declines to answer</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Don't know/Not sure</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>202</td>
<td>100</td>
</tr>
</tbody>
</table>

2.5.1 Food and Activity Liking Questions

The PALS food, beverage and activity groups showed good variability (most liked—sedentary, sweets; least liked—vegetables, fiber; Figure 4). Cronbach’s alpha was used in order to determine the internal consistency of all PALS food and activity groups for student responses. The groups ranged from approaching acceptable (close to 0.7) to poor (below 0.5 – fiber, sedentary, protein) (Table 4). The PALS items that produced the highest reliability were the salty and sweet groups. The Healthy Behavior Index approached acceptable internal reliability (Table 4).

Figure 4 visually represents all of the liking of the PALS food and activity groups compared to something very pleasurable like fun parks. It is important to note that students reported sweets and sedentary behaviors almost as pleasurable as fun parks.

The Healthy Behavior Index was normally distributed, had construct validity, with three separate factors that explained 56% of the variance across the groups (Figure 5).
Figure 6 shows that the healthy behavior index represented more than one dimension.

The Exploratory Principle Component Analysis measured less healthy food, healthy food and Physical Activity as dimensions. These 3 dimensions made up nearly 60% of the variance across all the responses. The first factor (less healthy) was 26.2% of the variance, the second factor (healthy) was 23.1% of variance, and the third dimension (physical activity) was 10.2% of variance.

Figure 4: Average liking of PALS groups, water and a pleasurable non-food (Fun Parks), showing the need for improvement in liking of healthier foods and activities.

Figure 5: Normal distribution of the Healthy Behavior Index (Shapiro-Wilk p=0.43)
Table 4: Internal reliability (Cronbach’s alpha), Mean, and Standard Deviation of PALS groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Cronbach’s alpha (α)</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary Group:</td>
<td>0.32</td>
<td>64.16</td>
<td>26.45</td>
</tr>
<tr>
<td>listening to music,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>playing video games,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>watching TV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweets Group:</td>
<td>0.66</td>
<td>55.28</td>
<td>33.48</td>
</tr>
<tr>
<td>Cookies/cake, Candy,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet Cereal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Activity Group:</td>
<td>0.53</td>
<td>48.62</td>
<td>37.14</td>
</tr>
<tr>
<td>Dancing, Playing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sports, Playing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outside</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSB Group: Soda,</td>
<td>0.66</td>
<td>46.41</td>
<td>38.82</td>
</tr>
<tr>
<td>Fruit punch, Juice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salty Group:</td>
<td>0.68</td>
<td>45.13</td>
<td>33.42</td>
</tr>
<tr>
<td>French fries, Salty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>snacks, Adding salt to foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit Group:</td>
<td>0.51</td>
<td>41.66</td>
<td>36.78</td>
</tr>
<tr>
<td>Apple, Banana,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy Group:</td>
<td>0.57</td>
<td>32.03</td>
<td>42.30</td>
</tr>
<tr>
<td>Yogurt, Milk,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chocolate milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein Group:</td>
<td>0.29</td>
<td>27.34</td>
<td>38.85</td>
</tr>
<tr>
<td>Tuna, Eggs,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken nuggets,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiber Group:</td>
<td>0.42</td>
<td>10.00</td>
<td>38.40</td>
</tr>
<tr>
<td>Cheerios/Kix, Whole</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wheat bread, Beans/Lentils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable Group:</td>
<td>0.58</td>
<td>5.45</td>
<td>47.08</td>
</tr>
<tr>
<td>Carrots, Corn,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes, Green</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>beans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy Behavior</td>
<td>0.66</td>
<td>-18.23</td>
<td>47.97</td>
</tr>
<tr>
<td>Index</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: Component plot of groups from the PALS that formed three factors
2.5.2 Breakfast Behaviors and Barriers

A majority of students reported that they do not eat breakfast every day (Figure 7). This is consistent with a survey of 14,594 people conducted in 2011 by Kellogg’s®. In the Kellogg’s®, 50% of middle schoolers reported not eating breakfast, a percentage that increased with age group (only 36% of high schoolers eating breakfast daily) (71). Additionally, according to an NHANES study conducted from 2005-2012, 14% of students ages 6 to 12 years old skipped breakfast and those who did had poorer diet quality (72).

Figure 7: Number of days students eat breakfast

![Bar chart showing breakfast frequency]

Our survey further asked students who did not consume daily breakfast about potential reasons why not. In response to arriving too late to school to eat school breakfast, 7% of students said they are too late every day, and 17% of students said they are too late 2 to 3 times per week. This corresponds with previously reported literature. Nearly 3 of 4 school officials identified late school busses as the primary barrier to participation in the school breakfast program from focus groups of school administrators in Pennsylvania (73). Other more recent literature also reports late arrival to school as the primary barrier to school breakfast participation (74,75).

From our survey, students also reported not eating breakfast due to lack of hunger in the morning. Of the students surveyed, 74% indicate that they are not hungry for breakfast every day. Additionally, 67% reported not liking what was being offered for lunch every week. This
report is consistent with many other school districts around the country when it comes to liking of school meals. In a survey conducted among 1,300 students in Fairfax County schools in Washington state, 77% of students reported that they did not like the food being offered, and close to half of the students indicated that they only ate school lunch two days in the week or less in some occasions (76).

A final identified barrier to breakfast consumption is stigma. According to the survey data, 13% of students report either sometimes or often to worrying what others might think of them if they ate breakfast at school. Unfortunately, a study published by the School Nutrition Association found that there is a stigma associated with school breakfast that implies that it is primarily for low-income students (73).

With these barriers in place, students were asked to report on how they would prefer breakfast be served in the future in order to promote higher participation. 45% of students preferred that there be a “Grab’N’Go” style breakfast option served in the morning from a breakfast cart. That way, students have the opportunity to eat their breakfast in the hall or at the beginning of their homeroom period. Many schools have adopted this model and previous research suggests that school breakfast consumption increases by 20% when students are provided an extra 10 minutes to eat in the morning (77).

2.5.3 Food Security

Upon asking students about their perceived food security status, greater than 40% responded sometimes or often to one of three survey questions about food security. Specifically, 29% reported sometimes or often to feeling worried that food at home would run out before more could be attained, 26% reported sometimes or often to eating less than they wanted because there wasn’t enough food at home, and 16% reported sometimes or often to not eating because there
wasn’t enough food at home. According to USDA statistics, food-insecure households with children make up 7.7% of households in the U.S. The data collected among adolescents in Windsor could suggest that food insecure households makeup anywhere from 16-29% of the total households in Windsor, which is significantly greater than the national average (78).

2.5.4 Oral Health and Sleep

Additional health behaviors were surveyed with 61% of students reporting that they brush their teeth twice a day in accordance with ADA published guidelines, while 57% of students reported never having a cavity. Although this is so, studies show that 13% adolescents ages 12 to 19 have at least one untreated cavity (79). In regard to sleep, 63% of students reported receiving between 8 and 9 hours of sleep each night. In a study considering sleep patterns among adolescents in grades 6 through 12, findings showed that the number of hours of sleep declined from an average of 8.4 hours for sixth graders to an average of 6.9 hours for twelfth graders suggesting that sleep declines as age increases (80).

2.5.5 Media Use

One possible cause of this decline in sleep could be attributed to an increase in media use with 82% of surveyed students in this study reporting use of computers and laptops while 75% reported use of smartphones, and 81% indicated usage of 2 or more media sources regularly. These results are not surprising considering previous research showing that adolescents reportedly spend an average of nine hours a day using screen-based media with about three of the nine hours devoted solely to mobile phone usage (81).

2.5.6 Students evaluation of the online survey

To assess the feasibility of online health behavior survey in a school-based environment, data were collected in regard to the usability and student satisfaction of the survey itself. In
evaluating the survey, 89% of students reported being able to answer the survey questions quickly while 91% reported being able to complete the survey without help. Additionally, 73% of students reported that the survey questions made them think about what they eat and do - making students more aware of their own health behaviors in order to increase the potential for positive changes in the future. Usability of our survey was comparable to that of a clinically collected sample with parent and child where only 82% of participants reported that the survey was easy to complete while 78% reported that the survey made them think about what they eat and do (66).

2.6 Tailored Messages

Students received an average of three messages like the message example depicted below (Figure 8) tailored to PALS responses with students receiving anywhere from 1 to 5 messages. Most frequent were reinforcing (increasing water or whole grain consumption) or encouraging (drink water or eat fruit instead of sugary foods/beverages) (Table 4). Unfortunately, due to a glitch in the Qualtrics survey software system, no students received a message encouraging them to eat less salty snacks as shown in the message frequency tables below.

Figure 8: Example of a tailored encouragement message promoting vegetable consumption based on PALS responses
**Table 4**: Percentages of students who received each encouraging or reinforcing nutrition message

<table>
<thead>
<tr>
<th>Encouragement Messages</th>
<th>% of Students Who Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salty Snacks</td>
<td>SSB 27</td>
</tr>
<tr>
<td></td>
<td>Sweet Grp 29</td>
</tr>
<tr>
<td></td>
<td>Sedentary 28</td>
</tr>
<tr>
<td></td>
<td>Veggie 28</td>
</tr>
<tr>
<td></td>
<td>WG 30</td>
</tr>
<tr>
<td></td>
<td>Dairy 25</td>
</tr>
<tr>
<td></td>
<td>Fruit 22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reinforcing Messages</th>
<th>% of Students Who Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>18</td>
</tr>
<tr>
<td>Activity</td>
<td>24</td>
</tr>
<tr>
<td>Veggie</td>
<td>15</td>
</tr>
<tr>
<td>Fruit</td>
<td>23</td>
</tr>
<tr>
<td>WG</td>
<td>3</td>
</tr>
<tr>
<td>Overall Healthy</td>
<td>1</td>
</tr>
<tr>
<td>Water</td>
<td>100</td>
</tr>
</tbody>
</table>

Additionally, students reported a willingness to try an average of 2 of the message suggestions that they received. Willingness to try these suggested health behaviors was assessed using the same hedonic scale as the PALS food and activity questions (Figure 9). For each message received, students reported how much they would like or dislike to try the target behavior of the message. Across all students, willingness to try was set as a rating above “Like To.”

**Figure 9**: Hedonic scale criterion used to assess willingness to try health behaviors among students

Rating above “Like To” as criterion for willingness

As seen in Figure 10, students were most willing to try decreasing their intake of sugar sweetened beverages (SSB) and sweets, as well as, increasing their time spent doing physical
activities. Of the students who received each message, the percentage of students who reported willingness to try each target behavior is depicted below. For instance, of the students who received a message about decreasing their SSB intake, 78% of them reported that they are willing to try this behavior change.

**Figure 10**: Percentage of Students Willing to Try Each Health Behavior Message Topic – Students most willing to try decreasing intake of SSB and sweets and increasing time spent in physical activity. Students least willing to try increasing intake of whole grains and dairy products.

![Percentage of Students Willing to Try Each Health Behavior Message Topic](image)

Lastly, in terms of message evaluation, most students (79%) reported learning something new, that the messages were helpful, and that they were open to receiving future messages.

### 2.7 Conclusion

Overall, the results of this school-based, observational study using an online health behavior survey and tailored message program indicate that the online survey was useful and feasible for assessing student health behaviors and providing tailored messages at school. The survey provided a confidential platform for students to express the healthiness of their diet, physical activity, additional health-related behaviors, and perceived food security. The data collected from this unique survey and tailored message campaign sparked a district-wide
conversation about the health and nutrition of their student body while this quantitative research provided two themes to assess via informal conversations to refine messages for a school-based nutrition campaign that will be discussed in chapter four.

A few limitations of this research are important to note. First, with any self-reported data there is a possibility for error in reporting. Second, data was only collected from one Middle School in Windsor, CT, making it challenging to generalize the results to other school districts and populations. Lastly, although food security was assessed using previously-validated survey questions from the Rudd Center Food Policy and Obesity, only the perceived food security status of the students was surveyed using three questions while no household income data was collected introducing the possibility for inaccurate reporting.
CHAPTER THREE

The Eat And Move As I Like (EAMAIL) Game: Piloting a Nutrition-Focused Computer Game to Promote Healthy Choices and Provide Generic Health Messages with Middle Schoolers

3.1 Introduction

Education with a focus on promoting healthy lifestyle habits has been a top public health priority for many years and continues to be vital in preventing the development of many chronic diseases in every community across the country. Unfortunately, many motivational obstacles remain such as lack of time and low self-efficacy for behavior change. These obstacles present major challenges when it comes to the adoption and maintenance of various healthy lifestyle choices (82,83).

