

Development and feasibility testing of a theory-based intervention to reduce sugar-sweetened beverage consumption among Central Appalachian adolescents

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ABSTRACT

Children and adolescents consume sugar-sweetened beverages (SSBs) excessively, which is associated with childhood obesity, dental caries, and increased risk for cardiovascular disease and type 2 diabetes. Interventions spanning the socio-ecological model (i.e., intrapersonal, interpersonal, environmental, policy) have been shown to reduce SSB consumption under controlled conditions. However, not much is known about their potential to work under “real-world” conditions. This information can ensure that effective programs reach populations that could most benefit, such as children and adolescents in Central Appalachia, who consume three to four times more SSBs than their American peers. Central Appalachia is a rural, geographically isolated region where attempts to reduce SSBs are challenged by limited resources, skepticism toward health programs/providers, and pervasive cultural norms around SSBs.

This dissertation describes three studies (2014-2016) that address these challenges by testing multi-level interventions that prioritize cultural acceptability and feasibility. The first study was a systematic review of child and adolescent SSB studies using the RE-AIM (reach, efficacy/effectiveness, adoption, implementation, maintenance) framework to evaluate whether studies reported elements necessary for replicability, such as resources needed for delivery or factors that might prevent participation. The review revealed that available evidence does not provide this information, and recommended that future studies prioritize evaluating and reporting these elements. The second and third studies describe methods to test implementation of Kids SIP*smart*ER, a theory-based program targeting various socio-ecological levels, in an Appalachian Virginia county. The second study engaged a group of local middle school youth (n=9) in adapting the program, which targeted universal theoretical constructs, to ensure that it was culturally acceptable and demonstrated potential to generate community-wide changes. The third study used a randomized controlled design to determine whether Kids SIP*smart*ER

was feasible as a school-based program. This study tested the program's potential reduce SSBs, as well as whether it was accepted, in demand, and able to be practically implemented within schools, the most common gathering place for rural adolescents. Taken together, these studies provide the foundation for larger, more controlled studies that prioritize both efficacy and replicability, in order to reduce the disproportionate burden of SSBs and associated diseases across Central Appalachia.

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
SSBs	Sugar-sweetened beverages
TPB	Theory of Planned Behavior
RE-AIM	Reach, effectiveness, adoption, implementation, maintenance
CBPR	Community-based participatory research
Peds-QL	Pediatric Quality of Life Inventory
PSA	Public service announcement
BMI	Body Mass Index

CHAPTER 1: INTRODUCTION

SUGAR-SWEETENED BEVERAGES IN THE UNITED STATES

Sugar-sweetened beverages (SSBs) are defined as any non-alcoholic beverage with natural or added sugars and no other significant nutrients, and include soft drinks, sweetened tea, 100% juice, fruit drinks, sports and energy drinks, and sweetened coffee and milk drinks. These drinks are a top energy source for children and adolescents in the United States, who consume an average of 155 calories (about 12 fluid ounces of soda) per day, accounting for about 8% of their daily caloric intake.¹ While SSB intake has declined in recent years,¹ it remains disproportionately high in certain subpopulations, including racial and ethnic minorities, low-income individuals, and those living in rural areas.¹⁻⁴

The relationship between excessive SSB intake and myriad adverse health outcomes has been highly researched, and correlations between SSB intake and childhood and adult obesity, type 2 diabetes, dental caries and decay, hypertension, coronary heart disease, and chronic kidney disease are well established.⁵⁻²² The breadth of robust literature connecting SSB intake to these outcomes has led to a consensus among the scientific, medical, and public health communities that these beverages negatively impact Americans' health, and that reducing intake can positively influence health outcomes.²³⁻²⁴ As a result of this consensus, organizations including the American Heart Association, World Health Organization, and the 2015-2020 Dietary Guidelines Advisory Committee have provided consistent recommendations to substantially reduce or eliminate daily SSB intake among children and adolescents, particularly among subgroups with high consumption rates.²⁵⁻²⁷

A SOCIO-ECOLOGICAL APPROACH TO REDUCING SSBs IN DISPARATE POPULATIONS

Researchers, health professionals, and policymakers have responded to the call to reduce SSB consumption among children and adolescents by testing a variety of intervention strategies spanning the socio-ecological model.^{15, 28-29} The socio-ecological model is frequently recommended as a guiding framework to understand and target factors that influence cardiovascular and metabolic diseases from an individual to population level.³⁰⁻³⁴ When applied to reducing SSB intake, the framework has been recommended to guide interventions that maximize public health impact by targeting the many

intrapersonal, interpersonal, environmental, and organizational/policy factors that have been shown to influence SSB intake.^{23, 34-36}

SSBs are readily accessible at school, after school, at home, in television advertisements, and throughout communities. Interpersonal factors, such as parental purchasing and consumption patterns, are highly influential on adolescent behavior.³⁷⁻⁴⁰ The environmental influences of marketing for SSBs is pervasive throughout school, shopping, and home environments.⁴¹⁻⁴⁶ Other environmental/policy influences include easily accessible vending machines, free refills, lower costs than healthier beverages, and excessive portion sizes.^{4, 47}

The current body of literature presents a variety of studies that address these influences. However, there is a lack of comprehensive reviews that assess the findings through a socio-ecological lens or that make comparisons across studies conducted at various socio-ecological levels. Furthermore, there is gap in understanding the extent to which these strategies may be translatable beyond the controlled study setting into “real-world” conditions, particularly the unique conditions among those subgroups who consume disproportionate amounts.⁴⁸⁻⁵⁰ Thus, further research is needed to better understand why, how, and for whom interventions show positive effects, as well as how disparate settings can adapt and test these interventions within their unique contexts.⁴⁹⁻⁵³ Research methods that initially prioritize both context and efficacy can establish a foundation for eventual large-scale testing, adaptation and translation across disparate populations. Central Appalachian children and adolescents are one such population.

SSB CONSUMPTION IN CENTRAL APPALACHIA

Central Appalachia is a rural, mountainous region spanning Eastern Kentucky, Southwest Virginia, East Tennessee and West Virginia that is home to about six million people.⁵⁴ The region’s natural beauty serves as a backdrop for systemic poverty, joblessness, and some of the nation’s worst health disparities.⁵⁴⁻⁷⁶ The root causes of the health disparities are the social and economic inequalities that have resulted, in part, from the historic exploitation of people and resources by coal companies, geographic isolation, and low levels of education and literacy.^{54, 67} The Appalachian counties in Tennessee, Kentucky, and Virginia have substantially higher poverty levels and unemployment rates as

well as lower high school and college graduation rates than the non-Appalachian counties of each state.^{52,53} In Virginia specifically, the average poverty rate from 2009-2013 was 11.3 percent, compared to 18.5 percent in the state's Appalachian counties.⁵⁴ In some Appalachian counties of Virginia, less than 75 percent of adults received a high school diploma by age 25, and less than 15 percent have graduated from college.^{57, 58} Twice as many children live in poverty in many Appalachian counties as children in the rest of the state of Virginia.⁷¹

While high rates of childhood obesity and associated chronic diseases are a nationwide crisis, children in Appalachia are disproportionately affected. Appalachia has one of the highest prevalence rates of childhood overweight and obesity—approaching 40% in many areas—of any racial, demographic, or geographic group.^{56, 64, 74-75} Diabetes prevalence in Appalachian Virginia is 12.4 percent, compared to 9.2 percent across the state.^{64, 76} On average, Appalachian adults receive type 2 diabetes diagnoses at younger ages than non-Appalachians.⁵⁰ Appalachians have less access to medical providers, dentists, and prevention specialists who are culturally competent and committed to the region; thus, they are less likely and less able to seek care.^{56-57, 67, 72-73} About 30 percent of Appalachian Virginians rate their health as fair or poor, compared to 17.4 percent of non-Appalachian Virginians.⁶³

Unique cultural norms likely exacerbate the disparities in Appalachia. Along with poor diet, lack of exercise, and less access to medical care, residents of Appalachia often mistrust expert opinion simply because they are “outsiders,” and display a fatalistic attitude toward chronic disease, i.e., that diagnosis is inevitable, and there is nothing to do to stop it.⁷⁸⁻⁸¹ Children are particularly affected, as the substantial lack of school-based health education, recreational activities, or positive behavioral norms perpetuate these economic and health disparities.^{62, 66, 82}

Excessive consumption of SSBs is highly prevalent among Appalachian children and adolescents. While there is a substantial lack of regional data, a recent survey in Appalachian Virginia indicated that adolescents consume an average of 57 ounces (SD=45) of SSB per day.⁸³ This is about three times the national average and far in excess of the recommendations by the American Heart Association of less than 36 ounces (450 kilocalories) per week.^{1, 25} In Appalachia, the majority of these calories come from

highly acidic soft drinks.^{42, 83} Combined with a unique cultural norm of “sipping soda throughout the day,” this preference for acidic drinks causes a severe dental erosion found almost exclusively in Appalachia and often referred to as “Mountain Dew Mouth.”^{42, 79} While reducing SSBs among adolescents has been recognized as a regional priority area by local needs assessments,⁸⁴⁻⁸⁵ few attempts have been made to change, or even assess, the SSB-related physical and cultural environment in Appalachian communities.^{66, 86} Given the pervasiveness of the problem and many influencing factors, there is a clear need for multi-level interventions that use theory and evidence-based strategies to reduce SSB consumption throughout the region. Such strategies should also prioritize cultural sensitivity and address the unique ecological factors that contribute to the pronounced disparity in drinking patterns and related health outcomes in the Appalachian region.

A SOCIO-ECOLOGICAL APPROACH IN APPALACHIA

In order to effectively reduce SSB consumption, change social norms, and reduce accessibility, interventions will require a theoretical underpinning that addresses factors across the socio-ecological model. The intervention could be designed such that it engages adolescents in changing their individual consumption and purchasing behaviors, becoming role models to their peers and family members, and understanding the impact of SSB intake on their greater community. This understanding could lead to a shift in cultural norms around SSBs from within the community, and subsequently facilitate environmental and policy changes.^{81, 86}

A novel theoretical framework can inform the development of an intervention that builds skills for both individual-level behavior change and efforts to generate higher-level changes around SSBs. The Theory of Planned Behavior (TPB) is frequently used to guide nutrition-related interventions for adolescents and has been tested for SSB interventions in children and adults.⁸⁷⁻⁹³ The TPB posits that a person’s decision to engage or disengage in a certain behavior is determined by his or her conscious motivation (intention) and perceived ability (perceived behavioral control). Both intention and perceived behavioral control are partially shaped by the individual’s attitudes and subjective norms (i.e., if the people within a social circle think one should engage in such a behavior).⁸⁷⁻⁸⁸ The relationships between

these constructs are thought to be dynamic among middle school children, who are highly influenced by norms yet are starting to make independent decisions.⁸⁹ In Appalachia, where strong family connections and cultural norms around SSBs are engrained in daily life, the use of the TPB to guide intervention development is especially justified.⁷⁹⁻⁸¹

While the TPB provides foundational guidance for individual behavior change, it may be insufficient to change cultural norms or instill a sense of community responsibility among Appalachian children and adolescents. Combining TPB with media literacy and public health literacy concepts may guide these changes by providing skills and motivation to help them navigate and modify their beverage environment. Public health literacy has emerged from health literacy and encourages obtaining, processing, understanding, evaluating and acting on information needed to make public health decisions that benefit the community.⁹⁴ The concept connects individual health literacy to community-level outcomes by acknowledging that health disparities arise not only from personal choices but also from complex social and ecological forces. The framework emphasizes teaching conceptual foundations, critical skills, and orientation to civic responsibility to encourage individuals to be the agents of change who seek to eliminate disparities by making social changes in their own communities.⁹⁴ This fits well with the core Appalachian values of self-determination and family and community pride.⁷⁹⁻⁸¹

Only one intervention study has previously used public health literacy as a guiding framework. In this study, the framework was used to develop a social marketing campaign to educate and inspire advocacy among Latino youth to reduce disparities in diabetes diagnosis. Participants exhibited a greater understanding of the social factors that influence diabetes and expressed a desire to be involved in initiatives to reduce disparities in their communities.⁹⁵ While this study lends legitimacy to the framework's utility in disparate populations, it was designed for high school students. More research is needed to investigate its application among younger adolescents as well as in combination with the TPB.

Incorporating media literacy concepts further addresses community-level influences as it builds an individual's skills to understand and interpret media messages to reduce the well-established influence

of media on his or her personal behaviors and the behaviors of others.⁹⁶ In previous studies, enhancing media literacy was shown to have a strong relationship with improved health behaviors in adolescents.⁹⁷⁻⁹⁹

This unique combination of an established theory that targets individual behavior change with a novel framework that contextualizes that behavior change within the unique social factors experienced by a whole school or community could generate widespread and lasting reductions in health disparities in these settings. However, significant formative work will be required to test the degree to which all desired constructs are targeted and whether the combination is accepted and effective. Additionally, as there is no established measure of public health literacy, measures will need to be developed and tested for reliability.

METHODOLOGY FOR FORMATIVE TESTING

As mentioned, SSB interventions in Appalachia are sparse; thus, there is a lack of evidence to guide formative testing proposed above to address these challenges. However, it is clear that the methods used should draw upon evidence-based strategies, yet prioritize context to ensure cultural sensitivity. A combination of three research approaches, the RE-AIM framework, community-based participatory research (CBPR), and the feasibility framework, can achieve this prioritization and establish a sound methodological foundation for larger-scale studies that can be replicated across the Appalachian region.

The RE-AIM Framework: Why, how and for whom

The RE-AIM (i.e., reach, effectiveness, adoption, implementation, and maintenance) framework is one approach to prioritize translatability at all stages of development, implementation, and evaluation.⁵⁰ RE-AIM uniquely addresses both internal and external validity. Internal validity focuses on determining a causal relationship between the intervention strategies and participants' improved health outcomes under optimal conditions.⁴⁸ Several literature reviews have reported on internal validity of SSB studies for children and adolescents; however, less is known about external validity, or the extent to which these positive effects could be translated beyond study conditions.⁴⁸ RE-AIM provides criteria to evaluate internal and external validity at the individual and organizational level for five domains:

- Reach: number, proportion, and representativeness of the participants in a study;

- Efficacy/Effectiveness: impact on primary study outcomes, quality of life, and unintended consequences;
- Adoption: number, proportion, and representativeness of settings and staff/intervention agents who agree to deliver or implement an intervention;
- Implementation: degree to which intervention is delivered as intended and associated costs;
- Maintenance: long-term individual change in primary outcomes and the extent to which intervention delivery or implementation is sustained over time.

This framework should be used to both assess the translatability of existing studies as well as guide the evaluation of new studies across the socio-ecological model, in order to maximize their potential for public health impact.⁵⁰⁻⁵³

CBPR and Feasibility – Ensure adaptability within unique contexts

Interventions to reduce SSBs in Appalachia can benefit from formative studies conducted using CBPR and feasibility methods. CBPR methods can ensure that proposed interventions are culturally acceptable and have potential for sustainability prior to larger scale testing.¹⁰⁰⁻¹⁰² Bowen’s feasibility methods can further investigate the extent to which these acceptable interventions can fit within the specific personal, cultural and environmental factors of a given setting.¹⁰³

CPBR draws equally upon the expertise and resources of researchers and community partners. Both groups are engaged in the research process to ensure that the intervention is evidence-based, but also considers the realities faced by a community.¹⁰⁰⁻¹⁰¹ CBPR can reduce health disparities by promoting community investment in interventions that target the causes of these disparities.¹⁰⁰⁻¹⁰¹ While stakeholder involvement may extend the length of the planning process, it increases the likelihood that an intervention will target prioritized areas and lead to sustainable results.¹⁰⁰⁻¹⁰¹ In Appalachia, use of these methods could ensure that interventions address the root causes of excessive SSB consumption by both understanding region-specific barriers and norms, but also capitalizing on community strengths and traditional values, such as self-sufficiency, sovereignty, strong family ties, and community pride.^{39, 81}

This process should not only involve community stakeholders but also members of the target population, such as adolescents. Youth participation is hypothesized to bolster acceptability of programs by eliciting nuanced aspects of community life that are vital to behavior change and that they uniquely understand.^{81, 104-105} Additionally, youth participation in the research process amplifies their influence and voice, and can strengthen their skills, capacity, and desire to become advocates for change in their community.^{104,106-107} Together, this increases the likelihood for widespread acceptance of programs among their peers and assures the potential for practical, long-term efforts to reduce SSB consumption and reduce chronic disease risk.¹⁰⁶ Despite this, youth participatory processes are infrequently attempted, and there is a gap in understanding the extent to which youth participation can enhance cultural appropriateness and/or acceptability.^{104, 107}

A feasibility study is a logical step following CBPR methods to identify needs and available resources for a specific type of intervention and then provide information on what adaptations are necessary to make sure that intervention can feasibly “fit” in a setting.¹⁰³ A feasibility study provides the framework needed to assess demand and acceptability in the larger target population, address implementation barriers, and determine how best to allocate community resources. These studies investigate the degree of demand, acceptability, implementation, practicality and integration of an intervention.¹⁰³ These focus areas are often assessed using a mixed methods approach involving key stakeholders and members of the target population.^{103, 108} Feasibility studies help prepare for larger research efforts by evaluating the degree to which an intervention has the potential to work in that setting before investing time and resources into widespread implementation.¹⁰³

FUTURE IMPLICATIONS OF THIS DISSERTATION

There is a clear need for multi-level interventions to reduce SSB intake among adolescents in Central Appalachia on a large scale; however, there is a significant lack of information in the current body of literature that can guide development, testing, and broad dissemination of these interventions across the region. This dissertation begins to close this gap by documenting the use of RE-AIM, CBPR principles, and the feasibility framework to better understand the gaps in existing SSB studies, and develop and test a

theory-based program to reduce SSB availability, norms, and consumption in a Central Appalachian community. The unique methodological approach can provide foundational support for larger studies that establish internal and external validity of theory-based, multi-level interventions to address SSB disparities across Appalachia and other disparate populations.

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CHAPTER 2

Manuscript 1: A systematic review to assess sugar-sweetened beverage interventions for children and adolescents across the socio-ecological model

Keywords: beverages; youth; children and adolescents; review, systematic

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ABSTRACT

Sugar-sweetened beverage (SSB) consumption among children and adolescents is a determinant of childhood obesity. Many programs to reduce consumption across the socioecological model report significant positive results; however, the generalizability of the results, including whether reporting differences exist among socioecological strategy levels, is unknown. This systematic review aimed to examine the extent to which studies reported internal and external validity indicators defined by the reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) model and assess reporting differences by socioecological level: Intrapersonal/interpersonal (Level 1), environmental/policy (Level 2), and multilevel (Combined Level). A systematic literature review was conducted in six major databases (PubMed, Web of Science, Cinahl, CAB Abstracts, Education Research Information Center, and Arcola) to identify studies from 2004-2015 meeting inclusion criteria (children aged 3 to 12 years, adolescents aged 13 to 17 years, and young adults aged 18 years, experimental or quasi-experimental, and substantial SSB component). Interventions were categorized by socioecological level, and data were extracted using a validated RE-AIM protocol. One-way analysis of variance assessed differences between levels. There were 55 eligible studies accepted, including 21 Level 1, 18 Level 2, and 16 Combined Level studies. Thirty-six studies (65%) were conducted in the United States, 19 studies (35%) were conducted internationally, and 39 studies (71%) were implemented in schools. Across levels, reporting averages were low for all RE-AIM dimensions (reach=29%, efficacy or effectiveness=45%, adoption=26%, implementation=27%, and maintenance=14%). Level 2 studies had significantly lower reporting on reach and effectiveness (10% and 26%, respectively) compared with Level 1 (44% and 57%, respectively) or Combined Level studies (31% and 52%, respectively) ($P<0.001$). Adoption, implementation, and maintenance reporting did not vary among levels. Interventions to reduce SSB consumption in children and adolescents across the socioecological spectrum do not provide the necessary information for dissemination and implementation in community nutrition settings. Future interventions should address both internal and external validity to maximize population influence.