Previous research has shown that traditional media outlets such as TV and radio can encourage awareness around certain health behaviors (84). Additional studies have found that other types of media such as online computer or videogames may be more effective when it comes to increasing awareness and promoting health behavior change since these types of media channels encourage active participation and have higher levels of engagement among participants. Computer-based gaming also promotes learning while using a fun medium. A survey conducted in 2012 (85) found that 41% of the participants had played a game in the past 12 months, with 82% of those people stating that the game was online. Additionally, laptops and PCs were the most-used game-playing device among these participants. Due to their extensive reach and interactive approach, computer-based gaming is becoming a popular means through which health promotion initiatives and health information can be dispensed.

Since video-gaming has become such a trendy activity among adolescents, educational computer games offer potential when it comes to effectively administering health promotion
programing to this hard-to-reach population (86). Little research has been done on the efficacy of technology-based health interventions among this population, especially when it comes to actual behavior change (84). According to a systematic review published in 2011 (87), computer-based health interventions were effective in increasing consumption of fruits and vegetables among children, while previous international studies show that videogames targeting specific behavior changes can produce significant improvements in knowledge regarding nutrition and healthy dietary and lifestyle habits (88-91).

This study aimed to create an online, nutrition-focused educational gaming experience that students report as interesting, enjoyable, and that they learned something new. The specific hypothesis was that students will be able to play the game easily and will report that the game kept their attention.

3.2 Participants/Sample

The EAMAIL game was piloted with six students in grades 6-8 from the Gardening after-school club at Sage Park Middle School on May 9th, 2019. Each student played the game either on their own school-provided Chromebook or on a PC in the Family Resource Center and answered eleven short evaluation survey questions afterwards.

3.3 Methods & Design

The EAMAIL game was created to be a fun, nutrition-focused computer game with an emphasis on the USDA MyPlate campaign for students to interact with. Beginning in the Summer of 2018, planning began to develop a game that could be accessed via the students’ school-provided Chromebooks. Shane Sacco, MS, a UConn Ph.D. candidate, was hired on June 6th, 2018 to program the preliminary version of a nutrition-based, online, interactive tool for the project. Upon recruiting him for the position, we discussed ways to incorporate a more
interactive component into the project aside from the Qualtrics survey alone. We decided that a fun, healthy food-focused game would be a creative way to engage students while incorporating information that aligns with the USDA Dietary Guidelines. We wanted the game to be simple yet challenging enough to engage this media-fixated population. Lauren Ciulla (UConn undergraduate student) was hired to create unique graphics and visuals for the online tool in order to make it more visually appealing and relevant to students of this age group.

**Figure 1:** Examples of EAMAIL game graphics created by student programmer - Lauren Ciulla

The premise of the game involves sorting various foods into the five different food groups based on their corresponding color: fruits (red), vegetables (green), grains (orange), protein (purple), and dairy (blue). Each image of food falls from the top of the screen and players are asked to catch the food using the correct colored bucket.

The first level introduces the sorting concept by asking players to only catch “anytime” foods – foods that are healthy to eat any time such as bell peppers and whole grain bread – while
avoiding “sometimes” foods – foods that are low in nutrition and should only be eaten occasionally such as cake and candy (Figure 2).

Figure 2: Example of level 1 game tutorial pop-up message

The next level introduces the concept of the USDA MyPlate food groups by asking players to catch the vegetables using the green colored bucket and the grains using the orange colored bucket. Using the cursor, players can move their bucket across the bottom of the screen in order to catch the falling foods while changing the color of the bucket by single clicking on their touchpad. With each new level (6 total), more food groups are introduced with new foods and new bucket colors that correspond. Additionally, as each player catches each food in the correct bucket, they receive points depicted in the upper right corner of their screen (Figure 3). If players fail to catch a food in the correct colored bucket or if they catch a “sometimes” food instead of avoiding it, they lose points resulting in the loss of a “life” depicted as red hearts also in the upper righthand corner of the screen (Figure 3). Each player only receives three lives, and if all lives are lost, the player loses the game and must restart.

Figure 3: Depiction of EAMAIL game screen with total points and “lives” remaining on upper righthand corner
At the beginning of each level, players are shown tutorial screens explaining the premise of each level and the food group that it is introducing. After each level, players are shown a generic message regarding the food group they just learned about. The generic messages that were incorporated into this game mimic the messages that were used in the tailored message program as part of the online PALS health behavior survey discussed in chapter 2 in order to maintain consistency and reiterate concepts.

**Figure 4**: Example of generic EAMAIL game message promoting vegetable consumption consistent with message delivered in PALS

3.4 Results

Based on evaluation survey responses, the majority (83.34%) of students agreed with the statement “a lot” or “very much” that the game was both interesting and enjoyable to play. Additionally, 83.33% of students felt that the game was easy to figure out and that it kept their attention. Lastly, 50% of students reported that they learned something new about food by playing the game (*Table 5*).
Table 5: EAMAIL Game Evaluation Survey Responses

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>% of Students Who Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel the game was interesting</td>
<td>100%</td>
</tr>
<tr>
<td>I feel the game was enjoyable</td>
<td>100%</td>
</tr>
<tr>
<td>I feel the game kept my attention</td>
<td>100%</td>
</tr>
<tr>
<td>I feel the game was easy to figure out</td>
<td>83%</td>
</tr>
<tr>
<td>I feel the game had good graphics and pictures</td>
<td>100%</td>
</tr>
<tr>
<td>I learned something new about food by playing the game</td>
<td>50%</td>
</tr>
<tr>
<td>I learned something useful about what is good to eat by playing the game</td>
<td>50%</td>
</tr>
<tr>
<td>The messages in the game helped me learn about healthy eating</td>
<td>50%</td>
</tr>
<tr>
<td>I think that I can try to eat healthier</td>
<td>50%</td>
</tr>
<tr>
<td>I would like to try eating more fruits that I like regularly, as suggested by the game.</td>
<td>66.70%</td>
</tr>
<tr>
<td>I would like to try eating more vegetables that I like regularly, as suggested by the game.</td>
<td>83.30%</td>
</tr>
</tbody>
</table>

In addition to online survey evaluation, students provided real-time, informal feedback while playing the game that was recorded by the research assistant administering the game to students. Common themes in this feedback include speeding up the game, incorporating more foods to catch in each food group, adding more levels to the game, and including the ability to pick out and change “skins” or colors/patterns to a personal avatar of some sort based on the amount of points you earn in each level. Students were encouraged to give honest feedback and were told that their suggestions were being heard and were of great value to the research team. Photos of Sage Park Middle School students playing the EAMAIL game can be seen below.

3.5 Discussion

After piloting the nutrition-focused, MyPlate computer game, survey evaluation responses from students indicate that the game was, in fact, enjoyable, interesting, kept their attention, and helped them to learn something new about food. Informal student feedback indicates that the game should be sped up, should have more levels and foods in each food
group, and should incorporate a personal avatar feature for students to customize with the points that they have earned.

Future versions of this game should be piloted with more students in a classroom setting due to the fact that only six adolescents were able to play the game in their after-school club at the time of this initial pilot. Additionally, the generalizability and acceptability of this game among other age groups outside of this middle-school population is unknown and should be explored in future research efforts in order to investigate whether or not this tool is appropriate and effective among younger, elementary-aged students.
CHAPTER FOUR

Effect of school-based, nutrition-focused activities on web-based reporting of healthy behaviors in middle-schoolers: a pre-post test pilot study

4.1 Introduction

Research has shown that adolescence is the most crucial transition period when it comes to the adoption of various health behaviors. Hence, promoting healthy lifestyle habits during adolescence and working to protect students from health risks early on are vital in the prevention of health problems down the road (92).

Previous studies have found that school-aged youth should engage in at least 60 minutes of moderate to vigorous physical activity each day (93) and that an association between obesity and the consumption of soft drinks exists (94). Additionally, television-watching, video game-playing, listening to music, and a lack of sleep have been linked with the overconsumption of food (95). With these findings, it is clear that integration of health promotion strategies into school curriculum and policy is important (96).

Multicomponent interventions that engage student participation and include both school and community involvement have the potential to bring about significant changes in the levels of physical activity in students (97). In addition, positive outcomes in terms of diet quality were found following the implementation of multicomponent interventions promoting a healthy diet in students from European countries (98).

The goal of our school-based nutrition-focused activities and baseline tailored health promotion messages was to improve student liking for healthy eating and activity. The expectation was that, by making students more aware of their own health-related behaviors, they will be better equipped to implement simple healthy behavior changes on their own. Examples of positive lifestyle changes include: increased liking of fruits and vegetables, decreased liking of
sugar sweetened beverages, increased liking of being physically active, and decreased liking for screen time. It was our hope that positive changes in the school environment would occur down the road such as increased student engagement, better academic achievement and an overall healthier student body. We hypothesized that students would report improved diet quality and health behaviors from pre to post test.

4.2 Design

This was an uncontrolled pilot study with a pre-post design with implementation of a school-wide nutrition-focused intervention in between in a single middle-school in Connecticut. The 7th grade class was the focus of tailored health promotion message at baseline and measured for impact from baseline in October 2018 to post-intervention in April 2019.

4.3 Intervention

With the initiation of the 2010 Healthy, Hunger-Free Kids Act, school districts were encouraged to implement wellness policies centered around the importance of proper nutrition and adequate physical activity (99). Unfortunately, many districts have yet to fully implement these policies to date (100). With National School Nutrition programs serving both breakfast and lunch, physical education classes, and organized sports, the school environment has the potential to significantly impact student diets and activity levels (101). Effective implementation of wellness efforts at the school level requires student buy in. Even so, research shows that many school officials tend to discount the most important stakeholders of all when developing and implementing school-based wellness programs — the students (102,103).

The objective of this study was to evaluate the implementation of a school-based, nutrition-focused intervention involving the Food Service Department in one Middle School in Windsor, CT. The interventions aim was to help Sage Park Middle School better implement their existing wellness policy by engaging students in activities to improve access and acceptance of
healthful, tasty foods. With the Social Determination Theory serving as a basis for development, student-focused activities, food tastings, student-lead menu polls, and school-wide health promotion messages were incorporated into the school environment from Spring of 2018 to Spring of 2019. Utilizing the community participatory model, broad engagement of school members, including teachers, foodservice staff, and students was achieved (104). The following sections outline and describe the school-based nutrition activities that took place at Sage Park Middle School for this study.

4.3.1 Breakfast Variety Food Show

To celebrate National School Breakfast Week at Sage Park Middle School, a National School Breakfast-themed Food Variety Show was held for students on March 9th, 2018. With the increasing popularity of mobile phones and social media among kids, there was an opportunity to create a fun, relatable, health and nutrition event for students. The goal was to craft an emoji-themed environment where students had the ability to try new, healthful foods and give their feedback. Using funds from a Foodshare Partnership Program Grant, giveaways and decorations were purchased including balloons and an Instagram photo booth.

Every student was asked to complete a short survey regarding their likes and dislikes of the items that were featured. With the help of several food vendors who provided products, a wide variety of healthy, breakfast items were offered for the students to taste. Examples of the
items that were offered include: Breakfast Pizza Flatbreads; Chicken and Waffle Bites; Breakfast Potato Boats; Fruit and Yogurt Smoothies; Whole Grain Pancake Bites; Egg and Cheese on Whole Grain Biscuits. Based on the survey responses, the most popular offerings were put on the menu in the fall of 2018. Figure 1 shows the percentages of students who reported liking each breakfast item and who wished to see it on the menu at their school.