INTRODUCTION

During the past decade, the consumption of sugar-sweetened beverages (SSBs) has garnered attention as a correlate to childhood obesity.¹⁻² SSBs, including soft drinks, fruit drinks, and sport and energy drinks, contain few nutrients yet are a top energy source for children and adolescents. Based on a nationally representative sample, children and adolescents in the United States consume an average of 155 kcal/day from SSBs, accounting for approximately 8% of their daily caloric intake.³

There is compelling evidence that a link exists between SSB consumption and weight status among children and adolescents and that reducing consumption has favorable effects on weight status.^{1, 4-5} High levels of SSB consumption have also been linked to other adverse health conditions, such as dental decay, headaches, anxiety, and type 2 diabetes mellitus.⁶⁻⁹ Furthermore, low-income children and adolescents and racial/ethnic minorities consume disproportionate amounts of SSBs and are at higher risk for developing obesity-related diseases, especially type 2 diabetes.^{3, 10-12}

Current interventions to reduce SSB intake use a variety of implementation strategies across levels of the socioecological model.¹³ The model considers the influence of intrapersonal, interpersonal, environmental, and organizational/policy factors on individual and population-level behavior change and is often used to develop childhood obesity initiatives.¹⁴⁻¹⁵ The socioecological model can be applied to SSB behaviors given that they are ubiquitous; that is, readily and easily accessible, highly influenced by parental patterns, and pervasively marketed, particularly to black and Hispanic children.¹⁶⁻²⁴ The Centers for Disease Control and Prevention specifically recommend using this model when designing strategies to reduce SSB intake, particularly among at-risk populations.²⁵

Many promising studies demonstrate effective interventions to reduce SSB consumption among children and adolescents.^{1, 4, 5, 26-29} However, all current published and planned systematic reviews of these studies focus almost exclusively on internal validity.^{1, 4, 5, 26-29} More specifically, these reviews highlight efforts to test interventions under optimal conditions to determine the causal relationship between the intervention and participants' improved SSB outcomes.³⁰ This firmly established evidence regarding the negative influence of SSBs on child and adolescent weight¹⁻² has led to calls for health professionals and

nutrition and dietetics practitioners to promptly and widely facilitate this behavior change, particularly within at-risk groups.^{2, 25} However, translation of research into practice-based recommendations that enhance public health influence requires a better understanding of the external validity across socioecological levels. This approach evaluates the degree to which an intervention's effects are generalizable to contexts outside controlled populations and environments.³⁰⁻³¹ This is a gap in the current reporting approach, which provides limited understanding about the external validity. One proposed approach to better understand the potential influence of these interventions is use of the reach, effectiveness, adoption, implementation, maintenance (RE-AIM) framework developed by Glasgow and colleagues.³¹

RE-AIM is a tool that assesses both internal and external validity elements of interventions and can be applied to various child and adolescent SSB interventions across socioecological levels.³² The framework provides criteria to evaluate the degree to which studies report both internal and external validity. Internal validity components are inclusion/exclusion criteria of participants and delivery agents (reach and adoption), attrition and imputation use (effectiveness and individual-level maintenance), and fidelity (implementation). Examples of external validity components include representativeness of the study sample or setting (reach and adoption), quality of life (effectiveness), and resource costs of implementing and sustaining an intervention in a given setting (implementation and site-level maintenance).³¹⁻³²

The RE-AIM framework has been frequently used to evaluate the validity of obesity-related interventions that use intra- and interpersonal strategies to change behavior and has been recommended to evaluate environmental/policy strategies. However, it has not been used to examine intervention strategies that span the socioecological levels.³³⁻⁴² The body of literature across different levels may differ widely in study design, reporting priorities, and quality. As one example, policy/environmental studies may focus more on setting-level indicators than individual/interpersonal studies. Therefore, assessing overall reporting quality by RE-AIM dimension and evaluating differences among socioecological levels will fully inform potential public health influence of available SSB interventions.⁴¹

The primary purpose of this systematic review of child and adolescent SSB intervention studies was to examine the extent to which studies reported on RE-AIM indicators and assess differences in reporting on RE-AIM indicators by socioecological level (i.e., intrapersonal, interpersonal, environmental, and policy). Based on previous literature,³³⁻⁴¹ our a priori hypotheses were that reporting quality would be highest for effectiveness and implementation, followed by reach, adoption, and maintenance; and when compared with intrapersonal/interpersonal studies, policy/environmental studies would report reach, efficacy/effectiveness, implementation, and individual-level maintenance indicators to a lower degree and would report adoption and organizational maintenance at a similar or higher degree. A post hoc exploratory aim was to explore differences in reporting by study design (randomized controlled trial or quasi-experimental) and setting (school vs non-school, in the United States vs not in the United States). Contrary to previous reviews that focus exclusively on internal validity,^{1, 4, 5, 26-29} findings from this review can identify the gaps in promoting translation of interventions to reduce SSB intake among children and adolescents into real-world practice settings.

METHODS

This systematic review was conducted in June 2015. Eligible articles were those published in English between 2004-2015 and targeting children, adolescents, or young adults (aged 3 to 18 years). Study designs included experimental or quasi-experimental designs where pretest–posttest data were presented. Consumption, sales, and/or servings measures were eligible study outcomes across the socioecological levels. Articles were excluded if they were not peer-reviewed, were cross-sectional, only reported methods, were published before the seminal SSB intervention study in 2004, and did not identify an SSB outcome a priori. Articles that did not include a clear and substantial SSB reduction component (i.e., only assessed SSB as part of a general nutrition intervention or did not explicitly include SSB in policy guidelines) were also excluded.

Initial search terms in six databases (Figure 1) included carbonated beverages, energy drinks, sugar sweetened beverage, SSB, sugary drinks, soda, and soft drinks, as well as youth, adolescent, child, school, and intervention, program, policy, and environmental. The search excluded articles pertaining to

university or college. This search yielded 1,542 unique citations. Two authors reviewed titles and abstracts to determine whether they appeared to meet key inclusion criteria and then met to resolve discrepancies and reach consensus. Subsequent review of citation lists of recent systematic reviews^{1, 4, 5, 26-29} and eligible studies also yielded 68 unique companion articles, which described additional aspects of eligible interventions. Figure 1 details the systematic process of identification of studies eligible for inclusion in this review. Eligible articles were reviewed and coded by one of the authors using a previously validated 21-item RE-AIM extraction tool.⁴³⁻⁴⁴ The 21 items of the extraction tool represented indicators of the five RE-AIM domains:

- Reach: number, proportion, and representativeness of the participants in a study compared with eligible nonparticipants;
- Efficacy/effectiveness: influence on primary study outcomes, quality of life, and unintended consequences;
- Adoption: number, proportion, and representativeness of settings and staff/intervention agents who agree to deliver or implement an intervention compared with non-deliverers;
- Implementation: degree to which intervention is delivered as intended and associated costs; and
- Maintenance: long-term individual change in primary outcomes and the extent to which intervention delivery or implementation is sustained over time.

Two authors coded five articles together to develop familiarity with the scoring protocol and met with the senior researchers for troubleshooting. All remaining articles were coded independently. Each reviewer coded a 1 (yes) or 0 (no) to indicate the presence or absence of each RE-AIM indicator and, where appropriate, noted specific details for indicators. Cohen's kappa was calculated for all independently coded articles to determine the tool's interrater reliability (mean=0.85). Coders met to resolve coding disagreements⁴⁵; all authors discussed unresolved disagreements to gain consensus.

Proportions of each of the 21 items reported were derived by summing across all studies and dividing by the study total (n=55). The proportion of reporting was also calculated for each RE-AIM dimension. Results were reported as the mean proportion reported across studies by dimensions and specific indicators. Using established protocol, a “comprehensiveness of reporting” score was determined for each study: high quality (15 to 21 indicators reported), moderate quality (8 to 14 indicators reported), or low quality (<8 indicators reported).³³

The socioecological level of the interventions (i.e., intrapersonal, interpersonal, environmental, or policy) was also documented. The studies were classified into one of three levels derived from the socioecological model, as shown in Figure 2:

- Level 1: intrapersonal and/or interpersonal strategies;
- Level 2: environmental and/or policy strategies; or
- Combined Level: multilevel strategies, including intrapersonal and/or interpersonal strategies and environmental and/or policy strategies

One-way analysis of variance and Tukey’s post hoc tests were conducted to examine reporting differences for each RE-AIM dimension among these three levels. In addition, when data were provided, averages, counts, or proportions were calculated for various RE-AIM indicators (e.g., participation rate and adoption rate) across socioecological levels.

RESULTS

Overall Findings

The systematic search identified 88 articles representing 55 studies (Table 1). Of these studies, 21 (38%) used intrapersonal and/or interpersonal strategies (Level 1),⁴⁶⁻⁸⁰ 18 (33%) used environmental or policy strategies (Level 2),⁸¹⁻¹⁰⁷ and 16 (29%) used a combination of intrapersonal and/or interpersonal and environmental and/or policy strategies (Combined Level).¹⁰⁸⁻¹³² Across all levels, the total proportion of RE-AIM reporting was 29%. Level 1 (35%) and Combined Level studies (34%) had a significantly higher proportion of reporting than Level 2 studies (17%) ($p<0.001$).

Description of Included Studies

About half of the 55 studies were randomized controlled trials^{46, 49-55, 57-63, 65-71, 73-75, 77-80, 83-85, 96-98, 109, 110, 112-118, 121-124, 127-129, 133} (n=29; 53%). The remaining studies used quasi-experimental designs, with either a two-group^{64, 76, 86-90, 104, 106, 111, 119, 120, 125, 130-132} (n=11; 20%), or one-group pretest–posttest^{47, 48, 56, 72, 81, 82, 91-95, 99-103, 105, 107, 108, 126} (n=15; 27%) design. In seven of the one-group designs, the pre- and posttests were administered to different samples.^{93-95, 99, 100, 105, 107, 126} Nearly three-quarters of the interventions and policies (n=39; 71%) were implemented in schools or multiple settings, including schools^{46, 49-55, 57-64, 70-72, 76, 80, 86-102, 104-108, 110, 111, 114-133}. Additional settings included home^{66, 67, 109, 112-113} (n=4; 7%), clinic^{47, 48, 56, 65, 68, 69, 73-75, 77-79} (n=7; 13%), and community-based organizations^{81-85 and 103} (n=5; 9%). Twenty of 55 (36%) studies identified SSB as their sole focus.^{56, 62-64, 70-72, 84, 85, 90, 96, 98, 99, 105, 106, 109, 112, 113, 120-125, 133} Of the 55 studies, one-third (n=19; 35%) were conducted internationally.^{46, 49-54, 57-60, 62-64, 77-80, 100, 106, 109, 110, 115-124, 127-129, 133} Of these, 15 (79%) were conducted in countries similar in economic development to the United States.^{46, 49, 50-54, 57-59, 60, 62-64, 77-79, 106, 115-124, 127-129, 133} Twenty-two reported using a behavioral theory during development (40%).^{46-54, 57-61, 64-68, 77-79, 82, 83, 96-98, 110, 114-118, 121-124, 127-129, 133} Finally, 21 (38%) reported focusing their programs or policies toward one or more at-risk groups: those of low socioeconomic status^{54, 108, 120-124, 133} (n=5; 9%), racial and/or ethnic minorities⁴⁷ (n=1; 2%), those who are overweight or obese^{55, 65, 68, 73-75, 77-79, 109, 112 and 113} (n=8; 15%), those living in rural areas^{56, 72, 98} (n=3; 5%), or multiple at-risk groups^{66, 67, 81, 84, 85} (n=4; 19%). Table 1 describes characteristics of the 55 individual studies, and Table 2 summarizes these characteristics across all studies.

Comprehensiveness of Reporting

Table 3 details the quality of reporting across the 21 indicators of RE-AIM dimensions by strategy level. Reporting quality was low across studies, with no statistically significant differences by study design or setting (Figure 3). The mean number of indicators reported was 6.0±3.1, with a range of 1 to 14. Table 1 details reporting quality of individual studies. None of the 55 studies were considered high quality, 21 (38%) were moderate quality, and 34 (62%) were low quality. About half of Level 1 and

Combined Level studies (11 out of 21 and 8 out of 16, respectively) were moderate quality, compared with only two of 18 (11%) Level 2 studies.

Reach

Across the five reach indicators, the average reporting for all studies was 29%. Level 1 (44%) and Combined Level (31%) studies reported a significantly higher proportion of reach indicators compared with Level 2 (10%) studies ($P<0.001$). Two Level 1 studies reported all reach indicators except representativeness. Reporting averages for each of the five reach indicators are described in Table 3.

Among those reporting participation rate (25 studies), the median number of participants per study was $675\pm1,331$, with an average participation rate of $66\%\pm31\%$. Across Level 1 (13 studies), Level 2 (4 studies), and Combined Level (8 studies), the median number of participants was 382 ± 497 , $705\pm2,807$, and $919\pm1,075$, respectively. Average participation rate ranged widely across Level 1 ($63\%\pm26\%$), Level 2 ($78\%\pm44\%$), and Combined Level ($78\%\pm24\%$) interventions.

Efficacy/Effectiveness

The average reporting across all studies for the four efficacy/effectiveness indicators was 44%. On average, Level 1 (57%) and Combined Level (52%) studies reported significantly more efficacy/effectiveness indicators than Level 2 (26%) studies ($P<0.001$). One Level 1 study reported all four effectiveness indicators, whereas six Level 1 and five Combined Level studies reported three. Reporting averages for each of the efficacy/effectiveness indicators are described in Table 3.

About half (11 out of 21; 52%) of Level 1 studies reported significant positive results; eight of these had a comparison group. Among Level 2 studies, 14 of 18 (78%) reported positive effects; six of these studies were comparison studies. One of these studies found a positive effect for servings but a null effect for consumption. Finally, more than two-thirds of Combined Level studies (11 out of 16; 69%) reported positive effects, including nine of the comparison studies. One of these studies found a positive effect for servings but a null effect for sales, whereas another reported a negative consumption effect (i.e., increased SSB) but found a positive servings effect (i.e., decreased servings). Across all levels, the

remaining studies reported either mixed (different within subcategories such as soda and fruit drinks) or null effects (n=5 and n=14, respectively).

Adoption

The average reporting across all studies for the six adoption indicators was 26%. The reporting was not significantly different across levels (25% for Level 1, 20% for Level 2, and 31% for Combined Level). Although no studies reported all adoption indicators, one Combined Level study reported all but representativeness. In addition, one Level 1 and one Level 2 study reported four of six indicators. Reporting averages for each of the adoption indicators are described in Table 3.

Of studies reporting participation rate, 21 (38%) reported setting participation rate and two (4%) reported staff participation rate. The average number of settings per study was 40.4 ± 69.0 with an average participation rate of $49\% \pm 32\%$. Across Level 1 (n=5), Level 2 (n=7), and Combined Levels (n=9), the respective number of settings was 18.2 ± 13.5 , 27.8 ± 36.0 , and 67.1 ± 109.5 . For the two studies reporting staff participation, the Level 1 study reported participation of 132 staff (38% participation rate) and the Combined Level study reported participation of 140 staff (21% participation rate).

Implementation

The average reporting across all studies for the three implementation indicators was 27%, with differences in reporting across levels approaching significance ($p=0.052$). Level 1, Level 2, and Combined Level studies averaged 30%, 15%, and 35% reporting, respectively. Two studies, one Level 1 and one Combined Level reported all three implementation indicators. Reporting averages for each of the implementation indicators is described in Table 3.

Across 12 studies reporting on the degree to which the intervention was implemented as intended, four followed closely with intended protocol, defined as reporting a fidelity $<75\%$, including two of three Level 2 and two of seven Combined Level studies. The remaining eight studies reported fidelity rates between 50% and 75%. No studies reported $<50\%$ fidelity. Because the few studies that reported implementation costs (n=10) did not use standardized metrics, it was not possible to compare across levels or determine an average implementation cost.

Maintenance

Across the three maintenance indicators, the average reporting among the 55 studies was 14%. There were no statistical differences between levels. The average reporting was 13%, 11%, and 21%, respectively, for Level 1, Level 2, and Combined Level studies. No studies reported all three indicators, but five of the 55 studies (representing all levels) reported at least two indicators. Reporting averages for each of the maintenance indicators are described in Table 3.

Of the 11 Level 1 and Combined Level studies reporting maintenance of individual outcomes, seven (64%) reported on maintenance of SSB outcomes as opposed to only weight-related outcomes. Three of these studies, two Level 1 and one Combined Level study, reported a positive maintenance outcome, although one had a very brief follow-up period and another only saw maintenance in certain types of SSB. The other four reported either a return to baseline in the intervention group or no significant differences between control and intervention groups at the maintenance time point. In addition, 10 studies reported setting-level maintenance. One was discontinued, seven were sustained with adaptation, and two reported intervention maintenance but did not specify whether adaptation measures were taken.

DISCUSSION

The purpose of this review was to examine the extent to which child and adolescent SSB studies reported on RE-AIM indicators and to determine differences in reporting based on the targeted socio-ecological level. Findings partially support our two hypotheses. First, overall reporting quality was highest for effectiveness and lowest for maintenance, and reporting for reach, implementation, and adoption were relatively similar. Second, studies using environmental/policy strategies reported significantly fewer indicators for reach, efficacy/effectiveness, and individual level maintenance. These studies also were more likely to report on organizational-level maintenance but not adoption. Compared with previous RE-AIM reviews, reporting across reach, effectiveness, and implementation dimensions appears to be lower for SSB interventions compared with other behavior-related targets, including physical activity, nutrition, or tobacco control.^{32-35, 44} However, SSB studies appear more likely to report adoption rates and setting-level maintenance.

Numerous primary studies and systematic reviews have detailed the promising effects of intervention and policy efforts at achieving reductions in SSB consumption among children and adolescents. However, the true public health influence of these interventions will only be realized if these interventions can be translated beyond research studies and into real-world settings. Simply knowing whether an intervention is effective is insufficient. From a public health nutrition perspective, it is important to identify and enact those programs and policies that can reach the most children and adolescents, achieve the best effects, have high likelihood of adoption and implementation by real-world settings, be able to maintain individual-level effects, and be sustained within local systems. Our review highlights that as a whole, key details are missing in these published reports. Without adequate information on all RE-AIM factors, researchers, practitioners, and decision makers lack adequate information to translate the current body of literature into practice and to maximize the health influence of available effective interventions and policies to reduce SSB consumption among children and adolescents.

Compared with previous RE-AIM studies, reporting averages for the reach factor for Level 1 and Combined Level appeared lower among SSB interventions than those seen in other behavioral studies.^{33-35, 37, 38} However, when compared with reviews of school-based intervention studies (because 39 of the 55 studies were school-based), more similarities emerge. For example, reporting of participation rate in Level 1 and Combined Level studies were similar (~62% and 50%, respectively) to the proportion of school-based nutrition, physical activity, and tobacco control studies (~59%).⁴⁴ The most pronounced difference arises when Level 2 studies are examined—only 22% of these studies reported participation rate. This is similar to the recent review by Brennan and colleagues⁴² that found only 10% of 146 obesity, nutrition, and physical activity policy and environmental interventions reported participation rate. The lack of reporting of participation rate typically arises due to undefined or unclear denominator, which is defined by the overall target population. Perhaps of even more concern is the lack of reporting of representativeness—only two Level 1 studies reported it—which is also corroborated by Brennan and colleagues,⁴² who reported representativeness in two of 32 studies. These gaps in reporting indicate a

significant lack of understanding of the degree to which a representative population is exposed to interventions to reduce SSB consumption.

When compared with other RE-AIM reviews, our reporting of key efficacy/effectiveness indicators related to changes in quality of life and attrition are lower across SSB intervention studies, particularly Level 2 studies.³²⁻³⁵ However, when compared with other reviews focusing on children and adolescents or school-based interventions, the Level 1 and Combined Level interventions tend to report attrition with similar frequency and also similarly underreport on quality-of-life indicators.^{32, 35} This suggests that quality of life may not be perceived as important to evaluate in children and adolescents regardless of the targeted behavior. It is promising that most studies showed positive changes to the primary outcome. Furthermore, studies that included both individual and environmental components had the highest proportion of effective trials.

Reporting of setting-level adoption and maintenance was considerably higher for SSB reduction studies compared with previous reviews. In particular, maintenance was not reported in any school-based studies of physical activity, nutrition, and tobacco control, or in a systematic review of policy and environmental changes related to childhood obesity.^{42, 44} Studies reporting more on adoption and implementation, particularly adaptations necessary for sustainability, were more likely to include environmental/policy approaches. This suggests that more information is available to promote adoption of these interventions. Similar to reach, there were no data on representativeness of staff or settings where interventions were adopted, making conclusions about generalizability difficult.

Intervention duration, delivery as intended, and cost are key indicators for both internal and external validity. Reporting these factors is critical for replication in both research and practice settings. The lack of reporting on the extent the protocol was implemented as intended limits the internal validity of the findings, particularly among Level 1 and Level 2 studies. In contrast, the lack of reporting on cost limits the findings' external validity related to the resources necessary to implement the given intervention in typical practice or community settings. This low implementation reporting is consistent with previous RE-AIM reviews.³²⁻³⁷

Findings also indicate differences in the reporting of specific RE-AIM dimensions between school and non-school studies as well as those conducted within the United States and outside the United States. However, the difference in overall comprehensiveness of reporting was negligible (Figure 3).