Figure 1: National School Breakfast Week Food Show Evaluation Survey Results

4.3.2 National School Lunch Week Kickoff Tabling

As part of National School Lunch Week (October 15-19, 2018), a tabling kickoff event was held to talk to the students about healthy eating habits. Seventh graders spun the wheel and answered questions about school meals and the five components of the USDA "MyPlate." Students were also asked to write down their favorite lunch offering and to post it up on the whiteboard. Each student who participated at our table was awarded a bracelet or sticker.
4.3.3 Lunch Variety Food Show

With the success of the Breakfast Food Show, another food show was sponsored on January 25th, 2019 with a focus on school lunch, instead. Approximately 200, 7th grade students were able to try the food show offerings during their lunch wave in the cafeteria. Four tastings items were developed by foodservice staff: an Asian Chicken Salad with sesame dressing and crispy wonton pieces, a Cornbread Chili Bowl with warm, whole grain cornbread, homemade chili and melted cheddar cheese, a Build-Your-Own (BYO) Burrito Bowl with quinoa, shredded chicken, stewed black beans, corn and fresh topping options such as shredded lettuce, guacamole, and pico de gallo, and finally, a Smashed Tot Chicken Biscuit Sandwich with melted cheese. Similar to the first food show, students were asked to give feedback via a survey that was handed out at the beginning of the lunch wave (Figure 2).
4.3.4 Developing Healthy Breakfast and Sustainability Messages

Although it is well-known that certain marketing techniques may have the ability to influence children’s consumption of various foods, little research has been done examining the effectiveness of student participation in the creation of these marketing materials. Some researchers suggest that student-lead marketing may increase the material's efficacy, with student buy-in generating more positive attitudes towards healthy eating and active living (105).

Upon review of the baseline PALS health behavior survey, two key areas of focus were identified: Breakfast Participation and Food Waste, particularly fruit and vegetable waste. With the help of the Family Resource Center Director at Sage Park, three groups of students from each lunch wave (6th, 7th, and 8th grade) were asked to participate in short informal discussion groups focusing on the topics of interest. Students were asks to report on how they felt about eating school breakfast, why they do or don’t, if they think it’s important to eat breakfast, and the barriers to eating breakfast, if any. In addition, students were also asked to report on how they feel about food waste, if they think reducing food waste is important, and possible ways to reduce waste at school. The exact discussion prompts can be seen in Appendix ____. At the end
of each discussion group, students were asked to brainstorm two possible messages that could be shared with their peers to help in decreasing food waste and increasing breakfast participation. All student messages were compiled, and themes were identified. Based on these themes, messages were developed for each topic of interest (Table 1).

**Table 1**: Themes and messages identified from informal focus groups with students

<table>
<thead>
<tr>
<th><strong>Food Waste</strong></th>
<th><strong>Testing Messages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Themes Identified</strong></td>
<td><strong>Some kids need the food that is thrown away. Think twice before you toss!</strong></td>
</tr>
<tr>
<td>Some kids don't have enough food</td>
<td></td>
</tr>
<tr>
<td>Pounds of wasted food measured during plate waste study</td>
<td>Your school wasted 48lbs of fruits and vegetables in just two days - lettuce cut the waste!</td>
</tr>
<tr>
<td>&quot;Fortnite&quot; game reference</td>
<td>Wasting school food is like wasting your chug jugs. School food helps to keep you healthy and strong!</td>
</tr>
<tr>
<td>Save leftovers or donate to sharing station</td>
<td>Pretty peas think before you throw away! Save leftover fruits and packaged snacks for afterschool activities!</td>
</tr>
<tr>
<td>Only take what you will eat/drink</td>
<td>If you carrot all, stop food waste by only taking the foods and beverages that you are going to eat and drink from the cafeteria!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Breakfast Participation</strong></th>
<th><strong>Testing Messages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Themes Identified</strong></td>
<td><strong>Breakfast is an egg-cellent way to start the day! It's the what your brain and body need to go all day!</strong></td>
</tr>
<tr>
<td>Gives your energy</td>
<td></td>
</tr>
<tr>
<td>New menu items the school offers for breakfast</td>
<td>Fruit smoothies, pancakes, potato egg and cheese boats galore! Breakfast - what's not to love?</td>
</tr>
<tr>
<td>No time to eat breakfast</td>
<td>Even when you're in a rush, it does your body a waffle lot of good to eat in the morning!</td>
</tr>
<tr>
<td>Helps keep you healthy</td>
<td>Breakfast helps keep you from getting sick - be the best version of yourself with breakfast!</td>
</tr>
<tr>
<td>Time to socialize</td>
<td>School breakfast is a cereal-sly good time to socialize with your friends before your start your day!</td>
</tr>
</tbody>
</table>
Each message corresponding with an identified theme was then tested among every 7th grade homeroom class in order for students to rank their favorite messages from most to least liked. This ranking was done through an online module that was created with the help of the web development team in the College of Agriculture, Health and Natural Resources at University of Connecticut. Short video tutorials were recorded and embedded into the module to help guide students through each message voting screen. After each student voted on which Breakfast Participation and Food Waste message was their favorite, the results were tallied, and the following messages won the student voting contest:

"Some kids need the food that is thrown away. Think twice before you toss!"

"Breakfast is an egg-cellent way to start the day! It's what your brain and body need to go all day!"
The winning messages in the student voting contest were added to the tailored messaging program at the end of the PALS post survey for students to take a second time six months after the initial baseline survey.

4.4 Results

The initial survey sample (October 2018) consisted of 202 participants while the post survey (April 2019) included only 198. Recorded responses were excluded if students did not complete the survey. Table 2 depicts the demographic characteristics of survey participants at pre and post intervention. The percentage of male participants decreased from 54% in the pre-intervention survey sample to 48% in the post-intervention sample. While ethnic demographics stayed relatively similar at pre and post intervention, the mean age of student participants increased from 12 in the pre-intervention sample to 12.5 in the post-intervention sample. This is understandable since many 7th grade students likely had birthdays over the six-month intervention period.

Table 2: Characteristics of Survey Participants at Pre and Post Intervention

<table>
<thead>
<tr>
<th>Student Demographics</th>
<th>Fall 2018 (n=202)</th>
<th>Spring 2019 (n=198)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54.00%</td>
<td>48.00%</td>
</tr>
<tr>
<td>Female</td>
<td>46.00%</td>
<td>52.00%</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>22.50%</td>
<td>25.80%</td>
</tr>
<tr>
<td>Black</td>
<td>34.00%</td>
<td>32.30%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>10.00%</td>
<td>8.60%</td>
</tr>
<tr>
<td>Asian</td>
<td>2.00%</td>
<td>2.20%</td>
</tr>
<tr>
<td>Native Hawaiian or Pacific Islander</td>
<td>0.50%</td>
<td>1.10%</td>
</tr>
<tr>
<td>Other, does not specify</td>
<td>0.50%</td>
<td>2.20%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years old</td>
<td>10.50%</td>
<td>0.60%</td>
</tr>
<tr>
<td>12 years old</td>
<td>80.00%</td>
<td>54.70%</td>
</tr>
<tr>
<td>13 years old</td>
<td>8.50%</td>
<td>41.90%</td>
</tr>
<tr>
<td>14 years old</td>
<td>1.00%</td>
<td>2.80%</td>
</tr>
</tbody>
</table>
4.4.1 Food and Activity Liking Questions

At both pre and post intervention, there was a good classroom response rate to the liking survey and acceptable internal reliability of the Diet Quality (0.644 and 0.80, respectively) and Healthy Behavior (0.662 and 0.83, respectively) Indexes. Both indexes showed similar factor structure in pre and post-intervention.

Table 3 shows the average pre and post-intervention for the groups, the indexes and the liking of fun parks, which as expected, did not change from pre to post intervention. There was significant improvement in both indexes from pre to post-intervention, indicating healthier behaviors (Figure 3), with the biggest gains in liking for fiber-rich foods and biggest decreases in liking for sweets and screen-time, some improvements in liking for vegetables and fruits, and just significant increases in liking of protein and decreases in liking of salty foods. Surprisingly, from pre to post-intervention, the liking of sugary beverages increased significantly and liking for physical activities decline significantly, as well. Although the physical activity group decreased in liking from pre to post-intervention, liking for activity still remained high at post-intervention.
Table 3: Average liking of PALS groups and indexes pre and post-intervention

<table>
<thead>
<tr>
<th></th>
<th>Pre N</th>
<th>Pre</th>
<th>Post N</th>
<th>Post</th>
<th>K-S Test</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable Group</td>
<td>192</td>
<td>4.961</td>
<td>188</td>
<td>23.73</td>
<td>0.2772</td>
<td>0.000000</td>
</tr>
<tr>
<td>Dairy</td>
<td>193</td>
<td>32.27</td>
<td>188</td>
<td>30.23</td>
<td>0.1021</td>
<td>0.190000</td>
</tr>
<tr>
<td>Fruit</td>
<td>193</td>
<td>41.16</td>
<td>188</td>
<td>58.45</td>
<td>0.2798</td>
<td>0.000000</td>
</tr>
<tr>
<td>Sweet Group</td>
<td>193</td>
<td>55.33</td>
<td>187</td>
<td>8.689</td>
<td>0.5114</td>
<td>0.000000</td>
</tr>
<tr>
<td>Sweet Drinks</td>
<td>193</td>
<td>46.35</td>
<td>188</td>
<td>58.62</td>
<td>0.2487</td>
<td>0.000000</td>
</tr>
<tr>
<td>Sedentary Group</td>
<td>193</td>
<td>64.22</td>
<td>188</td>
<td>11.19</td>
<td>0.5959</td>
<td>0.000000</td>
</tr>
<tr>
<td>Active Group</td>
<td>193</td>
<td>48.72</td>
<td>188</td>
<td>40.26</td>
<td>0.2021</td>
<td>0.001000</td>
</tr>
<tr>
<td>Fiber Group</td>
<td>192</td>
<td>9.864</td>
<td>188</td>
<td>59.98</td>
<td>0.6104</td>
<td>0.000000</td>
</tr>
<tr>
<td>Salty Group</td>
<td>193</td>
<td>45.18</td>
<td>188</td>
<td>38.78</td>
<td>0.1399</td>
<td>0.040000</td>
</tr>
<tr>
<td>Protein Group</td>
<td>193</td>
<td>27.47</td>
<td>188</td>
<td>34.62</td>
<td>0.1658</td>
<td>0.009</td>
</tr>
<tr>
<td>School Lunch</td>
<td>185</td>
<td>-23.28</td>
<td>186</td>
<td>62.33</td>
<td>0.6208</td>
<td>0.000000</td>
</tr>
<tr>
<td>School Breakfast</td>
<td>126</td>
<td>-12.39</td>
<td>184</td>
<td>-30.47</td>
<td>0.1971</td>
<td>0.005</td>
</tr>
<tr>
<td>Fun Park</td>
<td>188</td>
<td>74.51</td>
<td>179</td>
<td>73.81</td>
<td>0.049</td>
<td>0.978</td>
</tr>
<tr>
<td>Diet Quality Index</td>
<td>193</td>
<td>-19.9</td>
<td>188</td>
<td>19.81</td>
<td>0.4746</td>
<td>0.000000</td>
</tr>
<tr>
<td>Healthy Behavior Index</td>
<td>193</td>
<td>-25.44</td>
<td>188</td>
<td>20.32</td>
<td>0.562</td>
<td>0.000000</td>
</tr>
</tbody>
</table>
Figure 3: Average liking of PALS groups and indexes pre and post-intervention

- **Vegetable Group**
  - Pre: D=0.2772, P=0.000 (Post>Pre)
  - Post: D=0.2772, P=0.000 (Post>Pre)

- **Dairy Group**
  - Pre: D=0.1088, P=0.19
  - Post: D=0.1088, P=0.19

- **Fruit Group**
  - Pre: D=0.2798, P=0.000 (Post>Pre)
  - Post: D=0.2798, P=0.000 (Post>Pre)

- **Sugary Beverages Group**
  - Pre: D=0.2487, P=0.000 (Post>Pre)
  - Post: D=0.2487, P=0.000 (Post>Pre)

- **Screen-time Group**
  - Pre: D=0.5959, P=0.000 (Post<Pre)
  - Post: D=0.5959, P=0.000 (Post<Pre)

- **Active Group**
  - Pre: D=0.2021, P=0.01 (Post<Pre)
  - Post: D=0.2021, P=0.01 (Post<Pre)

- **Salty Group**
  - Pre: D=0.1399, P=0.04 (Post<Pre)
  - Post: D=0.1399, P=0.04 (Post<Pre)

- **Protein Group**
  - Pre: D=0.1658, P=0.009 (Post>Pre)
  - Post: D=0.1658, P=0.009 (Post>Pre)

- **Fiber Group**
  - Pre: D=0.6104, P=0.01 (Post>Pre)
  - Post: D=0.6104, P=0.01 (Post>Pre)

- **Diet Quality Index**
  - Pre: D=0.4746, P=0.0000 (Post>Pre)
  - Post: D=0.4746, P=0.0000 (Post>Pre)

- **Healthy Behavior Index**
  - Pre: D=0.562, P=0.0000 (Post>Pre)
  - Post: D=0.562, P=0.0000 (Post>Pre)
The liking for the School Lunch increased significantly from pre to post intervention (Figure 4) from dislike to approximately really like it. However, unexpectedly, the average liking of the school breakfast program stayed in the disliking range and significantly decreased in liking across the intervention. Importantly, approximately 60 more students were able to report the level of liking and disliking of the school breakfast program at post-intervention.

**Figure 4**: Liking for School Lunch and Breakfast at Pre and Post-intervention

4.4.2 Food Security

For perceived food security, there were somewhat fewer students who reported that they sometimes or often felt worried that their food at home would out - 35% decrease in the number of students who reported sometimes and a 27% decrease in the number of students who reported often. There was also a decrease in the number of students who reported sometimes or often eating less because there wasn’t enough food at home - 20% decrease in the number of students who reported sometimes and a 50% decrease in the number of students who reported often. That being said, there was no significant change in the number of students who reported sometimes or often to experiencing hunger but not eating because there wasn’t enough food at home warranting more effort in the future to address this problem.
4.4.3 Breakfast Behaviors and Barriers

When it comes to breakfast, there was a 35% increase in the number of students who reported eating breakfast at school. Even so, there was also a 30% increase in the number of students who reported not eating breakfast at all. This could be explained by the 11% increase in the number of students from pre to post-intervention reporting that they are not at school in time to eat school breakfast. Additionally, 33% more students reported that they are not hungry in the morning at post-intervention. Lastly, there was a 34% increase in the number of students who reported that they don’t like what is being offered at school for breakfast everyday showing a need for additional efforts to promote the national school breakfast program at Sage Park Middle School.

4.4.4 Oral Health and Sleep

At post-intervention, there was a slight increase in the number of students who reported brushing their teeth twice a day, with 65% of students at post-intervention and only 61% at pre-intervention. Additionally, 75% of students reported receiving at least 8 hours of sleep each night at post-intervention, increasing from 63% at pre-intervention. Although this is so, this increase from pre to post-intervention was not statistically significant (p=0.585).

4.4.5 Tailored Messages

The majority of students received four tailored health messages at post-intervention, an increase from pre-intervention with students only receiving an average of three tailored messages. This increase is most likely attributed to the addition of the Breakfast Participation message and the Food Waste message that were added to the collection of tailored messages at post-intervention based on the feedback from the student focus groups. Additionally, significantly more students at post-intervention disagreed or were more neutral that the survey
got them to think about what they eat and do (χ²=5.89, p=0.052), and there was no significant
different in the rating of helpfulness of the messages from pre to post-intervention
(χ²=0.23, p=0.635).

As seen in Table 4, students were most willing to try decreasing their intake of sugar
sweetened beverages (SSB) and sweets, as well as, increasing their time spent doing physical
activity and drinking water. This willingness for these behaviors stayed relatively consistent
from pre to post intervention aside a 25% decrease in willingness to decrease SSB consumption
from pre to post intervention. Willingness to increase low-fat dairy and whole grain consumption
remained the lowest from pre to post intervention.

Table 4: Percentage of students willing to try each health behavior message topic at pre and post intervention

<table>
<thead>
<tr>
<th>Message Behavior</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreasing Sugary Beverages</td>
<td>78%</td>
<td>58%</td>
</tr>
<tr>
<td>Decreasing Sweets</td>
<td>66%</td>
<td>67%</td>
</tr>
<tr>
<td>Increasing Physical Activity</td>
<td>60%</td>
<td>59%</td>
</tr>
<tr>
<td>Increasing Vegetable Consumption</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>Increasing Whole Grain Consumption</td>
<td>32%</td>
<td>19%</td>
</tr>
<tr>
<td>Increasing Low-Fat Dairy Consumption</td>
<td>24%</td>
<td>24%</td>
</tr>
<tr>
<td>Increasing Fruit Consumption</td>
<td>42%</td>
<td>45%</td>
</tr>
<tr>
<td>Increasing Water Consumption</td>
<td>69%</td>
<td>67%</td>
</tr>
</tbody>
</table>

4.5 Discussion

This was a pre-post pilot study with school-based interventions supporting school meal
programs with student participation and engagement through breakfast and lunch food shows,
tabling events, student discussion groups, and online voting on health messages. Outcomes of interest were change in liking of foods and activities, as well as, liking for school meals, indexes of diet quality and healthy behaviors, and perceived food security status.

From pre to post intervention, improvement in both diet quality and healthy behavior indexes were seen – suggesting that overall behaviors were healthier at post-intervention. Additionally, liking for school lunch increased, but the liking for school breakfast decreased at post-intervention. Some improvement in mild food insecurity were reported, but there was no significant change in severe food insecurity (hunger) from pre to post intervention.

With school nutrition programs such as the National School Lunch and Breakfast programs linked to positive changes in meal patterns and nutritional outcomes among students (106), it was our hope that promotion and increased accessibility of these meals, at either no cost or at a reduced cost for low-income students, could have the potential to increase the perceived food security status of students.

The low reported liking of the school breakfast program in our survey is fairly consistent with previous studies. Earlier research has shown that when breakfast is available at school, participation tends to be low. A study published in 2011 found that among third-grade public school students with access to the program, 44% “usually” participate, according to parental report, compared with 88% who usually eat school lunch (107). Since participation in school meals has been linked to positive changes in both nutritional and academic outcomes (108,109), it’s important that research continues to explore possible interventions to motivate students to engage in the school meal programs that are offered at their school.

A main limitation of this study was that the school-based activities included in the intervention were only loosely connected with the PALS survey that the students took.
Additionally, there was no control group used in the design of this pilot study. Therefore, the changes in diet and activity behaviors from pre to post intervention might not have necessarily been directly due to the intervention. Even so, the main strength of this study is its participatory nature. By engaging students through technology-based learning and fun, food-focused events, we saw improvements in overall diet quality and were able to collect crucial information about the likes, dislikes, activities, and perceived food security of middle school students. With previous research showing that liking for foods can serve as a proxy for dietary intake (61-64), the information gained from this study can help to better guide future health and nutrition interventions in this population.

4.6 Conclusion

It is clear that effective and feasible tailored health behavior interventions are needed in order to combat poor dietary and sedentary behaviors in children and adolescents. With high student engagement and improvements in overall diet quality, our study was feasible, well accepted, and is the first step to improve liking to promote behavior change. Based on these findings, areas for future research should focus on re-administering the PALS food and activity survey collecting identifiable information in order to conduct a pre-post within child measures study. This would allow for researchers to see changes in diet and activity preference at the individual student level. Efforts should also be taken to pilot the EAMAIL game with a larger student sample, possibly in a younger, elementary age group. Lastly, it is important that additional efforts to improve breakfast consumption and food security in Windsor are addressed through continued collaboration with community stakeholders such as the Hunger Action Team and district officials.
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Appendix A
DATE: June 5, 2018

TO: Valerie Duffy, Ph.D., RD
    Allied Health Sciences

FROM: Michael Fendrich, Ph.D.
    Institutional Review Board Member
    FWA #00007125

RE: Protocol #: H18-032, “Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promotion.”
    Funding Source: USDS/Hatch (Pending)

Approval Period: From: June 5, 2018 Valid Through: June 5, 2019
“Expiration Date”

On April 25, 2018, the Institutional Review Board (IRB) reviewed the above-referenced research study by expedited review and determined that modifications were required to secure approval. Those requirements have been met, and the IRB granted approval of the study on June 5, 2018. The research presents no more than minimal risk to human subjects and qualifies for expedited approval under category #7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Enclosed is the validated parental notification form and assent form. **A copy of the approved, validated notification and assent form (with the IRB’s stamp) must be used to notify and assent each subject.**

The IRB determined that parental permission can be waived for this study because it meets the criteria for Waiver of Informed Consent stated in 45 CFR 46.116(d) as follows:

- The research involves no more than minimal risk to the subjects;
- The waiver or alteration will not adversely affect the rights and welfare of the subjects;
- The research could not be practicably carried out without the waiver or alteration; and
- Whenever appropriate, the subjects will be provided with additional pertinent information after participation in the study.

All investigators at the University of Connecticut are responsible for complying with the attached IRB “Responsibilities of Research Investigators.”
Re-approval: It is the investigator's responsibility to apply for re-approval of ongoing research at least once yearly, or more often if specified by the IRB. The Re-approval/Completion Form (IRB-2) and other applicable re-approval materials must be submitted one month prior to the expiration date noted above.

Modifications: If you wish to change any aspect of this study, such as the procedures, the consent forms, the investigators, or funding source, please submit the changes in writing to the IRB using the Amendment Review Form (IRB-3). All modifications must be reviewed and approved by the IRB prior to initiation.

Audit: All protocols approved by the IRB may be audited by the Research Compliance Monitor.

Please keep this letter with your copy of the approved protocol.

Attachments:
1. Validated IRB-1 Application & Study Protocol
2. Validated Parental Notification Form
3. Validated Study Survey with Assent
4. Validated Script
5. Validated Appendix A Form
6. “Responsibilities of Research Investigators”
DATE: July 23, 2019

TO: Valerie Duffy, Ph.D., RD
Allied Health Sciences

FROM: Pamela I. Erickson, Ph.D.
Chair, Institutional Review Board
FWA #00007125

RE: Protocol #: H18-032, “Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promotion.”
Funding Source: USDS/Hatch

Approval Date: July 22, 2019

The Institutional Review Board (IRB) re-approved this protocol on July 22, 2019. The research presents no more than minimal risk to human subjects and qualifies for expedited approval under category #7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Enclosed is the validated parental notification form. A copy of the approved, validated notification form (with the IRB’s stamp) must be used to notify each subject.

Since this study expired on June 5, 2019, the IRB acknowledges that: a) no participants have been enrolled since the expiration date; b) no participants will be enrolled until the study has been re-approved; and c) no research has been conducted since the expiration date.

The IRB determined that parental permission can be waived for this study because it meets the criteria for Waiver of Informed Consent stated in 45 CFR 46.116(d) as follows:

- The research involves no more than minimal risk to the subjects;
- The waiver or alteration will not adversely affect the rights and welfare of the subjects;
- The research could not be pracitcally carried out without the waiver or alteration; and
- Whenever appropriate, the subjects will be provided with additional pertinent information after participation in the study.

All investigators at the University of Connecticut are responsible for complying with the attached IRB “Responsibilities of Research Investigators.”

Modifications: If you wish to change any aspect of this study, such as the procedures, the consent forms, the investigators, or funding source, please submit the changes to the IRB using the Amendment Review
Form (IRB-3) in InfoEd. The IRB must review and approve all modifications must prior to implementation.

**Audit**: All protocols approved by the IRB may be audited by the Research Compliance Monitor.

*Please keep this letter with your copy of the approved protocol.*

**Attachments:**
1. Validated IRB-2 Re-approval Form
2. Validated General Parent Information Letter
3. Validated Parental Notification Form
4. Validated Script Read in Class
5. “Responsibilities of Research Investigators”
IRB-1 Study Protocol

Protocol Version # and/or Date:
Version # 1/January 31, 2018
Version # 2/May 9, 2018

Study Protocol Title: Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promotion

Clinical Trial/GCP Training
Is this a research study in which one or more human subjects are prospectively assigned\(^1\) to one or more biomedical or behavioral interventions\(^2\) (which may include placebo or other control) to evaluate the effects of those interventions on health-related biomedical or behavioral outcomes\(^3\) (i.e. a clinical trial)? Indicate “yes,” “no,” or “N/A” in the space immediately below.

No

Is the study fully or partially funded by the NIH? Indicate “yes,” “no,” or “N/A” in the space immediately below.

No

Have the required key personnel completed Good Clinical Practice (GCP) Training? Indicate “yes,” “no,” or “N/A” in the space immediately below. (Note that IRB approval will not be given for NIH funded clinical trials until all required key personnel complete the GCP training.)

Good Clinical Practice training has been completed by the principal investigator.