Recommendations for Future Studies

Although most of the studies in this review report indicators of internal validity, including SSB outcomes, none comprehensively reported key external validity indicators. This finding is consistent with other reviews that have primarily focused on individual-level behavioral approaches.^{33, 36-38, 42, 44} Our findings indicate that studies using environmental or policy strategies consistently had lower reporting across individual-level RE-AIM indicators, making it difficult to determine the influence of these intervention strategies at a population level. This finding reinforces the cautionary advice of Jilcott and colleagues,⁴⁰ who warn against assuming adopted policies or environmental changes reach everyone within a setting. Thus, environmental or policy studies, in particular, could benefit from a balanced reporting of internal and external validity factors across individual- and setting-level indicators. It is also important to assess any barriers that may prevent the most at-risk members from taking advantage of or being exposed to policy changes.⁴⁰

The observed gaps in reporting of adoption, implementation, and setting-level maintenance also exist for the individual-level strategies and are not surprising given that this information has been similarly elusive in previous obesity prevention reviews.¹³⁴⁻¹³⁶ As summarized in this systematic review, the current lack of reporting across RE-AIM dimensions impedes researchers and practitioners' ability to apply the body of child and adolescent SSB intervention literature to their decisions about appropriate interventions for their own setting and population. Without this information, evidence-based strategies are more difficult to replicate and are unlikely to reach populations that can benefit most.

Potential Challenges

Planning, implementing, and reporting this information may be challenging due to scarce resources, publication word limits, and a lack of knowledge on the importance of reporting both internal and external validity. Although these challenges may be particularly prominent for small-scale pilot or

feasibility studies, understanding factors beyond effectiveness and internal validity is of paramount importance among these studies. Thus, it is critical to plan, prioritize, and secure resources for a comprehensive evaluation before the start of the study. This prioritization needs to be accompanied by more efforts to educate researchers, peer reviewers, and funding agencies about the importance of moving beyond the efficacy-based paradigm and providing opportunities to publish data other than efficacy or effectiveness.^{31, 137} There is some evidence that the paradigm is beginning to shift, such as a recent call to action for nutrition and dietetics practitioners to integrate translational research into their scope of work.¹³⁷ Based on our review, we have compiled a series of specific recommendations to enable researchers to overcome these challenges, improve reporting of internal and external validity, and subsequently promote the translation of effective intervention strategies into practice.

Recommendation 1

Report reach and representativeness of the study sample to increase transparency of potential generalizability. For strategies at all levels, identify and report characteristics of the study sample (i.e., demographic information), compare them with those of the broader target population, and report the participation rate based on the population. Studies testing environmental or policy approaches should include a measure of target population exposure (i.e., all students in a school district) with a clear description of how exposure is operationalized.

Recommendation 2

Examine the robustness of effects across high-risk groups within the target population and include and report on an indicator of child quality of life as an outcome. Studies at all levels should examine effects across subgroups to emphasize a continued focus on vulnerable children and adolescents. They should also report quality of life to discern whether positive intervention effects are at the expense of child perceptions of quality of life. A number of relatively brief measures of quality of life are available, such as the Peds-QL (Pediatrics Quality of Life Inventory).¹³⁸

In addition, environmental/policy change strategies should provide a logic model highlighting the potential influence on consumption and include brief behavioral assessment of SSBs when possible.

Although a number of environmental/policy change strategies measure individual-level outcome targets (i.e., sales or servings), these targets are somewhat distal to measurement of consumption.¹³⁹

Recommendation 3

Provide a description of the study setting and, when applicable, type of staff involved in implementation. For strategies at all levels, identify and report a denominator and characteristics of the target population of settings and staff (i.e., size, location, and level of expertise). For studies examining environmental and policy approaches, report any aspects of the decision-making process by which the approach was initially adopted. Further, if the study is in a single setting, provide a detailed description of the setting, including resources available and audiences served.

Recommendation 4

Clearly define and report intervention strategies, content, duration, structure, and costs as well as the degree to which the strategies were implemented as intended. For strategies at all levels, report characteristics of the intervention, including timing and fidelity information, throughout implementation. In addition, include costs related to intervention start-up and ongoing implementation. For policy strategies, include information on the variability in compliance to and enforcement of the policy.⁴⁰ For environmental change strategies, report on activities related to assessment of any ongoing upkeep.⁴¹

Recommendation 5

Assess and report information on the degree to which the intervention is sustained within organizations beyond initial implementation, and whether it leads to sustained behavior change. For strategies at all levels, report outcomes over longer time periods and include descriptions of adaptations made to ensure sustainability. For policy/environmental changes, include assessments of individual SSB changes for 12 months post-implementation, compliance, and enforcement of policies beyond the scope of research funding.

Limitations

Some limitations to the conclusions and recommendations should be noted. First, the data analyzed and discussed were only those that were reported and do not consider information that may have been collected but not included in the articles. However, companion articles were searched to elicit as much information as possible. Second, the search for articles was limited to peer-reviewed articles, which may have eliminated valuable studies, particularly policy-related studies, published in other outlets. Third, the outcome measures and study designs varied widely and the number of studies per level was modest, which should be considered when interpreting the RE-AIM findings across the levels. Finally, this review focused exclusively on SSB outcomes; therefore, difference in reporting across the socioecological strategies may not be generalized to interventions targeting other dietary and health outcomes.

Conclusions

This RE-AIM review across socioecological strategy levels systematically documents that child- and adolescent-focused SSB intervention studies are not providing enough information to determine best practices for nutrition and dietetics researchers, practitioners, and decision makers. Therefore, despite the quantity of studies as well as the available systematic reviews focused on internal validity,^{1, 4, 5, 26-29} the potential public health influence of child- and adolescent-focused SSB programs and policies remains unclear. To improve translation of evidence-based SSB interventions by nutrition and dietetics practitioners in real-world settings, future research and reviews should provide more information on all dimensions of the RE-AIM framework, including key elements of both internal and external validity studies.

Figure 2.1: Research study selection criteria of experimental, and quasi-experimental SSB studies in children and adolescents. ERIC=Education Research Information Center

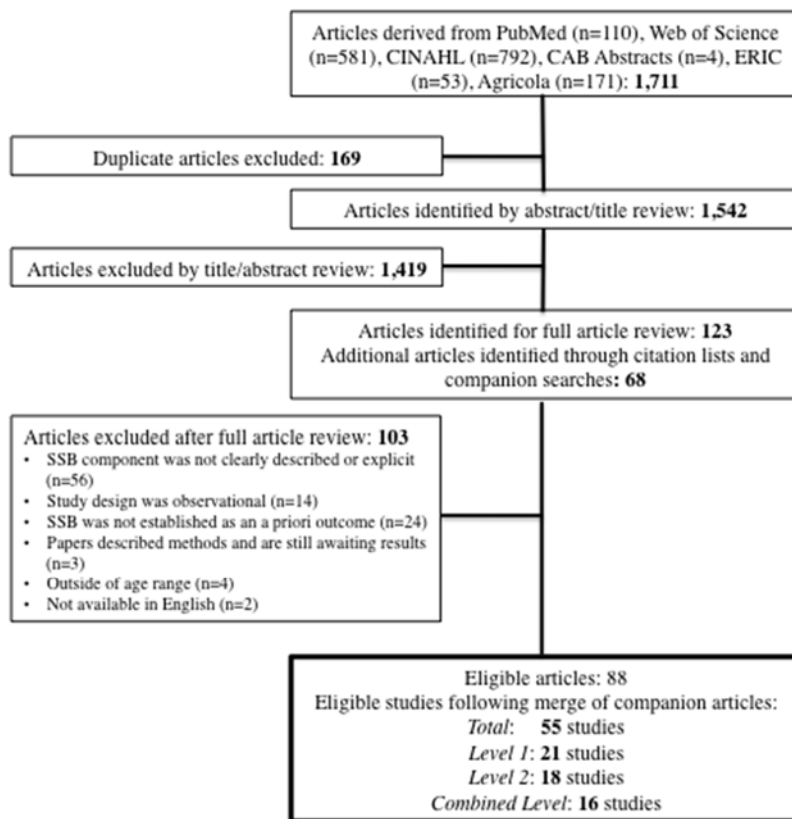


Figure 2.2 Evaluating socio-ecological strategy levels that address internal and external validity in child and adolescents (aged 3-18 years) sugar-sweetened beverage consumption studies (N=55)

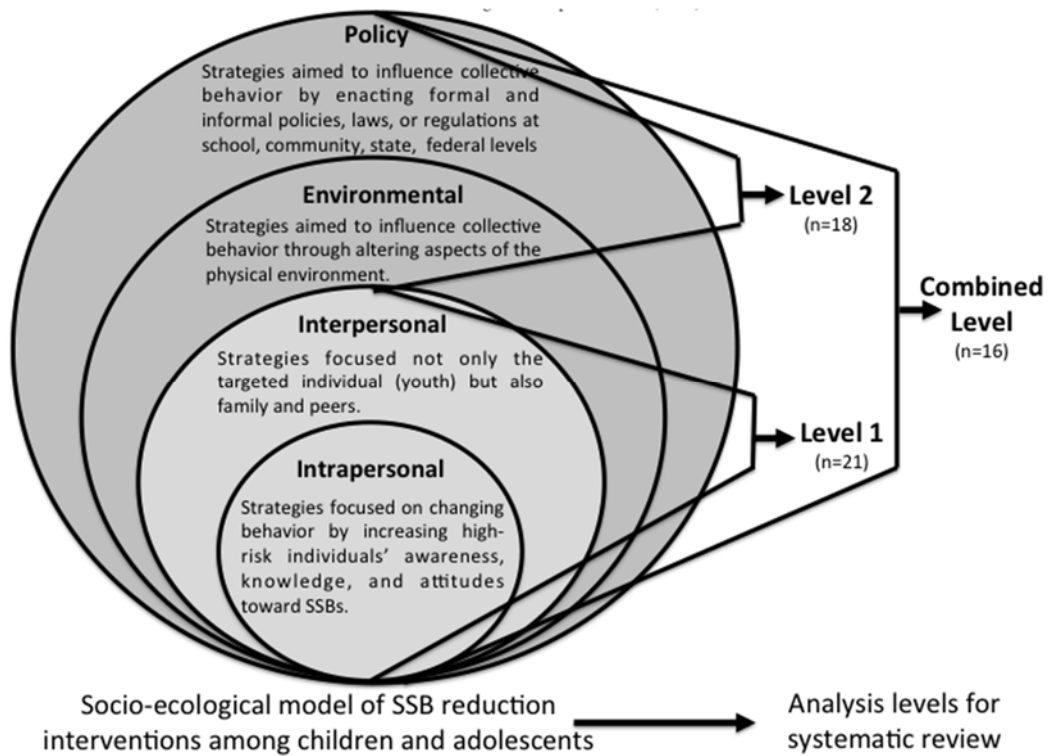


Table 2.1: Proportion of child, adolescent, and young adult-focused sugar-sweetened beverage interventions and policies reporting reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) item indicators by socio-ecological level

RE-AIM Dimensions and Item Indicators	Total trials % (n=55)	Level 1 Individual or interpersonal (%) (n=21)	Level 2 Policy or environmental % (n=18)	Combined Levels Individual and/or interpersonal and policy and/or environmental % (n=16)	p-value
Average % across all 21 RE-AIM indicators	29	35 ^a	17 ^b	34 ^a	<0.001
Reach (n=5)					
Method to identify target population	38	62	11	37	
Inclusion criteria	36	48	17	44	
Exclusion criteria	22	38	0	25	
Participation rate	45	62	22	50	
Representativeness	4	10	0	0	
Average % across 5 item indicators	29	44 ^a	10 ^b	31 ^a	<0.001
Efficacy/Effectiveness (n=4)					
Intent to treat analysis	20	29	0	31	
Quality of life or unintended consequences	5	10	0	6	
Attrition rate	56	90	6	69	
Measures/results from at least 1 follow-up	100	100	100	100	
Average % across 4 item indicators	45	57 ^a	26 ^b	52 ^a	<0.001
Adoption (n=6)					
Site and/or staff participation rate	40	24	39	63	
Description of setting	33	29	39	31	
Method to identify staff or delivery agents	11	14	6	13	
Level of expertise or staff or delivery agents	40	67	0	50	
Inclusion/exclusion criteria of staff or setting	29	19	39	31	
Representativeness	0	0	0	0	
Average % across 6 item indicators	26	25	20	31	0.279
Implementation (n=3)					
Intervention duration	40	67	6	44	
Extent protocol delivered as intended	22	10	17	44	
Measures of implementation costs	18	14	22	19	
Average across 3 item indicators	27	30	15	35	0.058
Maintenance (n=3)					
Measures/results >6 months post intervention	20	33	0	25	

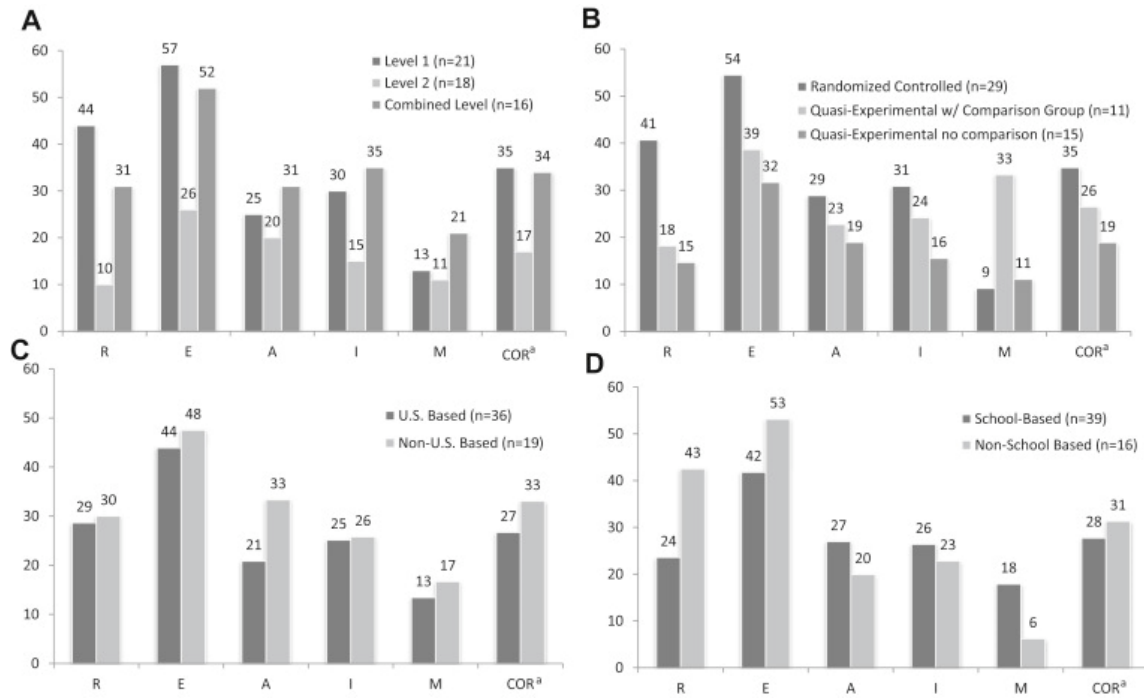
Measures of site-level maintenance	18	5	22	31	
Measures of maintenance costs	5	0	11	6	
<i>Average across 3 item indicators</i>	<i>14</i>	<i>13</i>	<i>11</i>	<i>21</i>	<i>0.392</i>

^aNo significant differences

^bSignificant differences

^cNA=not available

Figure 2.3: Mean proportion reporting of reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) framework indicators by study characteristics. (A) Socioecological level. (B) Study design. (C) Country. (D) Setting



^aCOR=Comprehensiveness of Reporting score. Studies of low quality reported <33% of indicators, studies of moderate quality reported between 33% and 67% of indicators, and studies considered high quality reported >67% of indicators.

Supplemental Table 2.1: Characteristics and quality of reporting of studies included in systematic review (n=55) by strategy level⁴⁶⁻¹³²

Study Characteristics						Effectiveness ^a (+, -, /, M)		Quality of Reporting (by # indicators reported)						
First author (s) Articles (# and years)	Location; Setting	Study Type	Age Group ^b	At-risk sample	Theory ^c	Consumption	Sales and/or Servings	R % (n=5)	E % (n=4)	A % (n=6)	I % (n=3)	M % (n=3)	Total (n=21)	COR ^d
Level 1 Studies (n=21)														
Brandstetter 1; 2012	Germany; School	RCT	ES	--	SCT	+	n/a	40 (2)	50 (2)	33 (2)	100 (3)	0 (0)	43 (9)	M
Bender 2; 2013, 2014 Bjelland, Lien, Grydeland, Grebemariam 5; 2010, 2011, 2012, 2013, 2015	USA; Clinic	Quasi no comparison	PS	Hispanic	SCT	/	n/a	40 (2)	50 (2)	33 (2)	33 (1)	33 (1)	38 (8)	M
	Norway; School	RCT	MS	--	SEM, SCT	+	n/a	40 (2)	50 (2)	50 (3)	33 (1)	0 (0)	38 (8)	M
Cunha 1; 2013	Brazil; School	RCT	ES	Low SES	TTM	+	n/a	0 (0)	50 (2)	33 (2)	33 (1)	0 (0)	24 (5)	L
Davis 1; 2007	USA; Multi-site	RCT	MS	Overweight or obese	--	/	n/a	20 (1)	50 (2)	17 (1)	33 (1)	0 (0)	24 (5)	L
Delpier 1; 2012 Ezendam 4; 2007, 2012 (2), 2014	USA; Clinic	Quasi, no comparison	HS	Rural	--	+	n/a	20 (1)	50 (2)	50 (3)	0 (0)	0 (0)	29 (6)	L
	Netherlands; School	RCT	MS	--	TPB, PAPM	+	n/a	40 (2)	75 (3)	67 (4)	33 (1)	33 (1)	52 (11)	M
Hendy 1; 2011	USA; School	RCT	ES	--	SCT, GST	n/a	+	40 (2)	25 (1)	0 (0)	33 (1)	33 (1)	24 (5)	L

James 2; 2004, 2007	UK; School	RCT	ES	--	--	+	n/a	60 (3)	50 (2)	17 (1)	33 (1)	33 (1)	38 (8)	M
Lo 1; 2008	Canada; School	Quasi with comparison	HS	--	CTL	/	n/a	40 (2)	25 (1)	33 (2)	33 (1)	67 (2)	38 (8)	M
Looney 1; 2014	USA; Clinic	RCT	ES	Overweight or obese	BS	+	n/a	60 (3)	75 (3)	17 (1)	33 (1)	0 (0)	38 (8)	M
Nollen 2; 2013 (2)	USA; Home	RCT	MA	Low SES & Racial/Ethni c Minority	BS	/	n/a	60 (3)	50 (2)	0 (0)	33 (1)	0 (0)	29 (6)	L
Raynor 1; 2012	USA; Home	RCT	ES	Overweight or obese	BS	+	n/a	80 (4)	100 (4)	17 (1)	33 (1)	33 (1)	52 (11)	M
Shapiro 1; 2008	USA; Clinic	RCT	MA	--	--	/	n/a	20 (1)	50 (2)	17 (1)	33 (1)	0 (0)	24 (5)	L
Sichieri 2; 2008, 2012	USA; School	RCT	ES	--	--	M	n/a	60 (3)	75 (3)	17 (1)	33 (1)	0 (0)	38 (8)	M
Smith 1; 2014	USA; School	Quasi no comparison	HS	Rural	--	+	n/a	60 (3)	50 (2)	17 (1)	0 (0)	33 (1)	33 (7)	L
Taveras, Woo Baidal, Sonnevile 3; 2011, 2012, 2013	USA; Clinic	RCT	MA	Overweight or obese	--	/	n/a	80 (4)	75 (3)	17 (1)	33 (1)	0 (0)	43 (9)	M
Tucker 1; 2011	USA; School	Quasi with comparison	ES	--	-- ASE, PAPM, ELM, TTM	M	n/a	0 (0)	50 (2)	0 (0)	0 (0)	0 (0)	10 (2)	L
Van Grieken, Veldhuis 3; 2009, 2013, 2014	Netherland s; Clinic	RCT	ES	Overweight or obese	--	/	n/a	60 (3)	75 (3)	50 (3)	67 (2)	0 (0)	52 (11)	M
Vargas 1; 2011	Brazil; School	RCT	ES	--	--	/	n/a	60 (3)	75 (3)	17 (1)	0 (0)	0 (0)	33 (7)	L
Wofford 1; 2013	USA; Communit y site	Quasi no comparison	MA	Low SES & African American	--	+	n/a	40 (2)	50 (2)	33 (2)	0 (0)	0 (0)	29 (6)	L