\(^1\)The term “prospectively assigned” refers to a pre-defined process (e.g., randomization) specified in an approved protocol that stipulates the assignment of research subjects (individually or in clusters) to one or more arms (e.g., intervention, placebo, or other control) of a clinical trial.

\(^2\)An intervention is defined as a manipulation of the subject or subject’s environment for the purpose of modifying one or more health-related biomedical or behavioral processes and/or endpoints. Examples include: drugs/small molecules/compounds; biologies; devices; procedures (e.g., surgical techniques); delivery systems (e.g., telemedicine, face-to-face interviews); strategies to change health-related behavior (e.g., diet, cognitive/behavioral therapy, exercise, development of new habits); treatment strategies; prevention strategies; and, diagnostic strategies.

\(^3\)Health-related biomedical or behavioral outcome is defined as the pre-specified goal(s) or condition(s) that reflect the effect of one or more interventions on human subjects’ biomedical or behavioral status or quality of life. Examples include: positive or negative changes to physiological or biological parameters (e.g., improvement of lung capacity, gene expression); positive or negative changes to psychological or neurodevelopmental parameters (e.g., mood management intervention for smokers; reading comprehension and/or information retention, behavioral intervention for psychiatric symptoms); positive or negative changes to disease processes; positive or negative changes to health-related behaviors; and, positive or negative changes to quality of life.
Research Plan

Purpose/Introduction:
The reason for this feasibility study, in partnership with the Sage Park Middle School in Windsor, CT, is three-fold:

1) Use Qualtrics online survey to screen for 7th and 8th graders usual diet and physical activity behaviors, sleep quality, school meal participation (barriers/facilitators), media use and perceived body size and food security.
2) From the reported usual diet and physical activity behaviors, provide a tailored message with follow-up secondary message that is supporting and encouraging health behaviors.
3) Use the composite findings from surveying the students to develop general health promoting messages for the school and to share with stakeholders (students, family, school, community) to support healthy behaviors of the student, improve participation in and consumption of the school meals, and develop programs to improve level of food insecurity.

The research questions are consistent with the reason for the study.

1) The online platform provides a feasible method within a school health class for the child to self-report their behaviors and feelings
2) Students will report that the survey made them think about their behaviors and move them to behavioral improvements.
3) The messages tailored to the student’s reported behaviors will be perceived as relevant (useful) and that they intend to try to improve the behavior.
4) Stakeholders will report that the information collected is useful for marketing and improving the school meals and identifying the level of food security/insecurity.

The goal of this research is to involve stakeholders to address an identified problem — poor student diet habits, risk of excessive adiposity, low participation in the school meals, particularly the school breakfast program, and high levels of food insecurity as identified by high use of the back-pack program to provide food over the weekend for students. Based on our work within the healthcare setting, we want to adapt the diet and physical activity online survey with tailored messages and messages campaign in a school setting and connect with the local food and health environment.

Background

Tailored nutrition advice produces greater changes in diet behaviors than that just from nutritional recommendations [1] and can be delivered via computer [2] or Internet [1]. Tailoring is usually to self-reported behaviors compared with behavior change goals and recommendations [2]. Grounded in the Transtheoretical Model and Social Cognitive Theory [2], technology-delivered communications can provide advice, motivate and promote available healthy options. From a systematic review, there is a need for better measures of self-reported behavior for tailored diet messages.

Conventional measures ask individuals to recall recent dietary intake (e.g., 24-hour recall) or usual frequency from a listing [3, 4]. Recall of behavior is cognitively challenging [5], time intensive and often misreported [6]. Screening usual dietary consumption patterns by asking likes/dislikes appears a feasible alternative to recall of behavior. Reported food liking correlates with reported intake [7-9]. With scholarly outputs from previous Hatch funding, we found that reported liking correlates with self-reported intake [10] and with biomarkers of dietary intake and/or adiposity in children [10], young adults [11], and adults [12, 13]. Liking survey responses can be formed into an index of diet quality (similar to the healthy eating index [14]) that explains variability in serum carotenoid status in children [10] and cardiovascular
disease risk factors [11, 15] and weight [16] in adults. **These data support that a liking survey can serve as a screening for usual dietary behaviors and diet healthiness (i.e., diet quality).**

Via collaborations with Dr. Sharon Smith at CT Children’s Medical Center, UConn students, and coordination with SNAP-Ed, screening of diet behaviors in a clinical setting is fast, with high response rate and excellent clinical-home test-retest reliability [17]. In an observational study of children who receive usual health care at CCMC PED [18], the child and parent completed the our Pediatric-Adapted Liking Survey (PALS), which asked liking/disliking of foods/ beverages, physical activities, and sedentary behaviors. The responses were constructed into a Healthy Behavior Index (HBI), which was normally distributed, had adequate internal reliability, and construct validity. The HBI detected differences by gender (females>males), age (older> younger), parent>child, health insurance (private>public), proxy of family income, and community demographics and food security (higher income/food security>lower income/food security). The HBI failed to explain adiposity across all children. However, a healthier parent index (not child index) was associated with lower adiposity among healthy weight children. **These data support that the liking survey is feasible in a clinical setting and can generate a useful index of diet quality and healthy behaviors. However, it was challenging to provide immediate and tailored feedback to parents and children with the paper/pencil PALS.**

Last year we put the PALS and additional health/nutrition questions (eg, dental health [19], food insecurity, body image, sleep) online. Children appear more likely to provide socially desirable responses on paper/pencil surveys versus computer surveys [20]. Researchers and public health experts support directly asking children about food insecurity [21, 22] to improve the understanding of its effects and changes with the food environment. Children who are food insecure are at greater risk of lower academic achievement [23], depression [22], unhealthy diets [24] and obesity [25]. Internet-based tools may be a way of assessing feelings and concerns of among young adolescence [26]. From over 300 parent/child dyads who each completed the survey, both reported high satisfaction with using the tablet to take the survey (>90% reporting agree with ease of use, understanding, and that the survey was fun) and that doing the survey made them think about what they currently eat and do. **Thus, an online version of the PALS is feasible in a clinical setting; doing the PALS gets children and parents to think about their diet and physical activity. We hypothesize that the online PALS will encourage honest reporting by children, including those who have risk of overweight and obesity.**

We have met preliminary requirements of a tailored message system [27]. From the previous PED cohort [18], we developed algorithms from the liking responses to trigger encouragement and positive reinforcement of healthy eating and physical activity [28]. From interactions and feedback with 300 middle schoolers (3 separate school districts), we developed brief messages on sugar-sweetened beverages, water, fruit, and physical activity and screen time. Thus, with the online platform, we can provide children and parents immediate tailored messages and reinforcing handouts. These tailored messages work within the constructs of the social cognitive theory, supporting intentions to change behavior and subsequent changes in behavior [29, 30]. The tailored messages were piloted tested on 138 participants. Eighty-four percent received a tailored message and 16% received a generic message about drinking water. Between 80 and 85% of the children and parents reported that they learned something new from the messages and between 80 and 90% reported that the messages were helpful and that they would like to receive similar messages in the future.

For EACH Participant Population State the Number of Participants to be Enrolled and Screened and/or the number of participant records reviewed (including, HIPAA covered health records and FERPA covered school records), if applicable:

We will recruit all of the 7th and 8th in the Sage Park Middle School in Windsor, CT (n=700).

The students will be recruited by the teacher through the health class (script below). The survey will be part of the class activity for all students and consistent with State of Connecticut
All students have access to a Chromebook at school. All students will have the ability to participate.

**Health Teacher Survey Introduction Script:** Today, Heidi Karner is going to visit our class to talk to you all about the Eat And Move As I Like program. She is a UConn student working on her Master’s Degree. She is also a Registered Dietitian and loves teachings kids about wellness and nutrition. She is going to speak to you all about an online survey that asks you about how much you like certain foods, beverages, school meals, and physical activities. Your responses to these questions will not affect your relationship with your school or your grade in this class.

**Justification of Sample Size:**

For justification of sample size, this feasibility study aims to be representative of the school and to address the reason for the research, hypotheses, and goal.

**Enrollment of UConn Students and/or Employees:**

Not applicable.

**Enrollment of Key Personnel, Spouses or Dependents/Relatives:**

Not applicable.

**For EACH Participant Population Describe Screening Procedures, if applicable:**

There are no screening procedures as all students enrolled in the school health class are invited by the health teacher to participate with parent notification and student assent.

**Anticipated Study Time Frame:**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of study coordinator by the health teacher</td>
<td>1 minute</td>
</tr>
<tr>
<td>Liking survey (35 items)</td>
<td>&lt;10 minutes</td>
</tr>
<tr>
<td>Usability Questions (5 questions)</td>
<td>1 minute</td>
</tr>
<tr>
<td>Messages (1-3 messages)</td>
<td>1-2 minutes</td>
</tr>
<tr>
<td>Message Responses (6 questions)</td>
<td>1-2 minutes</td>
</tr>
</tbody>
</table>

**Design, Procedures, Materials and Methods:**

[Describe opportunities provided to participants to ask questions in order for them to make an informed decision regarding participation.]

This is a feasibility study toward addressing the research questions. All 6th, 7th and 8th grades from Sage Park Middle School (Windsor, CT) will be recruited by their teacher through their health class (n=700) after sending out parental notification and waiting 3 weeks for parent to refuse the child participate in the study. The health teacher will introduce the student coordinator who will be present while the students take the survey to answer any questions. All students have access to Chromebook computers while at school. Students will complete the survey as part of the work of class and consistent with the State of CT,
Department of Education Comprehensive School Health Education (http://portal.ct.gov/SDE/Health-Education/Comprehensive-School-Health-Education). The face page of the survey provides the student with information about the purpose, the procedure, risks/benefits, confidentiality, voluntary participation, and if they have additional questions.

The figure below shoes the sequence of interaction with the Qualtrics program.

- First, children will complete the Qualtrics-based survey with 35 item liking survey (foods, beverages, physical activities, sedentary behaviors), sleep quality, school meal participation (barriers/facilitators), media use and perceived body size and food security.

- Second, students will respond to usability questions and if the survey made them think about what I eat and what I do.

- Third, based on their liking survey responses, the child will receive tailored or generic messages within the Qualtrics program that will show up on their screen. They will either receive a single message or a series of messages. Whether or not they receive a tailored or a generic message is based on algorithms from a previous cohort of children from the Connecticut Children’s Medical Center (CCMC). The tailored messages have the theme of healthy diet and physical activity recommendations following the USDA Dietary Guidelines 2015. The generic message is prompted when the child did not meet any of the criteria of a specific tailored message. For example, they would receive a generic message if they said that they liked all healthy foods, beverages and physical activities. The generic messages reinforce the importance of drinking water as a healthy beverage. Based on our work at the CCMC with this Qualtrics program, we estimate that 10% of children will receive a generic message about the importance of drinking water. A sample of the messages is attached to the IRB document.

- Finally, The Qualtrics program will then ask the student who receives a specific, tailored message to pick the most useful/relevant message. All children will be asked to report on their readiness to make that specific behavior change in regards to the topic that was introduced through the message.

We aim for the Qualtrics interaction (survey responses and messages) to average approximately 20 minutes to complete as shown below. The online survey is attached to the IRB document.

<table>
<thead>
<tr>
<th>Liking survey (35 items)</th>
<th>&lt;10 minutes</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Message Responses (6 questions)</td>
<td>1-2 minutes</td>
</tr>
</tbody>
</table>

We will share the feasibility study results with our collaborators and key stakeholders (parents, teachers, students, administrators, Family Resource-affiliated professionals, and the Windsor Hunger Action Team) to discuss key gaps in healthy eating behaviors and identify strategies and messages to address these gaps.
Data Analysis:

We will use descriptive analysis, comparing survey responses against Dietary Guidelines 2015 and other health recommendations. We also will conduct analysis including statistical modeling to understand patterns of association in the data. We will share the results of these analyses with our collaborators and stakeholders to discuss key gaps in healthy behaviors and identify strategies and messages to address these gaps. These messages will focus on simple, feasible steps that children can adopt to improve their health behaviors.

Inclusion/Exclusion Criteria:

The only inclusion criteria are 6th, 7th, and 8th graders who are enrolled in a health education class at the school. As usual to the school procedures, materials are sent home in English only with the expectation that the student can read the information if the family does not speak English. Thus, there is no exclusion of families who do not speak English. We would have no way of knowing this information.

Potential Harms/Risks and Inconveniences:

The survey will take up to 20 minutes to complete, which is an inconvenience. No identifiable information is collected.

Benefits:

Children will receive short, tailored nutrition education messages based on their individual responses to survey questions. They will also be able to receive fun, in-class nutrition education lessons by a UConn student who is introducing the survey. The study will benefit society in general by enabling researchers to directly assess the health behaviors, school nutrition participation and perceived food security level of the participating kids. This information can be used to justify and better tailor future health promotion efforts in this area.

Risk/Benefit Analysis:

The risks are low and the potential benefit higher as a way to learn more about school-based efforts to promote healthy behaviors among adolescents.

Economic Considerations:

Participants will receive a small incentive (worth less than $4) that reinforces healthy eating. This incentive is not a cash or gift card, but instead, something like a PopSocket mobile phone accessory with the USDA MyPlate symbol promoting a healthy diet imbedded on it.

Data Safety Monitoring:

Survey results will be monitored by the PI in conjunction with the student investigator once every two weeks (items 1, 2 and 3). Survey responses will be reviewed to monitor for clarity (i.e., the same question
is skipped by 5 or more participants). In that case, the question will be revised and an amendment will be submitted to the IRB (items 4, 5 and 6).

The following address the six issues for a plan for data safety monitoring:

1. Data will be monitored and collected biweekly during active data collection. The survey will also be monitored every week to ensure the the survey is functioning properly.
2. The principal investigator, Valerie Duffy, and student investigator, Heidi Karner, will monitor the data.
3. Survey responses will be reviewed to monitor for clarity (i.e., the same question is skipped by 5 or more participants) and adherence to the IRB protocol will be reviewed (eg, consent process, data collection procedure, inclusion/exclusion, risk/inconveniences, risk/benefit, economic considerations, confidentiality), and plans for continued research. New data collected will be monitored for adherence to IRB-procedures.
4. The data will be reviewed for missing values and incomplete surveys.
5. The principal investigator will work with the graduate student to interpret and analyze the data. Collaboration between the PI and the graduate student will assure the appropriate analysis of the data and the appropriate conclusions.
6. The principal investigator in conjunction with the graduate student, as appropriate, will make decisions on needed deviations from the IRB-protocol based on the risk/benefit assessment; the PI is responsible to assure that these deviations are approved by the IRB and implemented. The PI also works with the graduate student for scholarly activities and outputs (eg, scientific papers, grants) and for decision on termination of protocols.
7. We will share preliminary results of the survey finding monthly with the school/community stakeholders.

The PI will serve as the DSMO for the projects described in this IRB application and for communications between these projects and the IRB.

**Privacy/Confidentiality Part 1:**

The survey is going to be completely anonymous using Qualtrics as a medium. We will not collect any personally identifiable information. The subject’s name, e-mail IP address, and other personal information will not be recorded, as it does not pertain to the information that is necessary to be recorded.

**Privacy/Confidentiality Part 2: Complete the Data Security Assessment Form:**

Please see attached.

**Informed Consent**

As PI, you are responsible for taking reasonable steps to assure that the participants in this study are fully informed about and understand the study. Even if you are not targeting participants from “Special Populations” as listed on page 4, such populations may be included in recruitment efforts. Please keep this in mind as you design the Consent Process and provide the information requested in this section.
Consent/permission Setting:
Requesting a waiver of parental permission

Capacity to Consent:
Requesting a waiver of parental permission

Parent/Guardian Permission and Assent:
Requesting a waiver of parental permission

For the child assent, the online survey starts with a face page that provides the student with information about the purpose, the procedure, risks/benefits, confidentiality, voluntary participation, and if they have additional questions. At the end of the face page, the student has to assent online to participate to be taken to the online survey.

Documentation of Consent:
The Health Teacher will send home and collect all Parental Notification Forms. Parents and/or students who do not wish to participate in our study will be instructed to inform their health teacher and will have the right to submit a Notification of Refusal Form. A supplemental online assignment determined by the health education teacher will be given to complete in place of the survey during the health education periods that survey will be administered. Parents/guardians will have a period of two week to sign and submit the Notification of Refusal Form to the health education teacher.

Waiver or Alteration of Consent:
[The IRB may waive or alter the elements of consent in some minimal risks studies. If you plan to request either a waiver of consent (i.e., participants will not be asked to give consent), an alteration of consent (e.g., deception) or a waiver of signed consent (i.e., participants will give consent after reading an information sheet), please answer the following questions using specific information from the study:]

Waiver (i.e. participants will not be asked to give consent) or alteration of consent (e.g. use of deception in research):

- Why is the study considered to be minimal risk?
  The participants will respond to questions, most are not sensitive in nature. Reporting level of food security/insecurity is sensitive. However, the participants are reporting without identifying information. Responding to the questions online will evoke minimal risk to the participants.

- How will the waiver affect the participants’ rights and welfare? The IRB must find that participants’ rights are not adversely affected. For example, participants may choose not to answer any questions they do not want to answer and they may stop their participation in the research at any time.
Participants may choose not to answer any questions they do not want to answer and they may stop their participation in the research at any time.

- Why would the research be impracticable without the waiver? For studies that involve deception, explain how the research could not be done if participants know the full purpose of the study.

The waiver would link the participants to the responses, which is a potential loss of autonomy.

- How will important information be returned to the participants, if appropriate? For studies that involve deception, indicate that participants will be debriefed and that the researchers will be available in case participants have questions.

The participant will receive healthy messages once that is tailored to their responses.

Waiver of signed consent (i.e. participants give consent only after reading an information sheet):

- Why is the study considered to be minimal risk?

The participants will respond to questions, most are not sensitive in nature. Reporting level of food security/insecurity is sensitive. However, the participants are reporting without identifying information. Responding to the questions online will evoke minimal risk to the participants.

- Does a breach of confidentiality constitute the principal risk to participants? Relate this to the risks associated with a breach of confidentiality and indicate how risks will be minimized because of the waiver of signed consent.

Even if a breach of confidentiality is to occur, it will not constitute a principal risk to participants because the study data are not tied to and cannot identify the participants.

- Would the signed consent form be the only record linking the participant to the research? Relate this to the procedures to protect privacy/confidentiality.

A signed consent form would be the only record linking the participants to the research. Hence, we ask for a waiver of obtaining signed informed consent, as this act would result in loss of anonymity.

- Does the research include any activities that would require signed consent in a non-research setting? For example, in non-research settings, normally there is no requirement for written consent for completion of questionnaires.

No.

References / Literature Review:


Parental Notification Form Regarding Participation in a Research Study

University of Connecticut

Principal Investigator: Valerie B. Duffy, PhD, RD
Student Researcher: Heidi Karner, RD
Study Title: Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promotion
Sponsor: The United States Department of Agriculture

Researchers from the University of Connecticut are conducting a research study at your son/daughter’s school. This form will give you the information you will need to understand why this study is being done. Also, this form tells what you need to do if you DO NOT want your son/daughter to participate. We encourage you to take some time to read about the study and to discuss it with your son/daughter. We also encourage you to ask questions now and at any time. If you decide to allow your son/daughter to participate, no further action is required. Your son/daughter will automatically be enrolled in the study. However, if you decide that you DO NOT want your son/daughter to participate or if you decide later that you would rather not have your child’s data be used in the study, please sign the attached form and return it to your son/daughter’s teacher by date ________________.

Overview of Research
This research is about health behaviors of middle schoolers. We hope to survey many of the middle schoolers at your son/daughter’s school. We will share the findings with students, families, and teachers. We also will share the findings with people who support access to healthy food in your community. The goal is to develop a messages program to support children’s healthy behaviors. We also want to improve the school breakfast and lunch programs. We want to improve children’s access and acceptance of these meals at school. And, we want to support children eating healthy breakfast and lunch.

What are the study procedures? What will my son/daughter be asked to do?
This study involves doing a survey as part of health class. The survey is online. They will take on the Chromebook they use at school. We will ask your son/daughter what he/she likes to eat or do. We will ask them other health questions about sleep, use of media, their body size and if they get enough food to eat. We will ask them about breakfast and breakfast served at school. The survey takes about 20 minutes to complete.

At the end of the survey, your son/daughter will receive 1-3 short health messages. These messages were developed for children to encourage and promote healthy diet and physical activities.

If you DO NOT want your son/daughter to participate, what will he/she do instead?
You do not have to provide permission for your son/daughter to participate in a research study. You can notify us that you do not want your child to participate. If you say yes now you can still change your mind later.

UConn IRB PROTOCOL H18-032 APPROVED 6/5/18
Your son/daughter may say yes or no. Your son/daughter may change his/her mind later. Your child does not have to answer any questions that he/she does not want to answer. In place of the survey, your son/daughter can do another online activity determined by their health teacher.

What are the risks or inconveniences of the study?
We believe there are no known risks to your son/daughter because of his/her participation in the research study; however, a possible inconvenience may be the time it takes to complete the study.

What are the benefits of the study?
At the end of the survey, you son/daughter will receive some simple messages that encourage healthy behaviors. Later, all of the children’s responses will be summarized. This information will be shared with the children, families, school and community to help develop health promotion messages.

How will my son/daughter’s information be protected?
Your son/daughter’s participation will be anonymous. This means that their name, address or any other identifying information will not be collected. Your son/daughter will not be contacted in the future. Your son/daughter’s participation will not affect his/her relationship with their school.

We will do our best to protect the confidentiality of the information we gather from you but we cannot guarantee 100% confidentiality. Your confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties.

You should also know that the UConn Institutional Review Board (IRB) and Research Compliance Services may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your child’s responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

Can my son/daughter stop being in the study and what are my and my son/daughter’s rights?
Your son/daughter does not have to be in this study if you do not want him/her to participate. If you decide to allow your child to be in the study, but later change your mind, you may withdraw your child at any time. Even if your child has completed the study, you may decide NOT to have your child’s data used in the study. There are no penalties or consequences of any kind if you decide that you DO NOT want your child to participate.

Whom do I contact if I have questions about the study?
We will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the principal investigator, Valerie Duffy at valerie.duffy@uconn.edu or the student researcher Heidi Karner at heidi.karner@uconn.edu. If you have any questions concerning your child’s rights as a research participant, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802.
Parental Notification Form Regarding Participation in a Research Study

University of Connecticut

Principal Investigator: Valerie B. Duffy, PhD, RD
Student Researcher: Heidi Karner, RD
Study Title: Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promotion

Notification of Refusal:
I have read this form and decided that I DO NOT give permission for my son/daughter to participate in the study described above. My signature also indicates that I have received a copy of this parental notification form. Please return this form to the son/daughter’s teacher by (______________).

Print Son/Daughter’s Name:

Parent/Guardian’s Signature:  Print Name:  Date:

Relationship (e.g. mother, father, guardian): ________________________________
Health Teacher Survey Introduction Script:

Today, Heidi Karner is going to visit our class to talk to you all about the Eat And Move As I Like program. She is a UConn student working on her Master’s Degree. She is also a Registered Dietitian and loves teachings kids about wellness and nutrition. She is going to speak to you all about an online survey that asks you about how much you like certain foods, beverages, school meals, and physical activities. Your responses to these questions will not affect your relationship with your school or your grade in this class.
## Appendix A: Key Personnel and Study Investigators Log/Personnel Amendment Form

**Instructions:** The IRB must review and approve all changes to the Key Personnel, before implementation in the field. Submit this log at the time of initial review and at continuing review if changes are being made. Include the complete list of UConn Key Personnel and non-UConn Investigators. In addition, submit this form and an IRB-3 Amendment Request Form, to add or remove individuals to the protocol throughout the approval period.

<table>
<thead>
<tr>
<th>UConn Key Personnel Engaged in Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i.e. enroll participants, conduct consent process, collect or review data/identifiable information from participants, intervene/interact by performing invasive procedures, have access to information that links participants’ names or other identifiers with their data, or act as authoritative representatives for the investigators) – Provide the following information for each person:</td>
</tr>
</tbody>
</table>

**Important:** Please be specific. For example, the term “Co-Investigator” is not sufficient. You must describe the specific role (e.g. “Co-Investigator – train confederates”). For student directed research, the role of the PI may be described as “PI – oversee/mentor student researcher.” For full board and expedited studies, include the specific procedures (e.g. blood draws, interview, survey distribution, acting as a confederate) each person will perform and his/her experience/training with this procedure.