Level 2 Studies (n=18)														
Beets 2; 2014	USA; Communit y site	Quasi no comparison	ES	--	ASSF	n/a	+	20 (1)	25 (1)	17 (1)	67 (2)	0 (0)	24 (5)	L
Bleich 1; 2012	USA; Communit y site	RCT	MA	Low SES & African American	--	n/a	+	20 (1)	25 (1)	33 (2)	0 (0)	0 (0)	19 (4)	L
Bleich 1; 2014	USA; Communit y site	RCT	MA	Low SES & African American	--	n/a	+	20 (1)	25 (1)	17 (1)	0 (0)	0 (0)	14 (3)	L
Blum, Davee 4; 2005, 2007, 2009, 2010	USA; School	Quasi with comparison	HS	--	--	+	+	20 (1)	25 (1)	50 (3)	67 (2)	33 (1)	38 (8)	M
Cradock 1; 2011	USA; School	Quasi with comparison	HS	--	--	+	n/a	0 (0)	25 (1)	17 (1)	0 (0)	33 (1)	14 (3)	L
Cullen, Hartstein 2; 2007, 2008	USA; School	Quasi no comparison	MS	--	--	n/a	+	20 (1)	25 (1)	33 (2)	33 (1)	0 (0)	24 (5)	L
Cullen, Mendoza 2; 2008, 2010	USA; School	Quasi no comparison	MS	--	--	n/a	+	20 (1)	25 (1)	17 (1)	0 (0)	33 (1)	19 (4)	L
Fung 1; 2013	USA; School	Quasi no comparison	ES	--	--	+	n/a	0 (0)	25 (1)	33 (2)	0 (0)	0 (0)	14 (3)	L
Giles, Kenney 2; 2012, 2014	USA; School	RCT	US	--	SEM	/	n/a	20 (1)	50 (2)	67 (4)	33 (1)	0 (0)	38 (8)	M
Goto 1; 2013	USA; School	RCT	ES	Rural	BE	/	+	20 (1)	25 (1)	17 (1)	0 (0)	0 (0)	14 (3)	L
Kansagra 1; 2015	USA; Multi-site	Quasi no comparison	HS	--	--	+	n/a	0 (0)	25 (1)	0 (0)	0 (0)	0 (0)	5 (1)	L
Kim 1; 2013	Korea; School	Quasi no comparison	MA	--	--	+	n/a	0 (0)	25 (1)	0 (0)	0 (0)	0 (0)	5 (1)	L

Kubik, Nanney 2; 2013, 2014	USA; School	Quasi no comparison	MA	--	--	n/a	+	0 (0)	25 (1)	0 (0)	0 (0)	0 (0)	5 (1)	L
Mozaffarian 1; 2010	USA; Community site	Quasi no comparison	MA	--	--	n/a	/	0 (0)	25 (1)	17 (1)	0 (0)	0 (0)	10 (2)	L
Schwartz 1; 2009	USA; School	Quasi with comparison	MS	--	--	+	n/a	0 (0)	25 (1)	0 (0)	0 (0)	0 (0)	5 (1)	L
Simon 1; 2013	USA; Multi-site Netherlands;	Quasi no comparison	MA	--	--	+	n/a	0 (0)	25 (1)	0 (0)	0 (0)	0 (0)	5 (1)	L
Visscher 1; 2010	School	Quasi with comparison	HS	--	--	n/a	/	20 (1)	25 (1)	33 (2)	0 (0)	33 (1)	24 (5)	L
Woodward-Lopez, Samuels 2; 2010 (2)	USA; School	Quasi no comparison	MA	Low SES	--	n/a	M	0 (0)	25 (1)	17 (1)	67 (2)	67 (2)	29 (6)	L
Combined Level Studies (n=16)														
Albala 1; 2008	Chile; Home	RCT	ES	Overweight or obese	--	+	n/a	40 (2)	50 (2)	17 (1)	0 (0)	0 (0)	24 (5)	L
Bacardi-Gascon 1; 2012	Mexico; School	RCT	ES	--	SEM	-	+	20 (1)	75 (3)	17 (1)	33 (1)	0 (0)	29 (6)	L
Bogart 1; 2011	USA; School	Quasi with comparison	MS	--	SCT, DOI	+	n/a	40 (2)	50 (2)	33 (2)	67 (2)	33 (1)	43 (9)	M
Ebbeling 1; 2006	USA; Home	RCT	HS	Overweight or obese	--	+	n/a	60 (3)	50 (2)	0 (0)	67 (2)	0 (0)	33 (7)	L
Ebbeling 1; 2012	USA; Home	RCT	HS	Overweight or obese	--	+	n/a	60 (3)	75 (3)	17 (1)	33 (1)	33 (1)	43 (9)	M
Goldberg 1; 2015	USA; School	RCT	ES	--	TRA, SCT	/	n/a	20 (1)	50 (2)	50 (3)	67 (2)	0 (0)	38 (8)	M

Haerens 2; 2006, 2007	Belgium; School	RCT	MS	--	TTM, TPB	/	n/a	20 (1)	50 (2)	50 (3)	0 (0)	0 (0)	29 (6)	L
Kocken 2; 2012, 2015	Netherland s; School	RCT	HS	--	TPB, CTL	n/a	/, +	0 (0)	5 (1)	33 (2)	33 (1)	0 (0)	19 (4)	L
Laurence 1; 2007	Australia; School	Quasi with comparison	ES	--	--	+	n/a	0 (0)	25 (1)	0 (0)	0 (0)	67 (2)	14 (3)	L
Loughridge 1; 2005	UK; School	Quasi with comparison	HS	Low SES	--	/	n/a	0 (0)	25 (1)	17 (1)	33 (1)	0 (0)	14 (3)	L
Muckelbauer 4; 2009 (3), 2010	Germany; School	RCT	ES	Low SES	TPB	/	n/a	40 (2)	50 (2)	83 (5)	100 (3)	67 (2)	67 (14)	M
Patel 1; 2011	USA; School	Quasi with comparison	MS	--	--	+	n/a	40 (2)	75 (3)	50 (3)	33 (1)	33 (1)	48 (10)	M
Rogers 1; 2013	USA; Multi-site Netherland s;	Quasi no comparison	MA	--	--	M	n/a	0 (0)	25 (1)	17 (1)	33 (1)	0 (0)	14 (3)	L
Singh 3; 2006, 2009 (2)	School	RCT	MS	--	SRT	+	n/a	60 (3)	75 (3)	50 (3)	33 (1)	33 (1)	52 (11)	M
Taylor, McAuley 3; 2007, 2008, 2010	USA; School	Quasi with comparison	ES	--	--	+	n/a	40 (2)	75 (3)	17 (1)	33 (1)	67 (2)	43 (9)	M
van de Gaar 1; 2014	Netherland s; School	RCT	ES	Low SES	SM	+	n/a	60 (3)	50 (2)	50 (3)	0 (0)	0 (0)	38 (8)	M

- a) *Effectiveness Scores*: (+) positive effect (significant improvement); (-) negative effect; (/) null effect; (M) mixed effect; (n/a) not applicable
- b) *Age group targets*: PS: Preschool (ages 3-4); ES: Elementary (ages 5-11, K-5th grade); MS: Middle School (ages 11-14, 6th-8th grade); HS: High School (ages 14-18, 9th-12th grade); MA: Multiple age groups; US: Unspecified age groups
- c) *Theories*: ASE: Attitude – Social Influence – Self-Efficacy Model; ASSF: Systems framework for after school programs; BE: Behavioral Economics; BS: Behavioral Strategies (self-monitoring, modeling, stimulus control, positive reinforcement); CTL: Constructivist Theory of Learning; DOI: Diffusion of Innovations; ELM: Elaboration Likelihood Model; GST: Group Socialization Theory; PAPM: Precaution Adoption Process Model; SCT: Social Cognitive Theory; SDT: Social Development Theory; SEM: Socio-ecological Model; SM: Social Marketing; SRT: Self-regulation Theory; TPB: Theory of Planned Behavior; TRA: Theory of Reasoned Action; TTM: Transtheoretical Model
- d) *Comprehensiveness of Reporting Score*³⁰: High (15-21 RE-AIM indicators reported); Moderate (8-14 RE-AIM indicators reported); Low (<8 RE-AIM indicators reported)

Supplemental Table 2: Descriptions of included studies for a review assessing internal and external validity of child and adolescent-focused sugar-sweetened beverage (SSB) studies (n=55 studies)

Study Characteristics		Total (n=55) % (n)	Level 1 (n=21) % (n)	Level 2 (n=18) % (n)	Combined Level (n=16) % (n)
Study Type					
	Randomized Control Trial	53 (29)	71 (15)	22 (4)	63 (10)
	Quasi-Experimental with comparison group	20 (11)	10 (2)	22 (4)	31 (5)
	Quasi Experimental without comparison group	27 (15)	19 (4)	56 (10)	6 (1)
Primary Setting					
	School	64 (35)	52 (11)	67 (12)	75 (12)
	Home	7 (4)	5 (1)	--	19 (3)
	Clinic site	13 (7)	33 (7)	--	--
	Community-based organization	9 (5)	5 (1)	22 (4)	--
	Multi-site (including schools)	7 (4)	5 (1)	11 (2)	6 (1)
Primary Age Group Target					
	Preschool (ages 3-4)	2 (1)	5 (1)	--	--
	Elementary (ages 5-11; K-5 th grade)	36 (20)	48 (10)	17 (3)	44 (7)
	Middle-school (ages 11-14; 6 th to 8 th grade)	18 (10)	14 (3)	17 (3)	25 (4)
	High school (ages 14-18; 9 th to 12 th grades)	20 (11)	14 (3)	22 (4)	25 (4)
	Multiple age groups	22 (12)	19 (4)	39 (7)	6 (1)
	Unspecified age group	2 (1)	--	6 (1)	--
At-risk Population					
	Low SES	9 (5)	5 (1)	6 (1)	19 (3)
	Racial or Ethnic Minority	2 (1)	5 (1)	--	--
	Overweight or Obese	15 (8)	24 (5)	--	19 (3)
	Rural	5 (3)	10 (2)	6 (1)	--
	Multiple at-risk groups	7 (4)	10 (2)	11 (2)	
SSB as sole focus					
	Yes	36 (20)	24 (5)	44 (8)	44 (7)
	No	64 (35)	76 (16)	56 (10)	56 (9)
Used Behavior Change Theory					
	Yes	40 (22)	52 (11)	17 (3)	50 (8)
	No	60 (33)	48 (10)	83 (15)	50 (8)
Country					
	U.S.	65 (36)	62 (13)	89 (16)	44 (7)
	Outside of U.S.	35 (19)	38 (8)	11 (2)	56 (9)

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CHAPTER 3

Manuscript 2: Using a participatory process to engage youth in reducing sugar-sweetened beverages in a rural Appalachian community

ABSTRACT

Background. Children and adolescents consume excessive amounts of sugar-sweetened beverages (SSBs), which are correlated with many adverse health outcomes. We describe a youth participatory research study to adapt and implement a program to reduce SSBs in Central Appalachia, where excessive consumption is particularly prevalent.

Community Context: We conducted this study from August 2015 to May 2016 in Buchanan County, VA, a Central Appalachian town where we have an ongoing partnership with a community advisory board. Nine local middle school youth participated.

Methods. A small group of adolescents (n=9) systematically adapted and formatively tested *SIPsmartER*, an existing theory-based program for Appalachian adults, to ensure that it was age and culturally appropriate and targeted desired theoretical constructs. They also helped deliver components of Kids *SIPsmartER* when it was tested for feasibility in their school. Finally, they conducted community advocacy efforts intended to both build awareness of the problem throughout the community as well as develop individual skills to reduce the community's SSB burden.

Outcome. Youth participants found the program acceptable and felt that it was important for their classmates and friends. Quantitative and qualitative findings informed curricular changes to further enhance acceptability and theoretical grounding. As a result of assisting with the feasibility study and participating in advocacy events, youth participants reported viewing SSBs as a community problem, learning skills to help their community, and wanting to continue being advocates.

Interpretation. Results, challenges, and lessons learned from this can inform larger efforts to enhance culturally acceptability of programs and inspire Appalachian youth to take action to reduce health disparities in their communities.

BACKGROUND

Excessive consumption of sugar-sweetened beverages (SSBs), including soft drinks, energy and sports drinks, sweetened fruit drinks, sweetened tea, coffee and milk, is an established determinant of childhood obesity and is correlated with increased risk for Type II diabetes, cardiovascular disease, and poor oral health.^{1,2,3} Thus, reducing the high rates of consumption among U.S. children and adolescents, who consume approximately 155 kcal (8% of daily caloric intake) of SSBs daily, has been the target of various intervention strategies across the socio-ecological spectrum over the past decade.^{4,5}

Many of these intervention strategies have shown promise; however, few have been tested in low-income and rural children and adolescents, who consume disproportionate amounts and are at increased risk for developing obesity-related diseases.^{4,6} These subgroups experience unique cultural and environmental challenges that may preclude implementation of effective strategies to reduce SSBs; thus, study methodologies that address these challenges are warranted.

One highly recommended methodology is youth participatory research, through which children and adolescents engage in the formative development, implementation, and evaluation of community-based initiatives. This paper describes a yearlong participatory research project that engaged a small group of *youth ambassadors* from Central Appalachia in adapting Kids SIPsmartER, theory-based program targeting SSB behaviors, helping testing the program as a school-based intervention, and planning and implementing community advocacy initiatives.

COMMUNITY CONTEXT

Setting and Population

This study took place in Buchanan County, a Central Appalachian county in Southwest Virginia. Central Appalachia spans parts of Kentucky, Tennessee, West Virginia and Virginia and is disproportionately impacted by poverty, low educational attainment, and limited access to medical care.⁷⁻⁹ Buchanan County, a designated Medically Underserved Area, ranks 132 of 133 in Virginia's County Health Rankings.¹⁰ Across the county, 29% of children live in poverty.¹⁰ The unemployment rate in the county (9.8%) is nearly twice the state rate (5.5%).¹⁰ While county-level epidemiologic data is not

available, comparisons of the Appalachian counties of Virginia to the rest of the state have found disproportionate rates of poor oral health, heart disease, diabetes, and childhood overweight and obesity in the region.¹⁰

Burden of SSBs

Regional surveys indicate that consumption rates of Appalachian children exceed their non-Appalachian counterparts by three to four times.¹¹ This pronounced disparity in SSB intake in this region is a significant but modifiable contributor to these disproportionate disease rates. Combined with widespread availability, unique sipping behaviors (i.e., “sipping soda throughout the day” rather than with meals), a preference for citric acid drinks, and a lack of medical and dental health infrastructure, the high consumption of SSBs represents a public health crisis.^{7,11,12} Thus, a culturally appropriate intervention designed to specifically target SSB norms, accessibility, and behaviors could have a significant impact on adolescents’ health in this rural, underserved region.

Youth participation as a strategy to reduce burden

Appalachia’s unique norms, geographic isolation, and lack of resources have previously limited sustainable programmatic or advocacy efforts to reduce SSBs.¹³ Use of participatory methods can enhance interventions by addressing root causes of the problem, developing appropriate strategies, and capitalizing on community strengths and values.^{14,15} Simply put, because adolescents live in their community, they are better equipped to recognize and address their personal and community health needs.¹⁶ Furthermore, involving youth in this process provides opportunities to strengthen their skills, capacity, and desires to become health advocates in their community.^{14,15} Together, this increases the likelihood for acceptance of practical, long-term efforts to reduce SSB consumption and improve chronic disease.^{13,15}

Project objectives

The primary program objective was to use a participatory process to engage a small (n=9) group of middle school *youth ambassadors* in formative development and feasibility testing of Kids SIPsmartER. The community engagement objective was to determine (1) the extent to which this

participatory process enhanced participants' engagement in further advocacy efforts to reduce SSB consumption in their community; and (2) how participation impacted their perceptions of their community's health and their role in improving it.

METHODS

Needs Prioritization and Initial Program Development

This project was initiated in fall 2014, when a regional community advisory board first identified the need for an intervention to address the burden of SSBs in the region. The board prioritized SSB-related community needs based on existing resources and capacity of group members, including education for youth and their parents, changes to the community norms and environment, policies to reduce access in community settings, and changes to oral health infrastructure. The emerging first step was to involve a small group of middle school students as *youth ambassadors*, to help develop and participate in initiatives to address the first two needs. Two advisory board members, an afterschool leader and local pastor, recruited two local middle school principals who were asked to refer "motivated, outgoing" students. Principals identified 20 such students. Table 3.1 outlines the ambassadors' role in the three primary project components.

Prior to the ambassador involvement, the research team adapted *SIPsmartER*, an effective theory-based program to reduce SSB consumption among Appalachian adults, to be appropriate for adolescents.¹⁷ Adaptations for Kids *SIPsmartER* included shorter, more frequent lessons with more age-appropriate activities. Similar to the adult program, the lessons were grounded in the Theory of Planned Behavior (TPB) and emphasized principles of health and media literacy. Additionally, Kids *SIPsmartER* incorporated public health literacy, which encourages obtaining, processing, understanding, evaluating and acting on information needed to make public health decisions that benefit the community.¹⁸ The framework builds conceptual foundations, critical skills, and orientation to civic responsibility.¹⁰⁰ When combined, TPB, media literacy and public health literacy provide students with knowledge, skills, and behaviors to not only reduce their own SSB consumption, but advocate for more community-wide changes, in order to generate more widespread and lasting reductions in health disparities.

Kids SIPsmartER Camp

To test the acceptability and extent to which the framework constructs were targeted in the adapted Kids SIPsmartER curriculum, ambassadors were invited to a three-day intensive summer camp. The camp was held at a central location and transportation was provided. Of the 20 recommended students, 13 were consented and attended at least one camp activity. Nine (six girls and three boys) attended all three days. There were five 6th graders, one 7th grader, and three 8th graders. Four students did not attend beyond the first activity due to a scheduling conflict. Students received a \$50 gift card, passes to the local pool, and official certificates of their “junior researcher” status. Ambassadors gave their assent to participate, and parents provided signed consent. This study was approved July 15, 2015 by the Virginia Tech Institutional Review Board.

Upon the start of the camp, ambassadors learned that they had been identified as leaders by their principals and that the purpose of the camp was to enlist their help in making sure Kids SIPsmartER would be fun, engaging, and informative for their peers. Camp sessions included activities to assess theoretical constructs (focus groups and questionnaires), six 1-hour lessons delivered by two researchers, and debrief sessions where ambassadors gave feedback on the lessons and evaluation instruments. During the final session, they brainstormed ideas for community advocacy events to reduce SSBs, including how they would fundraise, recruit attendees, and conduct events.

All nine ambassadors signed up to continue involvement with these events. In the following months, the research team guided the ambassadors through efforts to educate and advocate for change in their community around SSBs. Evaluation strategies were put in place to assess the events as well as changes in the ambassadors’ perceptions of their ability to influence their community’s health.

Kids SIPsmartER feasibility testing

Using ambassador feedback, curriculum was refined and tested as a randomized crossover study at an elementary/middle school attended by six of the nine ambassadors in the semester following the summer camp. The program was delivered to all 6th and 7th graders. Students received Kids SIPsmartER or a matched contact physical activity program once per week for six weeks during science class. Parents

received six weekly phone calls to reinforce lesson concepts. The six ambassadors met approximately once per week after school at Boys and Girls Club to record parent messages, write and film a public service announcement (PSA), and plan their community advocacy events. During these meetings, the research team took notes and facilitated discussion, but the ambassadors led the meetings.

Community Advocacy Activities

The main community advocacy event took place at a local grocery store. During the after school planning meetings, the ambassadors, with research team support, developed a flyer that contained both accurate and culturally appropriate information on SSBs. To keep track of how many people they talked to, the research team developed tracking sheets. During the event, they distributed flyers and samples of sugar-free hot chocolate and set up a table with a few games and activities related to SSBs.

Evaluation

This project was evaluated using three methods. First, the extent to which Kids SIPsmartER was acceptable was assessed by satisfaction surveys and discussion following each lesson. Pre/post 5-item Likert surveys and scripted focus groups addressed targeted theory constructs.^{19,20} Second, the extent to which ambassadors carried out activities related to the feasibility study and community advocacy was evaluated by keeping attendance at planning meetings, tracking phone calls and interactions with community members during activities, and analyzing content of field notes from activities. Third, a researcher who was not affiliated with the project conducted individual interviews and exit surveys based on positive youth development principles²¹ to assess ambassadors' perceptions of their community as well as their role in their community's health.

Changes in pre-post surveys were analyzed using paired t-tests in SPSS V.22 for Mac. Satisfaction and exit survey variables were analyzed using descriptive statistics. Interviews and focus groups were transcribed and independently coded by two researchers, who came to a consensus on emerging themes.

OUTCOME

Kids SIPsmartER camp - Acceptability

Satisfaction surveys from lessons indicate that overall, ambassadors understood and liked lessons, felt that they were important, and agreed that their classmates would also enjoy the lessons (Table 3.2). They felt that they were able to share their thoughts freely, and that they could be role models after what they learned in the lessons. Feedback from the discussions included suggestions for more role playing/improvisation activities, more relevant scenarios (i.e., drink options at the county fair), and more of a focus on disease outcomes such as diabetes rather than outcomes like weight gain. The ambassadors felt that their classmates might be sensitive about their weight and they did not want feelings to be hurt. They also provided suggestions for refining the survey instruments to be more understandable for their peers. For example, one ambassador's inquiry about "what are soft drinks" led to suggestions to change it to the locally used term "soda pop" on the beverage questionnaire.