PI: Duffy, Valerie B

Protocol Title:
Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promot

**Updated By:** Valerie B Duffy @ 31-Jan-2018 08:30:59 PM

UConn IRB PROTOCOL H18-032 APPROVED 6/5/18
<table>
<thead>
<tr>
<th>Name</th>
<th>Start Date</th>
<th>End Date</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duffy, Valerie B</td>
<td>31-Jan-2018</td>
<td></td>
<td>PI</td>
</tr>
</tbody>
</table>

Role/Primary Function Performed in Study (see Important Note Above)
- oversee/mentor student researcher; assure IRB compliance, data management, data analysis and reporting

Graduate/Undergraduate Student? [ ]
<table>
<thead>
<tr>
<th>Name</th>
<th>Role/Primary Function Performed in Study Graduate/Undergraduate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heidi Karner</td>
<td>Day-to-day interactions with the school system and coordination of the research; work with the PI to assure IRB compliance, data management, data analysis and reporting.</td>
</tr>
<tr>
<td>Name:</td>
<td>Affiliated Institution</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION I: General Information

* Type of Research: Faculty

Study Title:
Online health behavior survey of tweens/adolescents to deliver tailored health promotion messages and provide direction for school-based health promot

* Study Objective (2-3 sentence summary of study):
The reason for this pilot study, in partnership with the Sage Park Middle School in Windsor, CT, is three-fold:
1) Use Qualtrics online survey to screen for 7th and 8th graders usual diet and physical activity behaviors, sleep quality, school meal participation (barriers/facilitators), media use and perceived body size and food security.
2) From the reported usual diet and physical activity behaviors, provide a tailored message with follow-up secondary message that is supporting and encouraging health behaviors.
3) Use the composite findings from surveying the students to develop general health promoting messages for the school and to share with stakeholders (students, family, school, community) to support healthy behaviors of the student, improve participation in and consumption of the school meals, and develop programs to improve level of food insecurity.

PI and Correspondent Information:
Principal Investigator (PI) Correspondent
NameDuffy, Valerie B Name:
* Department: Allied Health Sciences
* Preferred Phone #: Preferred Phone #:
203-671-7146 203-671-7146
Investigator Emergency Phone # (Required Full Board, More than Min. Risk only):
203-671-7146

* Are there additional key personnel to be listed on this study? Yes No

Section II: Collaborating Institutions/Facilities and Other IRB Reviews

* Will the research be conducted only at Storrs and/or the five regional campuses, School of Law, or School of Social Work with no involvement of a collaborating institution? Yes No

Collaborating Institutions with a Collaborative Agreement with UConn-Storrs
UConn has formal agreements with the University of Connecticut Health Center (UCHC), Hartford Hospital (HH) and the Connecticut Children’s Medical Center (CCMC) that authorize one IRB to take the lead with some research protocols. This decision is made by the IRBs involved, but the PI may request which IRB he/she prefers to be the IRB of record. See the IRB website for additional information. If you are collaborating with one of the institutions listed below, place an “check” in the appropriate cell to indicate which institution, based on the preponderance of expected enrollment, you are requesting serve as the IRB of record or that independent IRB approval will be sought from each applicable site. If you request that UConn-Storrs be the IRB of record, place an “check” in the appropriate cell.

<table>
<thead>
<tr>
<th>Institution Name</th>
<th>% to be enrolled/consented</th>
<th>Requested IRB of Record</th>
<th>Independent IRB Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>UConn Health Center</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hartford Hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connecticut Children's Medical Center</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UConn – Storrs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Provide additional comments as needed:
If the PI, Student Researcher or other Key Personnel has an affiliation/appointment with an Institution listed above, please explain:

Other Collaborating Institutions/Facilities
If you are collaborating with other sites, provide the name of each institution/facility (e.g. other university, K-12 school, nursing home, tribal affiliation, etc.) and describe the type of involvement of each institution (e.g. recruitment, enrollment/consenting, study procedures, follow-up, data analysis). Indicate if IRB approval/site permission is attached (indicate yes, no, or pending). You will need to obtain IRB approval from...
every collaborating institution that has an IRB before you can initiate research there. Note: tabbing out of the bottom right cell will insert another row if needed.

<table>
<thead>
<tr>
<th>Name of Institution</th>
<th>Describe Involvement</th>
<th>IRB Approval/Site Permission Attached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windsor Public Schools</td>
<td>Partnership to work together on a messaging program to support healthy behaviors of middle schoolers in their district.</td>
<td>Yes No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes No</td>
</tr>
</tbody>
</table>

Provide additional comments as needed:

If the PI, Student Researcher or other Key Personnel has an affiliation/appointment with an Institution listed above, please explain:

Heidi Karner, the masters student on the project, works as a consultant in the Windsor Public Schools with the Foodservice Department. She does things like writes menus, tests new recipes, assures identification and management of student food allergies.

International Research

* Will any aspect of the study take place outside of the United States? Yes No

SECTION III: Funding

It is the responsibility of the Principal Investigator to notify the IRB via an Amendment (IRB-3) form if the funding source changes.

- Departmental Funds
- External (including subawards)
- VPR Research Excellence Program
- Graduate School DDF or EE Award
- Office of Undergraduate Research Award
- Human Rights Institute
- Research Incentive Account
- Faculty Start-Up Funds
- Investigator Out-of-Pocket
- Unfunded

Externally Funded Studies:

If the research is supported either in whole or in part by external funds (federal, state or private), one COMPLETE copy of each grant application must be on file with the IRB.

- Name of Funding Source: USDA Hatch
- Principal Investigator: Valerie B. Duffy
- Contract/Grant Title: Tailored messages for health promotion and obesity prevention using e-health and m-health
- KFS Account Number: pending through CAHNR
- Grant/Contract Status: pending

- Will funds from this contract/grant be awarded to an individual or institution (via a PSA or subcontract) that will be engaged in human participant research? No

Provide additional comments as needed:

This proposal is submitted through the College of Agriculture, Health and Natural Resources as part of the CAHNR competitive capacity grant program. The proposal was scored as a “must fund” but needs final approval by USDA/NIFA.

* Is there an additional funding source? Yes No

SECTION IV: Conflict of Interest

At the time of proposal submission to the Office for Sponsored Programs (OSP), all investigators and key personnel are required to submit a Significant Financial Interest Review Form to OSP. For more information, please go to the Conflict of Interest Committee website, http://www.compliance.uconn.edu/conflict.cfm.

* Is any investigator listed on this protocol required to submit the follow-up form, “supplemental” Significant Financial Interest Review Form? No

SECTION V: Human Participants

* Total number of participants to be enrolled? 700

If you are enrolling more than one population describe the total enrollment for each.

* Participant Population(s):

Describe the participant population(s) including gender, ethnicity, income, level of education and age range.

Middleschoolers (7th and 8th graders) at Sage Park Middle School in Windsor, CT who likely are balanced in gender, varied in ethnicity, and income.
Recruitment:
Describe how participants will be identified and recruited. Attach copies of all advertisement/recruitment materials for IRB review. The students will be recruited through the Health teacher of their health class. This survey and follow-up message is connected with the health class activity. All students have access to a Chromebook as part of school; they will use the Chromebook to complete the online survey.

Special Population(s):
Identify any special participant population(s) that you will be specifically targeting for the study. Check all that apply.

- Minors
- Economically/Educationally Disadvantaged
- Prisoners
- Members of the Armed Forces
- Pregnant Women/Neonates
- Non-English Speaking
- Decisionally Impaired
- Individuals Living with AIDS/HIV
- UConn Students
- Other (Please identify):
- UConn Employees

Will this study be monitored by a UConn physician?: Yes ☑ No

SECTION VI: Drugs/Devices, Genetic Testing, Radiation and Biological Samples

Drug/Device Use
Does the study involve the use of any of the following (check all that apply)?

- An FDA approved drug or medical device: Yes ☑ No
- An investigative/unapproved drug, supplement or medical device: Yes ☑ No
- A non-medical device: Yes ☑ No
- A proprietary product: Yes ☑ No
- A biological agent: Yes ☑ No

Biological Samples
Does the study involve the use of biological samples? (Either banked or prospectively obtained): Yes ☑ No

Genetic Testing
Does the study involve the genetic testing of biological samples?: Yes ☑ No

Radiation or Radioisotopes
Does the study involve the use of radiation or radioisotopes?: Yes ☑ No

Treatment
Does this study offer treatment for the participants' condition?: Yes ☑ No
Face Page

What Do You Like and Do?

Purpose: This is a study about health behaviors of middle schoolers at your school. We hope to survey many middle schoolers at your school. With the survey information, we hope to create messages to encourage healthy behaviors of middle schoolers. We also hope to make the school meals better.

Procedure: This study involves answering survey questions online. We want to ask you what you like and how you feel. We also will ask you about meals at school. The survey should take about 20 minutes to finish.

Risk and benefits: There is no risk in doing the study. It takes some of your time. At the end of the survey, you will receive some simple messages that encourage healthy behaviors. Your responses to these questions will not affect your relationship with your school or your grade in this class.

Will I receive payment for being in the study? Are there costs for being in the study?:
You will not be paid to be in this study. We will provide you with a small incentive for participation. We also will provide you information on healthy eating. There are no costs to be in the study.

Confidentiality: We will not ask information that can identify you or your family. You will not be contacted for this study again. You can do the study only if you want. You are free to say no. You can stop the survey at any time.

Questions: You can contact Valerie Duffy if you have any questions about this study. The number is 860-486-1997.

You can contact the Institution Review Board (IRB) if you have questions about your rights as a study participant. The IRB is at the University of Connecticut. The number is 860-486-8802. The IRB is a group of people who review studies. They work to protect the rights and welfare of study participants.

Thank you.
If you give your assent to do the study, please check the box below:

☐ I agree to participate

**Child Liking Questions**

Please tell us how much you like or dislike these foods, drinks, activities, etc. There are no right or wrong answers, only what you feel. If you have never tried the item or done the activity, please check the "Never tried or done" box.

Please be sure to click the center dot on the scale to activate the question (it will turn from gray to black), even if you would like to keep your response neutral.

Practice using the slider to tell us how much you like or dislike **fun parks**.

![Fun Parks](image)

![Cheerios/Kix Cereal](image)
Playing Video Games

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Tuna Sandwich

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Listening to Music

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done
French Fries

Apple

Salty Snacks
<table>
<thead>
<tr>
<th></th>
<th>Love it</th>
<th>Really like it</th>
<th>Like it</th>
<th>It's okay</th>
<th>Dislike it</th>
<th>Really dislike</th>
<th>Hate it</th>
<th>Never tried or done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dancing</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cookies/cake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Banana

Never tried or done

Yogurt

Never tried or done

Green Beans

Never tried or done
<table>
<thead>
<tr>
<th></th>
<th>Love it</th>
<th>Really like it</th>
<th>Like it</th>
<th>It's okay</th>
<th>Dislike it</th>
<th>Really dislike</th>
<th>Hate it</th>
<th>Never tried or done</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eggs</strong></td>
<td><img src="image" alt="Eggs" /></td>
<td><img src="image" alt="Love it" /></td>
<td><img src="image" alt="Really like it" /></td>
<td><img src="image" alt="Like it" /></td>
<td><img src="image" alt="It's okay" /></td>
<td><img src="image" alt="Dislike it" /></td>
<td><img src="image" alt="Really dislike" /></td>
<td><img src="image" alt="Hate it" /></td>
</tr>
<tr>
<td><strong>Milk</strong></td>
<td><img src="image" alt="Milk" /></td>
<td><img src="image" alt="Love it" /></td>
<td><img src="image" alt="Really like it" /></td>
<td><img src="image" alt="Like it" /></td>
<td><img src="image" alt="It's okay" /></td>
<td><img src="image" alt="Dislike it" /></td>
<td><img src="image" alt="Really dislike" /></td>
<td><img src="image" alt="Hate it" /></td>
</tr>
<tr>
<td><strong>Watching TV</strong></td>
<td><img src="image" alt="Watching TV" /></td>
<td><img src="image" alt="Love it" /></td>
<td><img src="image" alt="Really like it" /></td>
<td><img src="image" alt="Like it" /></td>
<td><img src="image" alt="It's okay" /></td>
<td><img src="image" alt="Dislike it" /></td>
<td><img src="image" alt="Really dislike" /></td>
<td><img src="image" alt="Hate it" /></td>
</tr>
</tbody>
</table>
Soda

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Burger

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Whole Wheat Bread

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done
Water

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Juice

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Candy

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done
Playing Sports

Never tried or done

Orange

Never tried or done

Beans/Lentils

Never tried or done
Sweet Cereal

Chocolate Milk

Carrots
School Lunch

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

School Breakfast

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done

Adding Salt to Foods

Love it
Really like it
Like it
It's okay
Dislike it
Really dislike
Hate it
Never tried or done
**Breakfast Barriers & Pathways Questions**

Where do you usually eat breakfast?