Kids SIPsmartER camp – Targeted Theoretical Constructs

Among ambassadors who attended all camp activities (n=9), there were significant improvements in SSB-related attitudes ($p=0.05$), media literacy ($p<0.001$) and public health literacy ($p=0.011$) (Table 3.2). Data from the focus groups corroborate many of these findings. For attitudes, the ambassadors indicated that before the camp, they knew SSBs were not healthy but did not realize just *how* unhealthy, and also had never thought about the consequences to themselves and their community. For conceptual foundations of public health literacy, the ambassadors reported recognizing SSBs as a problem for their community and connecting it to disease outcomes. They also recognized the environmental forces that contribute to high consumption. Some thought the problem was more prevalent in their community than others, but others perceived it as a problem for all communities: *"I think all communities are the same...unless there is a community called Health Town!"*

The ambassadors displayed critical skills to reduce the public health burden, particularly communicating information about health concerns and understanding that part of the problem is the excessive availability, affordability, and demand. Most felt that the problem was preventable and that they could help, but some did not know where to start. Others had a lot of ideas for communicating messages to address the issue of SSBs in their community. They also had suggestions for environmental changes

that were needed, but were less sure about their role in making those happen. As they talked through these ideas, they began to increase their confidence that they could make meaningful changes (i.e., civic orientation).

“You know what I would like to see one day? After like we have made a change, I’d like to see still like a lot of pop [at the store] cause like nobody’s buying it and like not very much water cause everybody’s like getting all the water.”

Some survey findings were contradicted by the focus group findings. Survey data indicated that there were no changes in intention, however most ambassadors indicated in the focus groups that they had cut back on sugary drinks or intended to do so (*“I usually like drink like 2 cans of pop in a day, but now I’m gonna drink one,” “Like I’ll drink it on special occasions like at birthday parties and stuff but that’s it.”*)

Findings also suggested barriers and facilitators to individual changes that could be addressed to better target perceived behavioral control and subjective norms. Barriers to drinking fewer SSBs included widespread access/availability at home and in the community (*“If you go to Walmart to get a drink, all that’s in there is pop or sweet tea or something. You have to go to the back to get the water”*), parental and peer influence (*“My family always keeps pop in the fridge”*) and habit/taste preference (*“Because I like it, like that is probably what I’m not gonna like the most [about cutting back] because it tastes really good”*).

Along with proposing community-level solutions as described above, ambassadors also proposed facilitators that might make SSB reduction easier at an individual level, including parental restrictions (*“The rules will make it hard because if I wanted to drink it, I couldn’t because I’m not allowed to,”*) as well as making water more readily available and SSBs less available (*“Having water in your fridge all the time”*).

Kids SIPsmartER feasibility testing

The six ambassadors took turns delivering parent calls. Of 12 possible opportunities to make the calls (once per week for the 12 weeks of the program), they recorded calls for six weeks. The research team recorded the calls when the ambassadors did not meet or had other priorities during meetings. Six

of nine ambassadors created the PSA over five meetings. The script incorporated a tangible health outcome of SSB consumption (trouble concentrating), a barrier to drinking less SSBs (not liking the taste of water), a strategy to overcome this barrier (trying it with friends), and a benefit to reducing consumption (better concentration and performance in school). This PSA was shown to the their classmates as part of a lesson on media literacy and public service announcements (Figure 1).

Community advocacy

The ambassadors had three planning meetings for the grocery store event. Attendance at these meetings ranged from four to seven. The research team loosely designed the flyer to ensure that it used evidence-based messages, and the ambassadors gave several iterations of feedback to decide the most important messages and what ambassadors would say to customers as they distributed it (Figure 1).

Seven of nine ambassadors attended the grocery store event. One additional ambassador participated in the planning meetings but did not attend the event. According to their records, they distributed approximately 90 flyers and handed out approximately 50 sugar-free hot chocolate samples. Their records also indicated that seven individuals did not take the flyer, and no individuals declined the samples.

In general, ambassadors were surprised at how much SSBs they observed people buying. Several had stories about people who were unfriendly to them or didn't want to talk to them, but many had "success stories:"

"You know what the highlight of my day was? I was talking to this one lady and she was with her daughter and they had like a bunch of pop in their cart and then I started talking to her and handed her the flyer and I saw her reading it and stuff and she said her daughter had just got diagnosed with diabetes and then when I saw her later I saw that she had put back a bunch of the pop!"

Exit Surveys and Interviews

Five of the nine ambassadors were surveyed and interviewed (Table 3.2). In general, ambassadors reported learning more about the excessive intake of SSBs throughout their community, and associated this consumption with adverse health ("*a lot of people do have diabetes and other health situations that sugary drinks caused*") and environmental consequences ("*sometimes your town and stuff gets trashy and*

you can't go out and play"). All were confident that they could make a difference and reduce the problem in the long term. Despite feeling bad about people who were unwilling to listen to them or responded poorly to their messages (*"we was trying to get people to stop drinking sugary drinks but they won't stop drinking it, so it kinda made me feel bad,"*) some felt that they already had made a difference, especially at home.

"My family's been cutting down on the pop and buying more water, because I told them the causes [it can have] and put the little flyer on our fridge, and they've been drinking more water."

They all wanted to continue to be leaders and advocates in their school and community. The majority of their ideas were related to communicating messages through flyers or advertising, but a few made suggestions for environmental changes, such as putting more water in the vending machines or making sugary drinks less accessible. They also wanted to continue being role models for their friends and family members as well as reduce their own intake. They felt that being ambassadors had helped them learn the skills they needed and gain confidence to continue to be advocates for reducing SSBs.

"With this program I've learnt ways that you can stop people from [drinking SSBs], or help people to like stop drinking so much."

"I gained more confidence when we did the phone calls and read them to people...it made me feel good because you're telling kids' parents about it, and giving them a phone number to call."

"Before we done everything, I wasn't really heard on my opinion and no one like really cared...but whenever they [VT] came and explained everything like everyone was asking me questions and I would tell them. So whenever they would ask me like, you know, how am I supposed to find out how much sugar is in this drink, like I wouldn't know before and then they came and taught me and now I can tell them."

Difficulties

The primary limitation to this project was an inability to accomplish all activities suggested by the ambassadors. They wanted to conduct "audits" at grocery and convenient stores, conduct more advocacy events, and put on a play or assembly at their school. Our inability to carry out these activities was primarily a result of geographic distance and a lack of additional resources for more widespread efforts. However, our establishment of an advisory board, yearlong commitment, and relationships with the ambassadors and school principal provides a foundation to initiate larger, more sustainable efforts.

Additionally, it was difficult to engage the three 8th graders in some of the activities after the camp due to attendance at different schools and competing sports commitments. While one 8th grader did attend the grocery store event, all were lost to follow-up and did not complete the interviews. All 6th and 7th graders participated in the feasibility study and community advocacy, but one 6th grader missed the interview due to illness.

INTERPRETATION

This study established the utility of a participatory process to develop a culturally appropriate, theory-based program that can be brought to scale and tested in underserved regions. It offers methodology for testing cultural acceptability and tailoring programs to fit within unique community contexts. By testing the curriculum, we were able to determine changes to improve both the cultural acceptability (i.e., new role-playing scenarios reflecting local culture, language adjustments on survey instruments) and theory-based strategies (i.e., additional information on the regional SSB burden, more incorporation of identified barriers). This study also adds to a sparse body of evidence on effective use of participatory research methods for health promotion in Appalachian youth.^{16,22}

The ambassadors successfully communicated messages about the harms of SSBs at a community locale, over the phone, and via a public service announcement. Participation in the planning and implementation of these events helped them understand the problem of SSBs in their community, and inspired them to want to be advocates and deliver messages about healthy behaviors in the future.

This project provided insight into challenges that can be addressed with future studies that engage youth in health promotion and advocacy in underserved communities. First, it is critical to establish productive relationships with local youth-serving individuals/organizations to serve as an advisory board. This is particularly important in regions that are difficult to access geographically and/or have unique cultural norms, because this board can help identify community advocacy needs and facilitate more frequent, sustainable efforts to reduce obesity-related disparities.^{14,15}

Second, evaluation of the extent that youth participants feel they can make a change, as well as the degree to which those changes actually happen, should be established a priori in future efforts.

Community mobilization or readiness to change frameworks can help define a baseline understanding of the “change climate” of the community, and could be combined with positive youth development and/or public health literacy scales that assess changes at the individual level. This combination can assess the perceived impact on the individual as well as changes in the community’s readiness and capacity for change. This evaluation should use a mixed methods approach to fully describe barriers, implementation challenges, and youth outcomes. Finally, retention of all participants throughout implementation and evaluation should be highly prioritized.

This project focused on developing a culturally appropriate curriculum designed to reduce SSBs in Appalachia by providing youth with the knowledge, skills and motivation to become role models and advocates for their friends, family, and greater community. These skills and processes are not specific to SSBs and can transcend any health promotion efforts in at-risk populations. By providing successes, failures, and lessons learned, we hope that our study can inform future efforts to empower youth, implement sustainable and relevant programs and, ultimately, reduce the disproportionate burden of disease in medically underserved communities.

Table 3.1. Youth ambassador project components, description, and ambassador role

Project Component	Description	Ambassador Role
“Kids SIP _{smart} ER Camp”	3-day summer camp to formatively evaluate and enhance acceptability of curriculum and evaluation instruments	• Enhance instrumentation acceptability • Increase curriculum acceptability • Inform theory grounded targets (i.e. Theory of Planned Behavior, health literacy, media literacy, public health literacy) • Brainstorm community advocacy activities
Kids SIP _{smart} ER school-based feasibility study	12-week study to assess feasibility (acceptability, demand, implementation, limited effectiveness) in a school setting	• Deliver parent call component • Develop and film Public Service Announcement as in-class example
Community advocacy	Communication of evidence-based messages and environmental changes to shift social norms and reduce accessibility of SSBs	• Develop informational flyer • Distribute flyer at local stores

Table 3.2. Youth ambassador quantitative results: theoretical variables, satisfactions surveys, exit surveys

Theoretical variables – paired t-test (n=9)		
Variable (Likert scale 1-5)	Mean Score-Pre (SD)	Mean Score-Post (SD)
Attitudes	3.22 (0.37)	3.69 (0.34)*
Subjective Norms	4.04 (0.54)	3.89 (0.55)
Perceived Behavioral Control	3.93 (0.60)	4.33 (0.60)
Behavioral Intentions	3.42 (0.80)	3.50 (0.86)
Media Literacy	3.83 (0.41)	4.60 (0.37)**
Public Health Literacy	3.24 (0.63)	4.07 (0.41)*
Satisfaction surveys - following each lesson		
Questions (1-not at all to 5-very much)		Mean Score (SD) across 6 lessons
During this lesson, the instructors used words I could understand.	--	4.88 (0.16)
I learned something new from this lesson.	--	4.83 (0.28)
I liked doing this lesson.	--	4.79 (0.23)
My friends and classmates would like this lesson.	--	4.40 (0.49)
I think this lesson is important for my friends and classmates to learn about.	--	4.83 (0.28)
During this lesson, I was able to share my ideas and feelings.	--	4.88 (0.16)
I feel like I can be a role model by telling people what I know about the lesson topic.	--	4.42 (0.75)
Exit Surveys (n=5)		
After being an ambassador (1-Never to 5-Always)		Mean (SD) (n=5)
I am better at standing up for what I believe. ^a	--	4.20 (0.45)
I am more interested in community and world problems. ^a	--	3.80 (0.84)
I feel better about myself. ^b	--	4.00 (1.00)
I learned I can do things I didn't think I could do before. ^b	--	4.40 (0.89)
I believe I can make a difference in the world. ^c	--	3.60 (0.89)
I care about making the world a better place for everyone. ^c	--	4.80 (0.45)
It is important for me to try to make a different in the world. ^c	--	4.80 (0.45)
I want to use what I have learned as an ambassador to help others be healthier. ^c	--	4.80 (0.45)

*p<0.05

**p<0.001

^aPositive core values indicators

^bSense of self indicators

^cContribution indicators

Figure 3.1. Final iteration of “Stop the Sugar and Go Get Healthy” flyer; Screenshot from the Public Service Announcement created and filmed by the ambassadors



Chapter 3 References

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CHAPTER 4

Manuscript 3: Kids SIP*smart*ER: a feasibility study to reduce sugar-sweetened beverage consumption among middle school youth in Central Appalachia

ABSTRACT

Objective. Excessive sugar-sweetened beverage (SSB) consumption among children and adolescents is correlated with many adverse health outcomes. Central Appalachians consume SSBs in disproportionate amounts and experience significant health disparities, yet few studies to reduce SSBs have been attempted in the region. The objective of the present study was to determine feasibility (including acceptability, demand, practicality, implementation, integration and limited effectiveness of Kids SIP*smart*ER, a theory-based intervention to reduce the region's SSB burden, as a school-based program.

Design. This feasibility study used a randomized crossover design. Five 6th-7th grade science classes received both Kids SIP*smart*ER and a matched contact program over two periods in random order. Two researchers delivered one lesson/week for six weeks during each program. To assess limited effectiveness of Kids SIP *smart*ER to reduce SSBs and influence theory variables (Theory of Planned Behavior, media literacy, public health literacy) during the first crossover period, student surveys were administered surveys at baseline, immediate, and 3-month follow-up. Other feasibility indicators were assessed through teacher surveys and informant interviews, and student surveys and focus groups. Field notes, attendance, and lesson artifacts described implementation. For limited effectiveness, repeated measures ANOVAs assessed time and group effects using intent-to-treat. For additional feasibility indicators, descriptive statistics described teacher and student surveys, and content analysis of interviews and focus groups further informed feasibility.

Setting. One middle school in the Central Appalachian region of southwest Virginia.

Subjects: Seventy-four youth aged 11-13 and two teachers.

Results. Students in the classrooms receiving Kids SIP*smart*ER (n=43) significantly reduced SSB intake at immediate follow-up (-11 ounces/day; p=0.01), and maintained reductions after 3-months (-12 ounces/day; p<0.01). Time effects were significant for media literacy (p<0.001) and public health literacy (p<0.01) at 3-month follow-up. There were no significant between group effects for SSBs, TPB variables, or public health literacy; however, the intervention group significantly improved media literacy compared to the comparison group (n=31) (p<0.01). Teachers and students found the intervention acceptable, in

demand, and practical. Most lessons (17/18) were delivered, and average attendance was 93.1%.

Suggested changes before larger studies primarily involved more efforts to reach parents.

Conclusions. Kids SIP*smart*ER demonstrated limited effectiveness and was acceptable, in demand, practical, and implementable within existing resources. This study provides justification for further testing of Kids SIP*smart*ER as a component of community-based efforts to reduce the SSB burden in Appalachia.

INTRODUCTION

The excessive consumption of sugar-sweetened beverages (SSBs), including soda, juice, energy drinks and sports drinks in the United States has been linked to obesity, Type 2 Diabetes, dental caries and erosion, and cardiovascular disease.¹⁻¹⁸ Most American children and adolescents consume excessive SSBs; however, those living in rural, low-income households drink disproportionate amounts.^{1,19-}

²¹ In Central Appalachia, a mountainous region spanning Kentucky, West Virginia, Virginia and Tennessee that faces substantial economic, education, and health disparities, excessive SSB consumption is particularly prevalent.²²⁻⁴¹ Regional data indicates that the average consumption rates among children and adults are three to four times the national average and far in excess of the recommendation of less than 36 ounces per week.⁴²⁻⁴⁵ Many factors are hypothesized to influence SSB intake in adolescents, including taste, affordability, accessibility and targeted marketing.⁴⁶ In Appalachia, a widespread social norm of “sipping soda throughout the day” and constant availability of SSBs are additional contributors.^{43,47,48}

Lowering SSB consumption among adolescents in this region could reduce rates of childhood obesity and its co-morbid conditions. Many promising studies demonstrate effective interventions to reduce SSB consumption among children and adolescents.^{2,12,14,16,49} However, there is limited understanding of how to move these effective interventions into settings such as Appalachia, where resources for implementation are limited and SSB-related cultural norms are pervasive.⁵⁰⁻⁵² One method to fill this gap is to conduct a feasibility study in collaboration with local partners. Such studies can provide insight into an intervention’s potential for success under unique contexts.⁵³ It can also help researchers and community members prepare for larger translational research efforts by evaluating the degree to which an intervention is desired, acceptable, and has potential to work within the constraints of the community. Feasibility studies use a mixed methods approach and emphasize relevancy and context over efficacy.⁵³ Constructs measured include: limited effectiveness, acceptability, demand, practicality, implementation, and future integration. Limited effectiveness refers to extent to which an intervention results in predicted trends in the desired behavior change. Acceptability, demand, and

practicality focus on how the delivery agents and recipients react to the program, whether they are likely to use it, and whether they can deliver it within the existing context. Implementation measures the extent to which a program can be successfully delivered with high fidelity in a defined, but not fully controlled. Future integration assesses the extent to which a program can be embedded within the existing infrastructure or system.^{53,54}

This paper reports results of a two-group, randomized controlled study conducted in one middle school in Buchanan County, Virginia to test the feasibility of Kids SIP*smart*ER, a school-based intervention with a parent call component designed to reduce SSBs among middle schoolers. The six week program targeted constructs of the Theory of Planned Behavior (TPB), media literacy and public health literacy. The primary purposes of the study were to determine (1) limited effectiveness of the intervention to reduce SSB consumption and improve targeted theoretical constructs among students; (2) perceived acceptability, demand, practicality, and anticipated implementation and integration strategies of the program among students and school staff; and (3) maintenance effects on SSB consumption and SSB-related theoretical constructs three months after the intervention was conducted.

METHODS

Study Area and Formative Development

The Central Appalachian region faces high rates of poverty and chronic disease, including the highest prevalence of childhood obesity of any geographic, racial/ethnic or income group.^{24,34,38,55} These disparities results in part from geographic isolation, widespread cultural norms, and a lack of access to medical care and health promotion programs.²² The county selected for this feasibility study, Buchanan County, VA, is a designated Medically Underserved Area and ranks 132 of 133 in Virginia's 2015 County Health Rankings.^{30,56} The county reports similar graduation rates, unemployment rates, rates of children living in poverty, and quality of life outcomes as other Appalachian Virginia counties.⁵⁶

The principal of the elementary/middle school selected for this study had an established relationship with the research team from an ongoing collaboration with a local advisory board. The goal of this board was to improve obesity and oral health outcomes among county youth by reducing access to

and consumption of SSBs. The principal first helped facilitate a formative study, during which nine middle school youth systematically assessed and adapted Kids SIP*smart*ER program materials and assessment instruments to enhance age and cultural acceptability. Over several meetings, the principal, science teachers, and research team established protocol for recruitment, implementation, and evaluation. The teachers agreed to help with classroom management provide their feedback on the lessons.

Study Design and Participants

To afford all students the opportunity to benefit, the study used a randomized crossover design. During the first intervention period (Fall 2015), five 6th and 7th grade classrooms were randomized to receive either Kids SIP*smart*ER (n=3) or a matched contact comparison physical activity program (n=2). The classrooms received the other program in the second intervention period (Spring 2015) (Figure 4.1).

All 6th and 7th graders were eligible for the study (Figure 4.2). Packets describing the intervention and consent forms were distributed to each child to take home to the parents, and teachers made announcements in class. All students completed the surveys and participated in the lessons since they took place as part of regularly scheduled class, but only students whose parent/guardian provided consent were included in the analysis. By signing the consent form, parent/guardians also agreed to receive one phone call per week during both programs. Students were also excluded from data analysis if they did not attend regular science class due to a disability or had participated in the formative study (Figure 4.2). Parents/guardians received \$5 gift cards for receiving the phone calls. All students, regardless of consent status, received a t-shirt. Consented students who were randomly selected to participate in exit focus groups received a \$5 gift card. This research protocol was approved by Virginia Tech Institutional Review Board.

Intervention Description

The curriculum was adapted from an existing program, SIP*smart*ER, which has been shown to be effective at reducing SSB among Appalachian adults.⁵⁷ The SIP*smart*ER framework combines a well-established behavior change theory, the Theory of Planned Behavior (TPB), with media literacy, and the Kids SIP*smart*ER framework adds the novel concept of public health literacy (Figure 4.2). The TPB

posits that a person's motivation (intention) to change his or her behavior is influenced by his or her perception of the norms, attitudes, and control over that behavior.^{58,59} The constructs of the TPB as they relate to dietary behaviors have been shown to be particularly dynamic among adolescents, who are starting to make independent decisions yet are still highly influenced by peer and familial norms.⁶⁰ Media literacy encourages obtaining, interpreting, and controlling the influence of information found in media messages.⁶¹ Public health literacy has emerged from health literacy and encourages obtaining, processing, understanding, and evaluating and acting on information needed to make public health decisions that benefit the community.⁶² It emphasizes conceptual foundations, critical skills, and orientation to civic responsibility, so that individuals "will be better able to appreciate the ways health issues affect themselves, their community, and society-at-large."⁶² In combination, this framework contextualizes individual behavior change within a whole school or community, in order to simultaneously target individual-level behavior change and increase awareness of social and environmental changes needed to reduce public health burden.

Delivery Protocol

Six 45-minute lessons were delivered once per week during science class. Students had consistent daily schedules and stayed within the same cohort all day, so all lessons occurred on the same day and time each week. Each lesson included a teach back worksheet⁶³ to reinforce key objectives from the previous lesson, a short didactic portion, an application activity which involved students participating in games, skits, or other interactive activities, and an at-home assignment. Two trained researchers delivered the didactic portion, with assistance from the two science teachers during the application activity of most lessons. The materials were designed using clear communication techniques, and the delivery involved very few resources.⁶³ The teach back worksheets consisted of 4-6 questions developed using the lesson's theory-based learning objectives. The students completed these worksheets in small groups for the first four lessons, and completed the Lesson 5 worksheet as individuals. At-home assignments included tracking SSB intake using a drink diary, observing the prevalence of SSBs in the community, and practicing being role models at home. In addition to the classroom component, the program included brief

(≤60 seconds) phone calls delivered to consenting parents using the school's automatic call system. The objective of these calls was to encourage parents to reinforce the lesson content with the child at home. Table 4.2 details the Kids SIP^{smart}ER curriculum and parent call content.

The matched contact comparison intervention also consisted of six, 45-minute lessons on physical activity as well as brief parent phone calls. The primary objectives of this curriculum were to teach physical activity recommendations and associated health benefits, and introduce new forms of physical activity (i.e., yoga, dancing, etc.). The lessons similarly incorporated teach back worksheets, activity diaries, and at-home assignments.

Measures

Limited-effectiveness

To assess limited effectiveness, pencil-and-paper questionnaires were administered during one class period at four time points: Time 1 was one week prior to intervention period one, Time 2 occurred immediately following intervention period one, Time 3 was one week prior to intervention period two, and Time 4 was immediately following intervention period two (Figure 4.1).

The questionnaires were tested for age and cultural acceptability as part of the formative study. With the exception of the public health literacy scale, all instruments were adapted from SIP^{smart}ER and previously validated in adolescents.^{64,65,66} SSB intake was assessed using the BEV-Q, a 15-item beverage frequency questionnaire which asks participants to recall, on average in the last month, how often they consumed various beverages and how much they consumed each time.⁶⁷ A 58-item instrument assessed SSB-specific Theory of Planned Behavior constructs (attitudes, perceived behavioral control, subjective norms, and intentions), media literacy, and public health literacy. As no validated instrument had been developed to assess public health literacy, a 5-item instrument was developed for this study based on one previous study that used the framework⁶⁸ and supplemented by a 3-question community connectedness subscale.⁶⁹ All theory questions used a 5-point Likert scale. One question regarding the number of days in the past week the participant had been physically active for at least 60 minutes assessed physical activity changes due to the comparison program.⁷⁰ Students reported their age, grade, and gender. To assess BMI

percentile, height and weight were also collected for each participant in a private room, using a research grade stadiometer and Tanita scale. Data were collected in duplicate, with shoes and outerwear off.

Additional feasibility outcomes

Organizational demand, acceptability, practicality, implementation and potential barriers to future integration were assessed through teacher surveys (n=2) were administered following each lesson and a follow-up interview. The surveys contained ten Likert-type statements and five open-ended questions specifically designed to assess feasibility (Table 4.4). Students' acceptability and demand were assessed through four Likert-type questions during the post-survey as well as two focus groups (one per grade) following program delivery. During the focus group, students were asked to describe components of the program that they found "fun," "motivating," "surprising" and "helpful." To assess implementation of the intervention as intended, researcher field notes, attendance records, return rate of "drink diaries," correct teach back worksheet responses, and cost data were analyzed. All feasibility outcomes are reported for the first intervention period only.

Statistical Analysis

Limited Effectiveness

Data entry and analysis for quantitative data were conducted in SPSS Statistics for Mac (v.22). Descriptive statistics described baseline variables and Cronbach's alpha scores described scale reliability. Data was checked for normality, and outliers on the primary variable (SSB fluid ounces), defined as values greater than three standard deviations from the mean, at any time point were excluded from analysis.⁷¹ Item imputation using last-observation-carried-forward was used to handle values missing due to absenteeism or incomplete surveys. Approximately 1% of variables were imputed.

To test the hypotheses that students in intervention classrooms would significantly reduce their SSB consumption over time and compared to students in comparison classrooms from Time 1 to Time 2 and that this difference would be maintained at Time 3 (three month follow-up), repeated measures ANOVAs were used. An effect size was calculated on the primary SSB outcome between Time 1 and Time 3 to inform power calculations for future studies. Changes in SSB consumption among students in

Kids SIP^{smart}ER during intervention period two (Time 3 to Time 4) were also assessed, but no statistical comparisons between groups were made. Subgroup analysis was conducted for “high consumers,” defined as students who reported consuming more than the recommended amount of SSBs for adults (8 ounces/day) at baseline.

BEV-Q data was converted into ounces and kilocalories for analysis. Average scores were calculated for attitudes, perceived behavioral control, subjective norms, behavioral and implementation intentions, media literacy, community connectedness, and public health literacy. Baseline BMI percentiles at baseline were calculated according to the sex and age-specific Centers for Disease Control and Prevention growth charts.⁷²

Additional feasibility measures

Averages were calculated for each lesson as well as across lessons to determine teachers’ perceived demand, acceptability, and implementation. Students’ mean level of satisfaction and perceived demand were also computed. Open-ended responses were recorded and coded to further describe feasibility measures. Attendance, drink diary return rates, and percent of correct responses on teach back worksheets were tabulated. Cost data for materials and time spent on delivery were compiled to determine cost per classroom and/or student.

Focus group and teacher interview recordings were transcribed verbatim. Transcripts were independently analyzed by two members of the research team, who met to compare coding and generate a list of themes based on feasibility outcomes.⁷³ Field notes were reviewed and evaluated for similar themes, particularly implementation challenges.

RESULTS

Demographics

Of 90 eligible 6th and 7th graders, 76 (84%) returned parental consent forms to participate in data collection. Of these 76, 74 (97%) were present at baseline survey administration, and 63 (82.9%) were present for height and weight collection. Following baseline data collection, classrooms were randomized

to receive Kids SIPsmartER (n=3; n=43 students) or the comparison (n=2; n=31 students) program first (Figure 4.2).

At baseline, enrolled students had a mean BMI percentile of 80.35 (SD=25.18). Among those enrolled, 25.4% were overweight, and 39.7% were obese. The average SSB ounces/day was 36.17 (SD=26.94), or 469.5 kcals (SD=355.13). Additional baseline characteristics of each group are described in Table 4.2. There were no statistically significant differences between the groups at baseline.

Limited Effectiveness

First intervention period

Table 4.3 details all limited effectiveness outcomes. Five students (three outliers and two with missing baseline data) were excluded from analysis. Within the group receiving Kids SIPsmartER in the first period, significant decreases in SSB fluid ounces were found in both the whole sample (n= 42), (-10.96 ounces; p=0.010) and the subsample of high consumers (n=37) (-13.80 p=0.002) at Time 2. These differences were maintained at Time 3 (-12.24 ounces; p=0.003 for full sample; -13.35 ounces in subsample, p=0.005, respectively). An effect size (Cohen's d) of 0.48 was shown for the full sample from Time 1 to Time 3. There were no significant between group differences for SSB fluid ounces at Time 2 or Time 3 in the full sample (n=71) or the sub-sample (n=63) when compared to the comparison group (p=0.22, p=0.25, respectively). The between-group effect size from Time 1 to Time 3 was 0.29.

When examining individual beverage items (sweetened fruit drinks, sweet tea, sweetened coffee, soda pop and energy/sports drinks), there were no significant differences between groups. The decrease in overall consumption of SSBs in the intervention group is primarily attributable to a significant decrease in energy/sports drinks by Time 3 (p=0.02). A significant decrease in soda was observed at both follow-up time points in the comparison group (p=0.05, p=0.001, respectively). Additionally, consumption of water decreased between in both groups, and this decrease was significant in the intervention group (p=0.05).

Cronbach's alphas for the theoretical scales ranged from 0.53 – 0.89 (Table 4.3). At both follow-up time points, significant time (p<0.01) and group (p<0.01) effects were observed for media literacy. Time and group effects for public health literacy were significant at Time 3 (p<0.01; p=0.014,

respectively). There were no significant differences for Theory of Planned Behavior variables (attitudes, perceived behavioral control, subjective norms, intentions) or days meeting physical activity recommendations at either follow-up.

Second intervention period

During the second intervention period, students receiving Kids SIPsmartER (n=25) reduced their consumption by -9.61 ounces, which approached statistical significance (p=0.069). Among high consumers (n=23), the reduction also approached significance (-10.92 ounces; p=0.055). Additionally, significant increases in media literacy, public health literacy, attitudes, subjective norms, and behavioral intentions were observed (Table 4.3).

Demand, Acceptability, Practicality

Table 4.4 details additional feasibility results. Of 12 possible teacher surveys (one per teacher for each of 6 lessons), eight (67%) were collected. Across all lessons, teachers either moderately or strongly agreed with all survey items, indicating that they found the materials and content appropriate and important, and that their students liked and learned from the lessons. An in-depth interview with the teachers similarly indicated their satisfaction with Kids SIPsmartER, as well as their students' satisfaction. When asked to rate the importance of reducing sugary drinks in their school and community on a scale of 1 to 5, both teachers gave it a 5, citing concerns about higher rates of obesity at younger ages and the obesity epidemic as the primary reason for their ranking. They indicated that this program was the only one addressing these concerns, and should continue as part of the science curriculum. Both teachers felt that the program was practical to implement within existing resources. They felt it would be possible and enjoyable for them to teach the program and possible without assistance, as long as they received training.

Among students receiving Kids SIPsmartER in the first period and present at Time 2 (n=42), the majority agreed that they liked the program, that it was important, and that other kids their age would like it, and it was important for other kids to receive. All students in both focus groups (n=12) reported aspects of the program that they found fun (i.e. "made our own commercial"), helpful ("drink diaries"), surprising

(“how much sugar is actually in them”) and inspiring (“I helped my brother stop drinking pop”). Focus group participants also agreed that sugary drinks were a problem in their community, that this program was the only kind like it in the school, and that it was needed in their school and other county schools. Students did not report any “dislikes”, although they did indicate that they preferred the games and hands-on activities to writing activities.

Implementation

In the first intervention period, 17 of 18 possible lessons were delivered in the three intervention classrooms. One lesson was disrupted in one class by a school wide assembly. Factors influencing implementation included varying classroom layouts, class sizes, and class duration (the last class of the day was 5-7 minutes shorter), and broken equipment. In all 17 fully delivered lessons, the teach back activity and didactic portion were completed, but the time for the application activity varied. Student attendance in the three classes across the six lessons was about 93.1%. Students’ return rates for the drink diaries steadily declined from Week 2 to Week 6—in Week 2, the average return rate was 77.8%, and by Week 6 the return rate was 11.5%. Across the three classes, student group answered between 63-83% of teach back questions correctly for each of the first four lessons. For the fifth lesson, individual students answered correctly 72% of the time.

Teachers found the lessons understandable, appropriate, and engaging for their students. They felt that the VT instructors used the same resources they typically use in their classroom to deliver lessons. Five of six possible parent calls (83.3%) were delivered. The first call was not delivered due to a delay in setting up the call system. Materials costs for color printing, prizes and t-shirts, and water bottles for Kids SIPsmartER (n=58) was approximately \$8 per student. Staff time required for lesson preparation and delivery was about five hours per week.

Future Integration

While extensive understanding of future integration would require a long-term study with continuous monitoring, it was helpful to gain initial perceptions from the teachers and students. The primary barriers teachers identified that may limit more permanent integration included (1) a lack of

parental involvement and reinforcement at home, (2) limits to behavior change among young teens due to strong familial influences and habit formation, and (3) a potential lack of buy-in from teachers due to competing priorities for class time (i.e., standardized testing). The teachers made suggestions for eliminating these challenges, including tailoring the program for younger grades (4th or 5th) or conducting a multi-year program to increase parent engagement and better reach the kids before “habits are engrained.” They did indicate that the emphasis on role modeling had made an influence. One teacher described a student’s efforts at home:

“There’s this one kid in 7th grade who comes from a very rough background, with the family she has, and she stepped up and was like ‘...I’ve stopped drinking pop in my house, I’m trying to get my brothers and sister, I’m trying to get some of them to step back from it, too.’ If you know the family background, that’s kind of a huge deal, I mean for her to even say that in front of the class, it’s a big deal. I’ve taught her siblings and they’re pretty stubborn about things...again, I feel like that’s a big win.”

Despite the recognized need to involve the parents, the teachers felt that less than 50% of their parents would attend an in-person program.

To combat other barriers, they also suggested providing face-to-face training for teachers, keeping the program in subjects where its components align with state Standards of Learning (i.e., life science), and maintaining a schedule of 6-8 classes, once per week, to maintain ample class time for test preparations.

Similar themes emerged from the student focus groups. When asked if the program should continue at their school, many felt that it should be expanded to younger students, before they have formed habits; however, others felt that younger students might not understand, pay attention, or share what they learned with their families. The students expressed similar perceptions that parents at their school would not be interested in or show-up for a program about SSBs. In both the 6th and 7th grade focus groups, students expressed interest in helping to teach younger students what they learned.

DISCUSSION

This study demonstrates the feasibility of implementing Kids SIPsmartER in a rural Appalachian school serving a population with disproportionate rates of overweight and obesity, excessive SSB

consumption, and limited resources. The program was acceptable, in demand, practical to deliver, and demonstrated statistically significant effects. There were few barriers when implemented by the research team, and the program appeared to meet most desired learning objectives. The study revealed considerations and potential barriers to future testing and integration of the program within the school curricula.

Despite statistics indicating that rural Americans, particularly Appalachians, consume excessive SSBs and suffer disproportionately from associated diseases, to date only three studies have focused reducing SSBs in rural adolescents^{48,74,75} and only one was conducted in Appalachia.⁴⁸ This study conducted by Smith et al used community-based participatory research methods to develop a month long, peer-delivered pilot intervention in two high schools and reported a significant decrease in daily servings of SSBs amounting to a reduction of about 150 kcals/day.⁴⁸ This reduction is nearly identical to the 144 kcal decrease shown in our study, and suggests that the use of community-based methods is promising in this region. However, like other SSB studies, the Smith study did not report indicators beyond efficacy/effectiveness that are needed to inform practical translation across Appalachia.⁵³ Our study expands these findings by reporting information that is critical for understanding the program's potential to be expanded across the region.

Limited Effectiveness

Kids SIP*smart*ER showed limited effectiveness to reduce SSB consumption among program participants, both immediately following the intervention and at three-month follow-up, with a moderate effect size of 0.48. The lack of significant group effects was due, in part, to a linear (non-significant) decrease in the comparison group of about 5 ounces/day in the full sample across the three time points. As there were no baseline differences and we are not aware of any environmental changes that would have influenced SSB consumption rates, this decrease is most likely a result of group interaction bias. While the classrooms traveled as a cohort throughout their academic classes, it is possible that the groups interacted and exchanged information during lunchtime, recess, or other shared periods. Additionally, it is possible that the comparison students were influenced to change their behavior simply by filling out the

beverage questionnaire. Finally, although we did not see statistically significant changes in physical activity or water consumption in the control group, it could be possible that by encouraging another healthy behavior (physical activity), students were primed to make healthy changes to their beverage choices as well. Our matched contact comparison design was selected to ensure that every student in this medically underserved population could benefit, and fulfilled the school principal's request that the students have more opportunities for physical activity as well. Future studies in similar settings should select study designs that minimize interaction bias, such as randomization by school or grade rather than classroom, but still provide every student with opportunity to benefit.

Despite these biases, the significant and sustained decreases in consumption in the intervention group are promising. While the sample size and repeated testing method does not allow for statistical comparisons between the two intervention periods, similar decreases with similar effect sizes were shown among students who received Kids SIP*smart*ER in the second period. Additionally, students in the second intervention period reported similar significant increases SSB-related media and public health literacy.

The significant within and between group effects on SSB-related media literacy align well with the adult study, which also reported statistically significant increases in SIP*smart*ER compared to the comparison condition.⁵⁷ The current study also contributes to the general body of literature showing the importance of media literacy education to improve health behaviors among adolescents.⁷⁶⁻⁷⁹ To our knowledge, this is the first child and adolescent-based SSB study to incorporate and report on changes in media literacy.⁵² Young adolescents are highly engaged with media, both as frequent users and targets of pervasive industry marketing efforts, particularly related to SSBs.⁸⁰ Thus, media literacy is a crucial to reducing the influence of these ads on purchasing decisions. Furthermore, general media literacy is highlighted as an important concept to learn and practice in both 6th and 7th grade state Standards of Learning.

This study is the first to target and assess public health literacy in middle school youth, and the promising results warrant continued study in disparate populations. Our study expands on the findings of the only other known study to use the framework by Rogers et al.⁶⁸ The study used the public health

literacy framework to develop a social marketing and advocacy campaign, which resulted in a greater understanding of and actions against the social factors that influence diabetes disparities among urban Hispanic and Latino high school students.⁶⁸ Our study incorporated similar messaging into a theory-based behavioral intervention and targeting a younger, yet similarly disparate, population. The improvements in public health literacy indicate that middle school students can grasp these social factors as well. In the focus groups, students discussed the importance of this program because so many people in their community drink SSBs, and wanted to play a role in keeping the program in their school and around their community. Future studies are needed to develop more sensitive, validated instruments to assess public health literacy constructs, as well expand use of the framework beyond understanding disparities to taking community action to reduce them.

Despite the similarities in core curricular components to the adult program, Kids SIP*smart*ER students did not significantly improve SSB-related attitudes, subjective norms, perceived behavioral control, or intention, a contrasting finding to the adult study, which found significant improvements in attitudes, subjective norms, and perceived behavioral control.⁵⁷ These findings contradict the hypothesis that changes would be more apparent due to the dynamic nature of these constructs in adolescent as well as previous evidence that TBP-based dietary interventions in adolescents frequently report changes in theory variables and associated behavior changes.⁶⁰ While there were significant decreases in SSB ounces, the program might have been even more effective had there been more change in TPB variables, particularly attitudes and behavioral intentions, which have a strong relationship to SSB behaviors.⁶⁶ The program's ability to influence these constructs maybe have been limited due to a lack of individualized monitoring. In the adult study, each participant received weekly support calls where they could report and re-assess their goals and discuss barriers and strategies to overcome them. While the Kids SIP*smart*ER lessons occurred weekly, there was no follow-up with each student individually or support between lessons. Additionally, the scale scores were relatively high at baseline, thus, it is possible that there was simply limited room for improvement.

Collectively, these limited effectiveness findings indicate the while Kids SIP*smart*ER demonstrates potential to reduce SSBs by targeting TPB variables, media literacy and public health literacy, further refinements to the curriculum and data collection instruments and methodology are necessary prior to large scale testing. These refinements include incorporating more age-appropriate monitoring strategies and further testing of the theory-based measures to ensure validity in this population.

Additional feasibility measures

The findings provide justification for a larger scale effectiveness study, as they indicate that the program has potential to be eventually implemented sustainably with few monetary or staff resources or outside support. The qualitative and quantitative feasibility measures used in this study demonstrate that Kids SIP*smart*ER is acceptable, in demand, and practical to deliver in a low-resource, rural school setting. Teachers felt that most components of the program could easily fit within the life science curriculum. Home culture and lack of parental involvement were the primary perceived barriers to future studies and/or integration into curriculum. School culture and environment were not perceived to be barriers, with the exception of potential time constraints caused by standardized testing requirements.

Despite the small sample size, the participation rates in this study were high, demonstrating acceptable recruitment strategies and parental buy-in. However, as the teachers reflected, future programs that do not offer a parent incentive may not be as successful. It was clear from interviews with teachers and student focus groups that the primary concern in terms of future integration was a lack of substantial parent component. This echoes recommendations of other school-based obesity interventions for adolescents, including SSB-specific interventions, which call for interventions that target both the students and the parents, to address the home environment.^{21,81, 82,83} Teachers and students agreed that outcomes would be better if there was more reinforcement at home, but felt that parents in their region, particularly in the middle school age group, would not be interested in participating. This perception that parents would not be interested in participation has been reported in other studies of obesity prevention strategies in Appalachia.^{84,85}

It is evident that a family or parent component is highly desirable to improve effectiveness of Kids SIP*smart*ER. In Appalachia, where the family unit is highly valued and “an individual’s problem becomes a family problem,” this is particularly relevant.⁸⁶ Yet, it is not clear how this parent engagement can be ensured in this remote region. One suggestion from the teachers was to implement the program in lower grades or conduct a multi-year program. The teachers’ observations that parent involvement peaks in late elementary school and drastically declines by middle school is supported by national data.⁸⁷ While this may increase parent buy-in and involvement, it would require substantial curricular changes, additional formative testing for age acceptability, and may not be generalizable to schools that do not have combined elementary/middle schools. An additional way to reach parents could be better incorporation and/or expansion of the parent call component. The automated calls allowed for to follow-up with parents after each lesson, but this study did not assess the extent to which parents received, listened to, and spoke with their children about the content of these calls. Better incorporation of this component could provide a means to educate parents, reinforce messages to students, and change the norms and environment that are pervasive at home. Another recommendation is to bolster the curriculum’s emphasis on role modeling, encouraging students to talk to their parents about the harms of SSBs to work toward eliminating it in the home. Both the teachers and students qualitatively described Kids SIP*smart*ER’s potential to influence “home culture” due to its emphasis on role modeling.