- [ ] Home
- [ ] School
- [ ] Both home & school
- [ ] I don't eat breakfast

How many days a week do you usually eat breakfast?

- [ ] Everyday
- [ ] 2 to 3 times per week
- [ ] I am at school in time to eat school breakfast if I want.

I get to school too late to eat breakfast at school.

- [ ] Everyday
- [ ] 2 to 3 times per week
- [ ] I am at school in time to eat school breakfast if I want.

I am hungry in the morning, and I want to eat breakfast.

- [ ] Everyday
- [ ] 2 to 3 times per week
- [ ] Never

I worry what others might think of me if I eat breakfast at school.

- [ ] Yes
- [ ] No
- [ ] Sometimes

I don't like the foods that are offered for school breakfast.

- [ ] Everyday
- [ ] 2 to 3 times per week
- [ ] I like the foods that are offered

What is the **number one** reason that you don’t eat school breakfast?
- I get to school too late
- I don't feel hungry
- I worry what others might think of me if I eat breakfast at school
- I don't like what is being offered
- I eat breakfast at home.

Please choose the BEST to WORST options for serving breakfast at school by assigning each option with a number as follows: 1 = BEST; 2 = BETWEEN BEST AND WORST; 3 = WORST.

Breakfast in the Classroom - Breakfast is delivered to each classroom before the bell rings.

Grab 'n' Go Breakfast - Allows for easy access to ‘grab’ breakfast and take into the classroom.

Breakfast After 1st Period or Second Chance Breakfast - Allows for students to eat later in the morning.

**Food Security Questions**

I felt worried that our food at home would run out before we could get more

- Often
- Sometimes
- Never true

I ate less than I wanted to because there wasn’t enough food at home.

- Often
- Sometimes
- Never true

I was hungry but didn’t eat because there wasn’t enough food at home.

- Often
- Sometimes
- Never true
Flow Sheet

How do you feel today?

[Smiley face options: 😊😊😊😊😊😊]

How old are you?

- 11 years old
- 12 years old
- 13 years old
- 14 years old
- Other [□□□□□]

What gender do you identify with?

- Male
- Female
- Other [□□□□□]

Which one of these groups would you say best represents yourself?

- White
- Black or African American
- Asian
- Native Hawaiian or Other Pacific Islander
- American Indian or Alaska Native
- Other, please specify [□□□□□□]
- Don't know/Not sure
- Declines to answer
Do you identify as Hispanic or Latino?

☐ No
☐ Cuban
☐ Mexican
☐ Puerto Rican
☐ South or Central American
☐ Other Spanish culture
☐ Don't know/Not sure
☐ Declines to answer

How many times a day do you brush your teeth?

______________________

How many cavities do you think you have had?

______________________

How would you rate your overall dental health?

Excellent  Very Good  Good  Fair  Poor

What time do you usually go to bed at night?

______________________

What time do you usually wake up in the morning?

______________________

Do you have access to the Internet at home?

☐ Yes
☐ No

https://uconn.co1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview
9/8/2019

How do you access the Internet? (select all that apply)

- [ ] Computer/laptop
- [ ] Tablet
- [ ] Smartphone
- [ ] Other [__________]

How often do you go on the Internet?

- [ ] Several times a day
- [ ] Once a day
- [ ] 2-4 times a week
- [ ] Once a week
- [ ] Fewer times than once a week
- [ ] Other [__________]

Which image looks most like you?

1 [__________] 1.5 [__________] 2 [__________] 2.5 [__________] 3 [__________] 3.5 [__________] 4 [__________] 4.5 [__________] 5 [__________] 5.5 [__________] 6 [__________] 6.5 [__________] 7 [__________]

Which image looks most like you?

https://uconn.co1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview
Child Evaluation Questions

I could answer the questions in this survey quickly.

The questions made me think about what I eat and what I do.
Salty Message

Snacks like chips and french fries have a lot of salt, which will make you thirsty. Try a healthier snack like an apple with nut butter or whole grain crackers with cheese instead! Your body will thank you!

Please think about the message that you just received.

How much would you like to eat healthier snacks?

SSB Positive - Child
Stop your thirst with water - sugary drinks will just make you thirstier!

Please think about the message that you just received.

How much would you like to drink more water?

Sweets Positive - Child

Have a sweet tooth? Try eating fruit for a sweet treat!
Please think about the message that you just received.

How much would you like to eat fruit as a snack or for dessert?

Sedentary - Child

TV and video games are fun to play but try to limit them to 2 hours a day. Instead, get up and play with your family, friends or pets! Aim for 1 hour of activity per day.
Please think about the message that you just received.

How much would you like to move and play for 1 hour or more each day?

Veggies Negative - Child

Get crunching on more veggies at every meal! Snack on baby carrots and bell pepper strips with dip.
Please think about the message that you just received.

How much would you like to try eating more vegetables?

Fiber Negative - Child

Get chewing on more whole grains - try foods like whole wheat bread, popcorn and Cheerios!
Please think about the message that you just received.

Dairy Negative - Child

Try choosing more yogurt, milk and cheese to make your smile bright and your bones healthy and strong!
Please think about the message that you just received.

How much would you like to try eating fruit at most meals and snacks?

Fruits Negative - Child

Fruits are packed vitamins making your skin glow and body grow! Eat fruits at most meals and snacks - add some fruit to your cereal or yogurt!
Dairy Positive - Child

Yogurt, milk and cheese make your smile bright and bones strong! Keep choosing these foods to have a happy body.

Please think about the message that you just received.

How much would you like to eat lower sugar yogurt and low-fat milk?

Activity Message - Child

Whether you are playing a sport or just running around with friends or family, keep it up! Your body loves when you get up and be active!
Please think about the message that you just received.

Veggies Positive - Child

Keep crunching on veggies! The more you eat the better - they're packed with vitamins and fiber!
Please think about the message that you just received.

How much do you like eating vegetables and at most meals and snacks?

Fruits Positive - Child

Fruits are packed with vitamins to make your skin glow and body grow! Keep eating fruit at most meals and snacks!
Please think about the message that you just received.

How much do you like eating **fruits** at most meals and snacks?

**Fiber Positive - Child**

**Keep chewing on whole grains like whole wheat breads, cereals and snacks!**
Please think about the message that you just received.

How much do you like eating **whole grains** at most meals?

**Breakfast Participation Message - Child**

Breakfast is an egg-cellent way to start the day! It's what your brain and body need to go all day!

Please think about the message that you just received.

How much would you like to try eating **breakfast** every day of the week?
Food Waste Message - Child

Some kids need the food that is thrown away. Think twice before you toss!

Please think about the message that you just received.

How much would you like to try wasting less food at school?

Overall Healthy Message - Child

You’re making lots of great choices to make your body happy and healthy! Keep up the good work!
Please think about the message that you just received.

How much do you like eating healthy, being physically active, and limiting your screen time every day?

Water Message - Child

Did you know that more than half of your body is made up of water? Make sure to drink enough water each day to stay healthy!
Please think about the message that you just received.

How much do you like drinking water instead of sugary drinks or sweet juices?

Message Evaluation Questions

I learned new information about food and nutrition from these messages.
The messages I received were helpful.

I would like to receive more messages like these in the future.
Appendix B
Breakfast Message Ideas:

- Research shows that students who eat breakfast have increased physical endurance to help them make it through the school day and after-school activities.
- School breakfasts are an excellent source of protein, vitamins A and C, calcium, and iron.
- Studies show that students who eat breakfast on a regular basis have a better overall diet and are less likely to be overweight.
- Items offered served as part of the School Breakfast Program are the right portions that are low in fat, sugar, and salt.
- While you sleep your body uses up its energy stores to get you through the night. No wonder you’re hungry in the morning! That’s why it’s important to listen to your morning hunger and refuel with a balanced breakfast.
- Ever feel tired and restless in the middle of the day? Sounds like a case of a breakfast-skipper! We recommend a daily dose of breakfast (even something small!) to prevent this mood and energy slump.
- What does a balanced breakfast lunch look like? Think carbohydrates for the energy you need when your first wake up, protein for additional energy, and fiber to keep you full until your next snack!
- Get ahead and stay ahead! Kids who regularly eat breakfast do better in school and tend to miss less school due to an illness.
- Become inspired by breakfast options by trying the breakfast offered at school. They contain everything you need in the right amounts, all at your convenience.


Food Waste Message Ideas:
Wasted food is wasted strength/muscle

Did you know that roughly 40% of food produced in America is thrown away?*
*According to the 2012 Natural Resources Defense Council (NRDC) report “Wasted: How America is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill”

Reducing food waste is an important step for fighting hunger, decreasing greenhouse gas emissions, sustainable use of natural resources, and reducing food waste cost.

The issue of food waste is a global concern and the amount of annual food waste produced by the U.S. is one of the highest in the world. While we may offer plenty, we end up wasting too much.
You may have heard of recommendations to reduce your carbon footprint, conserve water, and to support local agriculture as ways to protect the environment. Add reduce food waste to the list! It is among the simplest yet very meaningful ways you can contribute to a healthier environment.

Do the RIPE thing! Instead of throwing out an un-eaten item, keep it as a snack for later or the next day if possible. Focusing on the multiple uses of food is an important step for reducing food waste.

Ever see a bruised piece of fruit or an odd-looking vegetable and think “Ew, I don’t want to eat that!” Well that quickly adds up if everyone does that once or twice! Choosing to eat these perfectly healthy foods is a helpful way to reduce food waste.

Discussion Group Outline & Prompts:

Introduction
Welcome and thank you for agreeing to spend time with us today!
I’d like to introduce myself and my assistant. My assistant is here to take notes and make sure that I stay on track. I’m here to ask questions and guide the discussion, but you all will be doing most of the talking. We invited you because we really want to hear what you have to say. Today we’re going to be talking about school food and food waste today.
It’s important to know that there are no right or wrong answers. Every person’s experiences and opinions are important. So we ask you to speak up. I may call on you if I haven’t heard from you in a while. You may not agree with what others are saying, but we want to hear what everyone has to say.
Does anyone have questions?

Let’s start with talking about school breakfast…

- How do you feel about eating breakfast at school?
- Is this something you do? Why or why not?
- Do you think eating breakfast is important?
- What kinds of foods do you eat for breakfast?
- Do you think eating breakfast every day is realistic? Is it something you think you could do? Is anyone here doing this now?
- What makes it hard for you to eat breakfast every day if you don’t?
- What would have to happen to get you to try eating a healthy breakfast at school more often?

Now that we’ve heard what you have to say about breakfast, let’s talk about food waste…
• Last year, I collected waste from the cafeteria and an average of 24lbs of fruits and vegetables were wasted between the two days that I collected. That was JUST the fruits and vegetables, not the main entrees, milk, etc. - How do you feel about this?
• Did you know that roughly 40% of the food produced in America is thrown away? - Why do you think so much food is wasted in the U.S.? Here at Sage Park?
• Do you think that reducing waste here at school is important?
• What could we do to help reduce food waste here in the cafeteria?
• What would have to happen to get you to try reducing the amount of food that you waste at school? Outside of school/at home?

Closing
Before you all leave today, I’d like to go around the table and ask everyone to do two more things for me:

1. Help me make messages that I can share with your classmates. I want to try and increase the number of students who eat school breakfast and reduce the number of students who waste food here at Sage Park. Please write one short message on your half sheet of paper about either school breakfast or reducing food waste for your classmates to read that you think might help. For example… [give message example]

2. Answer this: Is there anything else that you would like to tell me?

Thank you so much for talking with us and helping us out today! Have a great rest of your day!