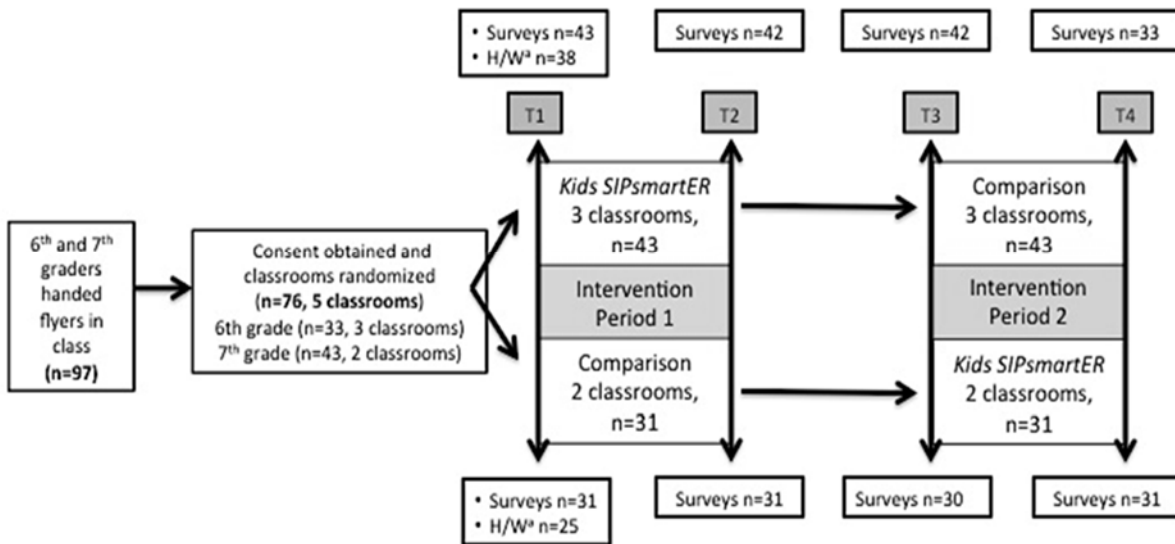
The main strengths of this study include the mixed methods evaluation design, which allowed for better description of feasibility indicators. Additionally, it is strengthened by the matched contact randomized design, which is not commonly reported for feasibility studies. This study also reported 3-month follow-up data to assess maintenance of behavior changes. Strengths of the program itself include that it requires few resources, is not time intensive, and can be embedded within standards of learning requirements for middle schoolers. Finally, the study was greatly strengthened by the continued support and buy-in from teachers and staff.

Limitations

Several limitations should be considered when interpreting study findings. First, this study was limited by a small sample size and lack of a true control group. Other school-based SSB studies demonstrated more effective results due to higher sample sizes;⁵² however, the matched contact crossover design allowed all students to participate and respected the requests of the school principal. Although the school selected for this intervention is fairly representative of the immediate region, results may lack generalizability beyond Appalachian Virginia. Finally, the primary SSB outcome is self-reported, which may introduce bias, however the measure used to assess SSB intake has been previously validated in youth and is practical to use in a school-based setting and on a larger scale.⁶⁷

Despite these limitations, the study served its purpose to establish the feasibility of implementation of Kids SIP*smart*ER in middle schools in medically underserved regions in Appalachia. Demand, acceptability, implementation, and limited effectiveness were established, and barriers for future integration and suggestions for adaptation were detailed. Importantly, this study provides effect size information and feasibility data needed to inform a larger scale study in a region known to consume excessive amounts of SSB. Future efforts to secure funding and resources should prioritize school and community buy-in prior to implementation. These study designs should avoid interaction biases, included strategies to better involve parents and address “home culture,” and incorporate methods to test teachers’ capacity to develop and deliver the intervention. Additionally, future studies should be adequately powered to assess differential effects by various subgroups, as well as relationships between the various theoretical constructs in the Kids SIP*smart*ER framework and SSB consumption. Finally, efforts to reduce SSB consumption in the region should be expanded to include environmental and policy changes, in order to reduce access, change cultural norms, reduce consumption on a large scale, and, ultimately, reduce the prevalence of childhood obesity, cardiovascular disease, diabetes, and poor oral health.

Figure 4.1: Randomized crossover study design for Kids SIPsmartER feasibility study



^aH/W=height and weight data collected

Table 4.1: Kids SIPsmartER curriculum overview and parent call objectives, corresponding with Theory of Planned Behavior (TPB), media literacy (ML) and public health literacy (PHL) constructs

Week and Topic	Key Learning Objectives	Key Theoretical Constructs	Parent Phone Calls
1. What's In Your Drink?	- Identify a drink as sugary and distinguish between sugary and non-sugary drinks - Calculate how much sugar is in various sugary drinks - Recognize if they drink too many sugary drinks - Identify adverse health affects of consuming too many sugary drinks - Understand that most kids drink too many, but Appalachian kids drink disproportionate amounts	- Attitudes [TPB] - Conceptual Foundations [PHL]	Define SSBs, discuss harms and recommendations for adults and children
2. Drop the Pop!	- Calculate ounces of sugary drinks they typically drink - State reasons to set personal and group goals for drinking less sugary drinks - Set SMART personal and group goals for drinking less sugary drinks - State personal barriers that might make it hard for someone to drink less sugary drinks and identify ways to overcome those barriers	- Perceived Behavioral Control [TPB] - Behavioral Intention [TPB] - Subjective Norms [TPB]	Illustrate barriers that are specific to the home and provide strategies to help child meet goals
3. The Game of Life: Pop Edition	- Recognize personal financial benefits of drinking less sugary drinks - Recognize personal health, social, and productivity costs of drinking too many sugary drinks - Recognize public's health, social, productivity, and environmental costs of drinking sugary drinks - Recognize that their community is disproportionately affected by sugary drinks	- Attitudes [TPB] - Subjective Norms [TPB] - Conceptual Foundations [PHL]	Describe the health, economic and environmental costs of SSBs and relate that to child's health
4. Talking Back	- Recognize that advertisements of sugary drinks are often untruthful - Recognize that the beverage industry directly targets teens and those living in rural areas - Understand specific tactics that advertisements use to sell beverage products - State alternative messages beverage companies could use to tell the truth	- Attitudes [TPB] - Media Literacy	Discuss how advertisements target rural adults and youth and give examples of ways to recognize tactics

5. Spreading the Word	• Recognize that untruthful advertisements are widespread throughout their school, homes and community stores • State what it means to be a “healthy role model” • State messages they would use to teach a friend or family member that drinking too many sugary drinks is harmful and that the consequences are not inevitable	• Media Literacy • Perceived Behavioral Control [TPB] • Critical Skills [PHL]	Suggest ways parents can be role models by reducing their own SSB intake and supporting their child
6. In Our Own Voice	• Set individual long-term goals to drink less sugary drinks • Recognize that they can be role models among their family and friends to drink less sugary drinks • State the purpose of a public service announcement • Demonstrate the use of various persuasive techniques based on target audiences • State strategies to overcome barriers after program ends	• Perceived Behavioral Control [TPB] • Behavioral Intentions [TPB] • Critical Skills [PHL] • Civic Orientation [PHL] • Media Literacy	Encourage parents to discuss child’s PSA and how they overcome barriers now that program is over

Figure 4.2: Kids SIPsmartER Conceptual Framework

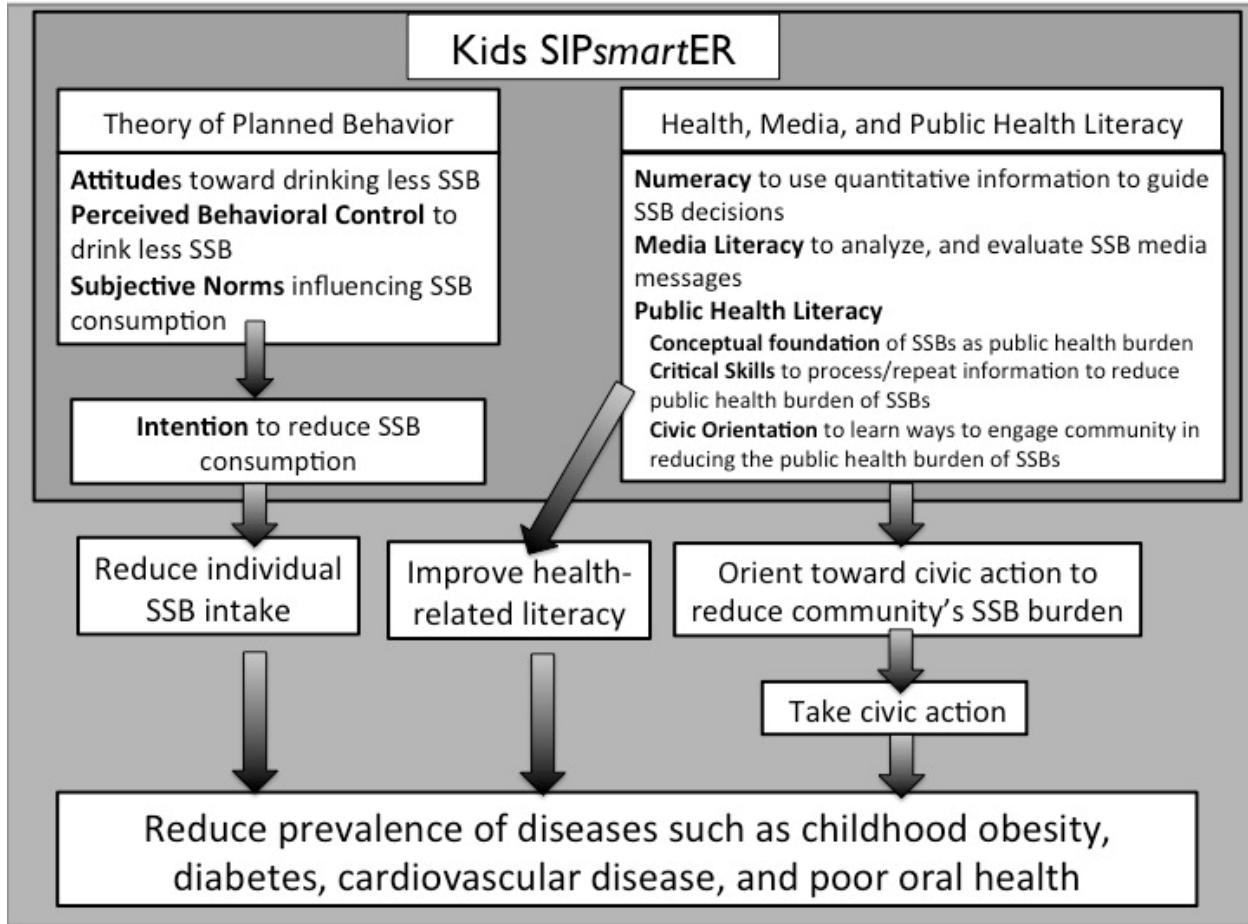


Table 4.2. Baseline data for Kids SIPsmartER by intervention group (n=74)

	Intervention ^a (n=43)	Comparison ^a (n=31)
Female, n (%)	26 (60.5%)	18 (58.1%)
Mean age (SD)	11.67 (0.61)	11.84 (0.73)
Mean SSB ounces (SD) ^b	35.59 (25.73)	36.59 (28.39)
Mean SSB kilocalories (SD)	457.87 (341.06)	469.36 (376.32)
Mean water ounces (SD)	26.70 (19.36)	22.71 (17.99)
# consuming more than recommended SSB (8 ounces/day)	37 (86.0%)	29 (93.5%)
# getting less than recommended physical activity (60 mins, 7 days/ wk)	31 (72.1%)	23 (74.1%)
Mean BMI %ile (SD) ^c	78.2 (27.9)	83.7 (20.48)
# underweight (<5 BMI%ile) ^c	1 (2.6%)	0 (0.0%)
# normal weight (5.0-84.9 BMI %ile) ^c	12 (31.6%)	9 (23.7%)
# overweight (85.0-94.9 BMI %ile) ^c	10 (26.3%)	6 (15.8%)
# obese (>95% BMI %ile) ^c	15 (39.5%)	10 (26.3%)

^aNo significant differences between two groups

^bDoes not include students with missing data from baseline BEV-Q (Intervention n=42; Comparison n=28)

^cHeight and weight data (Intervention n=38; Comparison n=25)

Table 4.3.Limited effectiveness results by intervention group using last-observation-carried-forward, missing values imputed (n=71)

	Items; Cronbach's alpha	Intervention Group Period 1 (n=43) ^a			Comparison Group Period 1 (n=28) ^a				Between Group Effects	
		Baseline (T1) Mean (SD)	Post-test 1 (T2) Mean (SD)	Post-test 2 (T3) Mean (SD)	Baseline Mean (SD)	Post-test 1 (T2) Mean (SD)	Post-test 2 (T3) Mean (SD)	Post-test 3 (T4) Mean (SD)	T1 to T2	T1 to T3
Overall SSB ounces/day ^{b,c} n=67	n/a	35.59 (25.73)	24.62** (21.99)	23.35** (25.14)	32.18 (22.85)	28.82 (29.6)	26.78 (30.59)	17.17 (22.62)	F=1.51; p=0.22	F=1.36; p=0.25
Overall SSB kcals/day ^{b,c} n=67	n/a	467.60 (339.10)	323.89* (295.46)	301.24** (327.59)	411.92 (302.71)	362.08 (365.09)	337.96 (386.19)	216.36 (274.53)	F=1.21; p=0.28	F=1.40; p=0.24
Water ounces/day ^b	n/a	26.70 (19.36)	27.09 (17.85)	22.05* (15.85)	22.37 (18.03)	20.40 (17.89)	18.55 (15.72)	22.94 (18.11)	F=0.27; p=0.61	F=0.05; p=0.83
Soda pop ounces/day ^b n=70	n/a	12.33 (13.56)	10.18 (10.31)	9.39 (12.81)	12.04 (10.86)	8.34* (8.09)	5.80** (5.51)	5.72 (7.19)	F=0.31; p=0.58	F=1.26; p=0.27
Energy/sports drinks ounces/day ^b n=70	n/a	13.21 (17.41)	7.96 (16.39)	7.31* (14.68)	7.91 (13.22)	8.73 (16.40)	8.87 (17.13)	4.45 (8.98)	F=1.79; p=0.19	F=3.35; p=0.72
Coffee (with cream and/or sugar) ounces/day ^b	n/a	1.80 (4.17)	1.51 (3.45)	1.68 (4.63)	3.66 (7.39)	4.44 (10.08)	3.46 (9.43)	2.26 (5.42)	F=1.45; p=0.23	F=0.04; p=0.95
Sweet tea ounces/day ^b	n/a	3.08 (9.65)	2.79 (9.41)	2.33 (6.15)	2.11 (4.72)	2.47 (4.34)	2.96 (7.42)	2.81 (6.07)	F=0.072 ; p=0.79	F=0.57; p=0.45
Sweetened fruit juice ounces/day ^b n=69	n/a	4.54 (7.48)	3.13 (6.72)	2.14 (3.77)	7.46 (12.68)	4.88 (5.11)	5.16 (7.56)	2.94 (4.41)	F=0.23; p=0.63	F=0.002; p=0.97
Media Literacy ^d n=69	19; 0.84	3.70 (0.56)	4.11** (0.56)	4.21*** (0.65)	3.90 (0.54)	3.82 (0.59)	3.80 (0.55)	4.16*** (0.42)	F=8.48; p=0.005	F=22.09; p<0.001
Public health literacy ^d	5; 0.68	3.00 (0.86)	3.31 (1.03)	3.42** (0.97)	3.17 (0.74)	3.06 (0.74)	3.09 (0.80)	3.46** (0.63)	F=2.87; p=0.095	F=6.43; p=0.014

Community Connectedness ^e n=70	3; 0.73	3.45 (0.76)	3.10 (1.29)	3.31 (1.18)	3.23 (0.93)	3.36 (0.83)	3.19 (1.08)	3.02 (1.13)	F=2.46; p=0.12	F=0.17; p=0.68
Attitudes ^d	6; 0.83	3.62 (0.75)	3.60 (0.86)	3.66 (0.86)	3.40 (0.79)	3.20 (0.70)	3.14 (0.64)	3.55* (0.53)	F=0.56; p=0.46	F=2.35; p=0.13
Perceived Behavioral Control ^d	3; 0.58	4.03 (0.92)	3.91 (0.79)	3.98 (0.87)	3.94 (0.75)	3.48 (0.71)	3.68 (0.87)	3.88 (0.84)	F=2.55; p=0.12	F=0.90; p=0.35
Subjective Norms ^d n=70	3; 0.53	3.40 (0.88)	3.43 (0.86)	3.39 (0.90)	3.76 (0.83)	3.42 (0.80)	3.39 (0.67)	3.82** (0.65)	F=2.25; p=0.14	F=1.97; p=0.17
Behavioral Intentions ^d	4; 0.85	3.43 (1.21)	3.47 (0.83)	3.33 (1.11)	3.31 (1.11)	3.00 (0.93)	3.01 (0.86)	3.45* (0.84)	F=1.92; p=0.17	F=0.75; p=0.39
Implementation Intentions ^d n=70	2; n/a	3.51 (1.15)	3.60 (1.01)	3.58 (1.08)	3.42 (1.17)	2.83 (1.25)	2.95 (1.26)	3.59 * (0.92)	F=5.19; p=0.026	F=3.42; p=0.069
# days meeting physical activity recommendations	n/a	4.86 (1.73)	4.49 (1.93)	4.35 (1.73)	4.86 (1.82)	4.50 (1.71)	4.32 (2.00)	5.04* (1.69)	F=0.001 ;p=0.98	F=0.003; p=0.96

^aIntervention Group Period 1 received Sip Smarter between T1 and T2; Comparison Group Period 1 received Sip Smarter between T3 and T4

^aOn primary variable (total SSB): Group 1=42; Group 2=25

^bCalculated based on beverage frequency questionnaire

^cSSB includes soda pop, energy/sports drinks, coffee with cream and/or sugar, sweet tea, and sweetened fruit juice, does not include 100% juice

^d Responses on a 5-point Likert scale (i.e., strongly disagree to strongly agree)

^e Responses on a 5-point Likert scale (i.e., never to all the time)

*Within group changes from T1 significant p<0.05

**Within group changes from T1 significant p<0.01

*** Within group changes from T1 significant p<0.001

Table 4.4: Feasibility results by area of focus (demand, acceptability, practicality, implementation, integration)

Area of focus				
Demand, Acceptability, Practicality	<i>Teacher surveys</i>		<i>Teacher interview</i>	
	Items (1-strongly disagree to 5-strongly agree)	Mean across lessons (n=8)	Sample question	Notable Quotes
	During this lesson, the instructors used words and phrases my students could understand.	4.83	Acceptability <i>How in general did you feel about the program as it was being implemented in your school and classrooms</i>	• “The kids really enjoyed learning what they were telling them and it was valuable for them to hear that stuff and it was a great program for them to be involved with.” <i>6th grade teacher</i> • “The 6th graders really enjoyed it and you know, it’s been a week since ya’ll have been here and even today I heard kids say some stuff about sugary drinks so I mean the message has at least stuck with them to this point, and hopefully it will continue to stick with them.” <i>6th grade teacher</i> • “The kids really looked forward to it each week.” <i>7th grade teacher</i> • “Well-needed, well-received too. We definitely appreciate you guys coming in and opening our eyes to certain things.” <i>7th grade teacher</i>
	The instructor did a good job of engaging my students in the activities during this lesson.	4.83		
	The handouts, worksheets, and activities were appropriate for my students.	4.83		
	My students learned something new from this lesson.	4.67		
	My students liked doing this lesson.	4.33	Demand <i>If you were to rate the importance of reducing sugary drinks in your school and community on a scale of 1 to 5, what would you say?</i>	• “I would definitely say a 5 [importance of program from 1-5], especially in this area, we’re starting to see some obesity and some health problems at younger ages now.” <i>6th grade teacher</i> • “I also rate it a as a 5. It seems like you’re combatting more problems with the kids not being as physically active...it’s all video games and technology now. So you know, drinking all the sugar, it’s adding weight, it’s becoming a problem, it’s gonna be a diabetes epidemic at some point down the road.” <i>7th grade teacher</i> • “This is the first we’ve seen anything like this.” <i>6th grade teacher</i>
	This lesson helped my students learn to be role models for their friends and family.	4.4		
	The topic of this lesson is important for my students to learn about.	5		
	This topic could fit into the science curriculum at my school.	4.75	Practicality <i>How would you feel about teaching Healthy Hurley in your own classrooms?</i>	• “It wasn’t a problem at all for me to give up science time for this program because in 7th you’re only [standardized] testing in reading and math.” <i>7th grade teacher</i> • “I’d be okay with [teaching Kids SIPsmartER on my own.] I feel that the information [the VT teachers] have shared with us gave us a nice base.” <i>6th grade teacher</i> • “I already teach macronutrients, that’s part of the standardized testing so that gets taught every year and I do a little more because I’ve got a nutritional background. I have no problem at all teaching, and it’s needed, it’s much needed.” <i>7th grade teacher</i>
	I feel confident that I could teach this lesson as part of the science curriculum in the future.	4.42		
	I would enjoy teaching this lesson in the future.	4.58		

	Student surveys (n=42)					Student focus groups	
	Items (1-Strongly disagree to 5-strongly agree)				Mean (SD); % agreed	Sample question	Notable Quotes
	I liked this program.				4.60 (0.83); 90.5% (n=38)	Acceptability <i>Write down one thing about Sip Smarter that you found fun, helpful, surprising and inspiring.</i>	• “Sip Smarter is really fun, it taught us tons of stuff about pop that we probably didn’t know before and taught us not to drink a lot.” 6th grader • “They didn’t make it boring, they made fun by using cool stuff.” 7th grader • “It kind of changed my mind about pop.” 7th grader
	I learned something new from this program.				4.52 (0.80); 92.9% (n=39)		
	Other kids my age would like this program				4.05 (1.08); 71.4% (n=30)	Demand <i>Do you think it’s important keep teaching Sip Smarter here at your school?</i>	• “We’re young right now and stuff. It’s helping us a lot where we...like if we get older, we won’t drink a lot of pop because we learned the consequences before we got old.” 6th grader • “It’s important because there’s a lot of people here that drinks pop.” 7th grader • “I think if you like talk about it when they’re young, they might change their life when they get older.” 6th grader
	It is important for kids my age to get this program.				4.57 (0.70); 88.1% (n=37)		
Implementation	Attendance and Lesson Delivery					Teacher Interview and Open-Ended Survey Questions	
	Lessons delivered				17/18	Sample Question	Notable Quotes
	Attendance across lessons (%)				93.1	<i>What other tools/strategies would you use if you taught this lesson?</i>	• “The tools and strategies used were great. They provided visual examples and used technology use as teachers do on a normal day.” 6th grade teacher • “I think the program needs to be the same length or maybe another week or two. Not shorter at all.” – 7th grade teacher
	Drink Diary Return Rates (%)						
	Week 2	Week 3	Week 4	Week 5	Week 6		
	77.8	44.4	26.4	15.1	11.5		
	Correct “Teach Back” Answers (%)					Field Notes	
	Week 2	Week 3	Week 4	Week 5	Week 6	• Implementation was often limited by shortened class periods at the end of the day • One class was much larger than the other two, so activities had to be adjusted • One several occasions, the classrooms experience technical difficulties, such as a broken projector, which resulted in the research team providing their own projector • Teachers were engaged during lessons and voluntarily assisted with activities	
74.7	82.6	70.3	62.9	72.0			

Suggestions for future integration	<i>Teacher Interviews</i>
	Perceived Barriers to Future Integration • Home culture is a driving factor for high SSB consumption, but parents are hard to reach • School culture does not promote SSB consumption • Habits are already engrained by 6th or 7th grade • Pressure to pass standardized tests may limit training and class time available <i>“It starts at a very early age, we’re seeing children drink pop as early as 2 years old, so we definitely think getting the parents more involved would be something that would lead to more results.” 6th grade teacher</i> <i>“By the time they get to 7th grader their ideas are already formed and it’s much harder to break a kid out of a habit. They’ve already developed that part of their personality.” 7th grade teacher</i> <i>“They [parents] may come in and be like we don’t care about this, it’s none of your business what we feed our kids. You’ll have the other part of them though, that com in and they’re like, I didn’t realize this, we need to cut back ” 7th grade teacher</i> Suggested Strategies to Enhance Integration • Keep Kids SIPsmartER in subjects where teachers already have baseline knowledge level to minimized training time • Move program to 4th grade, another year with fewer standardized tests, where more parents are involved and may be more likely to “buy-in” • Create a multi-year program to reinforce messages, generate parent buy-in, but also build decision-making skills before high school
	<i>Student Focus Groups</i>
	Perceived Barriers to Future Integration • Adults may not attend/listen • Some felt younger kids should learn it, but others thought they may not listen or get as much information • Accessing SSBs at school isn’t common <i>“I’d say probably go down into 5th, but some littler kids may not understand...they really won’t pay as much attention to it, they won’t be tempted to go back and tell their family.” 7th grader</i> <i>“I doubt very few of them [parents] would show up. They wouldn’t listen, we’ll listen better than grownups.” – 7th grader</i> Suggested Strategies to Enhance Integration • Train older kids to teach younger kids • Spread to other schools <i>“It should be spread out to more schools where the other schools can learn how bad it will be for them before they end up doing like some people already have.” 6th grader</i>

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CHAPTER 5: CONCLUSIONS

The excessive rate of SSB consumption among children and adolescents in the United States is alarming due to its independent association with myriad adverse health outcomes. The need to address this problem is particularly salient in Central Appalachia due to the disproportionate rates of consumption, specific cultural norms, low educational attainment, poverty and lack of medical and oral health infrastructure. Current efforts to reduce rates of consumption in this region are sparse, and their methods are insufficient to combat the pronounced disparity across the region. Thus, there is a critical need to develop and test delivery of multi-level, evidence-based programs that engage local citizens, are tailored to the population, and have the potential to be institutionalized and sustained across a variety of settings and contexts (Figure 5.1).

This dissertation addresses this need and informs future efforts to relieve the burden of excessive SSB consumption in Appalachia. First, Study 1 identified gaps in current studies to reduce SSBs among children and adolescents. By using the RE-AIM framework to guide a systematic literature review, the study highlighted the lack of internal and external validity reporting in studies across the socio-ecological model. Without this information, the extent to which effective strategies could be similarly implemented in the Appalachian region is unclear. Study 1 provides recommendations for future studies working across the socio-ecological model, particularly in health disparate populations, to better assess and report information that can be used to facilitate this translation.

While it is critical to develop a better understanding of the translatability of evidence-based interventions to reduce SSBs in Central Appalachia, it is equally important to understand the unique cultural context under which this translation will occur. This understanding is essential in order to select an appropriate intervention strategy to meet the needs and norms of a particular community. Studies 2 and 3 present methods to arrive at this understanding for Kids SIPsmartER, a classroom-based behavioral intervention to reduce SSB intake among Appalachian middle school students.

Study 2 engaged a small group of young adolescents in a participatory process, which resulted in both the adaptation of a theory-based, culturally acceptable program as well as advocacy efforts to build awareness and change cultural norms community-wide. This study established the utility of a brief but

intensive participatory method to enhance cultural relevance of theory-based programs. Additionally, it provided initial evidence that the theoretical framework of Kids SIP*smart*ER can lead to individual intention to reduce SSBs and increased understanding of the importance of wider, community-level changes to reduce the public health burden of SSBs. Finally, the study suggests the potential of community engagement as an acceptable method by which youth can shift norms around SSBs, and provides recommendations for expanding efforts to include advocacy for environmental and policy changes.

Study 3 used a feasibility framework to assess the acceptability, demand, practicality, implementation, integration, and limited effectiveness of Kids SIP*smart*ER. Findings revealed that the program can be feasibly delivered to middle school youth in schools, a venue where the majority of children can be reached. This method, while time and resource intensive, provides valuable insight into the cultural factors, resources, time, and demand necessary to implement an evidence-based program on a larger scale. While the degree to which results within this middle school are generalizable across the region is unclear, the method to ascertain feasibility information is a replicable and worthwhile preliminary step that could be used in participating school districts prior to any widespread effort.

Combined, the three studies in this dissertation represent the initial stages of larger efforts to reduce SSB consumption across Central Appalachia (Figure 5.1). This initial work establishes (1) the need for more detailed reporting of internal and external validity factors for evidence-based interventions; and (2) a simple, replicable method to translate those evidence-based interventions across various unique contexts. It provides preliminary evidence that Kids SIP*smart*ER, a school-based program, can effectively reduce SSB consumption, and recommends community-based methods to expand this program to include higher-level changes. Future studies in this region should build on this work in several ways.

First, further testing of Kids SIP*smart*ER is necessary to not only establish effectiveness, but also to inform translatability and sustainability. The moderate effect size resulting from the feasibility study can inform a design that, while similarly pragmatic, eliminates group-interaction bias and is adequately powered for mediation analysis of the underlying theoretical framework. This testing should occur in

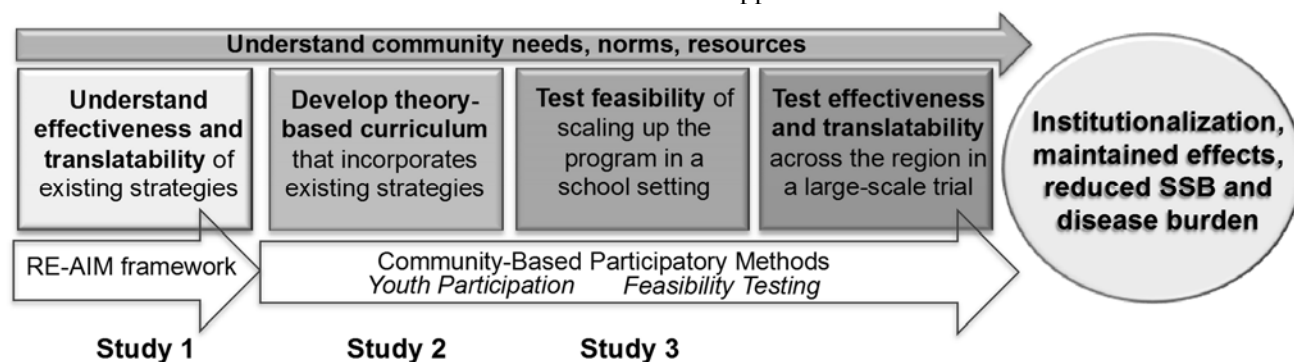
middle schools across the region and be guided by RE-AIM or similar frameworks in order to provide internal and external validity information needed to scale-up the intervention across Central Appalachia. Furthermore, future studies should continue to use CBPR methods to understand varying climates for implementation across school districts, build necessary relationships with school officials, and establish guidelines for sustainability beyond the research study period.

Second, while the Kids SIP*smart*ER curriculum should continue to focus on behavioral strategies, it should also incorporate additional elements of public health literacy to encourage youth to be advocates for environmental and policy level change in their greater community. This multi-level approach is essential to reducing access, shifting social norms, and ultimately reducing consumption on a large scale. Thus, while school is the most logical place for implementation in this region, future studies should also allocate time, resources, and evaluation methods to engaging youth as leaders of advocacy efforts beyond the classroom.

Finally, future studies should expand efforts to address the pervasive interpersonal influence of “home culture.” Studies should continue to involve local youth-serving organizations, teachers and school staff, and parents in planning, developing, and evaluation. Further testing and monitoring of technological methods to reach parents is needed. Additionally, program curriculum should continue to encourage students to be role models to their parents, siblings, and friends outside of the school setting.

While the focus of this dissertation is specifically on reducing SSBs due to its disproportionate prevalence in the Central Appalachian region, the methods and recommendations put forth are applicable across many obesity-related behaviors and appropriate for replication in other subpopulations. The use of community-based research methodologies to implement evidence-based, culturally appropriate interventions across the socio-ecological model is essential to reduce the disproportionate prevalence of childhood obesity and associated cardiovascular and metabolic disorders in health disparate populations.

Figure 5.1 Methodology to develop evidence-based, culturally appropriate approaches to reducing the burden of SSBs in Central Appalachia



APPENDICES

Appendix A: Parent Cover Letter and Informed Consent Form (Manuscript 2)

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Parent Cover Letter

Dear [Parent],

Congratulations! [insert child's name] has been chosen by [X] to join a research project with Virginia Tech. Researchers at Virginia Tech would like to invite [insert child's name] to serve as a "youth ambassador" on a project to reduce sugary drink intake among middle school students. The goal of this research project is to develop a program that can reduce sugary drink intake and encourage healthy living.

As a youth ambassador, [insert child's name] will help create a program to reduce sugary drinks for middle school students in Appalachia. [Insert child's name] will attend a day camp for three days during summer 2015. During the camp, your child will be involved in activities where [he or she] will be asked to share beliefs and opinions about sugary drinks. [He or she] will help create activities to help [his or her] classmates learn about which drinks are healthy and which are unhealthy. After the activities, we will ask the ambassadors how they felt about the activity and whether they think their classmates would like it and learn from it. During the camp, we will also do arts and crafts and play games. We will provide lunch, bottled water, and supervision at all times for your child.

Transportation will be provided to and from the camp each of day. Additionally, [insert child's name] will be given a \$50 gift cards and three YMCA swim passes at the end of the third day.

In the future, [insert child's name] may also choose to keep working as a youth ambassador by helping lead the program for their classmates in the fall.

Please contact the research team at Virginia Tech with any questions or concerns:

Dr. Jamie Zoellner (540-231-3670; zoellner@exchange.vt.edu)

Hannah Lane (540-797-3465; hglane07@vt.edu)

If you would like [insert child's name] to serve as a youth ambassador, please sign the included consent form.

Thank you!

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Parent Informed Consent

Title of Project: “Youth Ambassadors Camp: a method to involve middle school youth in developing a program to reduce sugary drink intake for their classmates”

Investigators:

Jamie Zoellner, PhD, RD, Department of Human Nutrition, Foods and Exercise
Hannah Lane, PhD Student, Department of Human Nutrition, Foods and Exercise

I. Purpose of this Project

The main reasons for doing this study is to learn about the types of drinks middle school students in Grundy drink, and to learn why they make those choices. When we say “drinks” we mean everyday drinks, such as water, milk, soda pop, or juice. We hope to use what we learn to create a program to help students make healthier drink choices, such as drinking more water and less soda pop. As a “youth ambassador,” your son and daughter will help create this program during a three-day camp. A larger group of middle school students will receive the program during the school year. We hope that with your son or daughter’s help, we can make this program fun as well as educational.

II. Procedures

Your son or daughter and the other ambassadors will attend a three-day camp over the summer. Graduate students from Virginia Tech will lead the camp. During the camp, the ambassadors will be part of a focus group, where they will be asked about the drink choices and habits of their friends and classmates. During the focus group, the ambassadors will be asked to answer some questions and do some activities to help us learn about these choices. A note taker will write down their answers, and we will also audio record the focus group.

We will also spend part of each day of the camp creating the program that the larger group of middle schoolers will receive. The ambassadors will help us design the handouts and activities so that they are appropriate for their friends and classmates. At the end of each activity session, the ambassadors will fill out a short survey to tell us if they think their friends will enjoy the session and learn from it.

In addition to these activities, the camp will consist of arts and crafts, games, sports, and lunch and snacks, which will be provided by the research team.

At the end of the last day of the camp, there will be another focus group. The purpose of this group is to learn whether your son or daughter enjoyed helping us create the program. We also want to know if helping with this study made the ambassadors feel involved in helping make their classmates and community healthier.

III. Risk

This study does not have many risks. We will encourage your child to share honest opinions, but he or she will never be required to share if he or she feels uncomfortable. Also, because your child is a youth ambassador, he or she will not be able to participate in some parts of the program that happens during the school year. Your child will still be able to attend the activities and classes, but he or she cannot fill out any of the surveys or receive any money or gift cards.

Your child will be under the supervision of the research team at all times, including transportation to and from your home to the camp; however, the research team will not be responsible for any injuries or accidents. While we do not think any injuries will happen during the types of activities we will be doing, we will do our best to contact you if they do. We will seek medical help if needed, but we will not be responsible for any medical costs.

IV. Benefits

This project will help us learn about the drink habits and choices that middle school students in Grundy make, so that we can design the best program to help them make healthier drink choices. Your child's health may not improve during the study, but we hope that he or she learns new skills that will help him or her make healthier drink choices. We also hope your child will become a leader and a role model for his or her peers and will continue to help the community.

V. Extent of Anonymity and Confidentiality

Your child's identity will be protected during the study. Only the Virginia Tech team will be able to access the information that we collect, and nothing will have your child's name on it. The consent forms or other forms with your child's name will be stored in a locked room that requires key card access. At no time will the research team release any data without your permission. The results of this study may be written up for publication, but no names or identifications will be written.

VI. Compensation

Your child will receive a \$50 gift card if he or she attends all three days, as well as three swim passes for the YMCA. During the camp, he or she may also get small prizes such as water bottles, t-shirts, or tote bags.

VII. Freedom to Withdraw

Your child can withdraw from the study at any time without penalty.

VIII. Subject's Responsibilities

You and your child voluntarily agree to participate in this study.

IX. Researcher Contact Information

For questions about the research project, contact:

Dr. Jamie Zoellner, PhD, RD, Dept of Human Nutrition, Foods and Exercise
zoellner@vt.edu
540-231-3670
Hannah Lane, PhD Student, Dept of Human Nutrition, Foods and Exercise
hglane07@vt.edu
540-797-3465

For questions about your child's rights as a human subject, please contact:

Dr. David Moore, Associate Vice President for Research Compliance
moored@vt.edu
540-231-4991

X. Parent's Permission

I have read and understood the Consent Form. I have had all of my questions answered, and I know that if I have questions about the project or my child's rights as a human research subject in the future I can contact any member of the research team, listed above. I have received a copy of this consent form to keep. I hereby acknowledge all above information and give my consent for my child to participate as a youth ambassador for this project.

Parent's Signature: _____

Parent Printed Name: _____

Son or Daughter's Name: _____

Date: _____

Researcher's Signature: _____

Printed Name: _____

Date: _____

Appendix B: Child Assent Form (Manuscript 2)

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY Youth Ambassador Assent Form

Title of Project: Youth Ambassadors Project

Investigators:

Jamie Zoellner, PhD, RD, Department of Human Nutrition, Foods and Exercise
Hannah Lane, PhD Student, Department of Human Nutrition, Foods and Exercise

What is a Youth Ambassador? Am I one?

If you are a youth ambassador, you are someone who is a role model to your friends and classmates. You are a good listener, you help your friends when they need it, and you are very polite and respectful to your parents, teachers, friends, and other adults that you know. You try to help make your community a better place to live.

You are here today because an adult you know thinks that you are the type of person who would be a youth ambassador.

What will I have to do and how long will it take?

If you decide you would like to be a youth ambassador, you will come to a camp for three days. The main topic of the camp will be learning about the drinks that you and your friends and classmates like to drink, such as soda pop, tea, or juice. During part of the camp, you will help us answer questions about these drinks. You will also get to help create activities that educate your friends and classmates on how to make healthier choices about what they drink.

Since we are adults, we do not understand what you and your friends and classmates experience everyday. That is why we need your help! You can help us develop a program for other middle schoolers that fits into their daily life and helps them think more about their drink choices.

The first and last part of the camp will mostly be us asking you to answer or participate in an activity about you and your friends' daily habits and choices. We will record what you say, but we will not share it with anyone else, not even your parents and teachers. We may use some of the information in our papers, but your name will not be on them.

A lot of the time during the camp will mostly be us giving you examples of activities that we think your friends and classmates might like. Then you will be able to fill out a piece of paper to tell us if you like the activities and if you think your classmates will like them.

For the rest of the time you are at camp, we will play games, go outside, and maybe do some arts and crafts. You will also get to eat lunch and snacks while you are at camp.

After the camp is over, you can decide if you want to keep helping us create the program and also help when we do the activities with your classmates during afterschool.

What if I am asked a question I don't want to answer?

We hope that you will feel safe and comfortable during the camp activities, but we will never force you to answer a question or participate in an activity if you do not want to.

How will this project help me and my classmates?

This project may make you more confident and independent, and help you continue being a role model to your friends, classmates, family and community. You may learn how to make drink choices that are healthier and make you feel better.

This project will also help your classmates. With your help, we will be able to make sure that the activities we share with your classmates are fun and interesting for them, and help them make healthier drink choices as well.

Will I get paid?

You will get a \$50 gift card at the end of the last day of camp. You will also get some passes to the YMCA pool. During the camp, you may also win small prizes like water bottles or tote bags.

Can I stop if I want to?

Yes, if you decide that you do not want to be a youth ambassador anymore, that is okay. You can stop coming to the meetings at any time. You will not be in trouble and we won't be mad.

Who do I talk to if I have questions?

You can call the research team at the phone number listed at the top of this paper.

Assent

When you sign your name here, you are saying that you have read this paper and that you want to be a youth ambassador in this study. Do not sign it if you don't want to in the study. Also, remember that if you want to be in the study now and sign the paper but change your mind later, it is okay. You do not have to keep participating if you do not want to.

This project has been explained to me and I want to be a youth ambassador.

Signature of Minor: _____

Printed Name of Minor: _____

Date: _____

I was present for the assent discussion and the minor was able to ask questions, and appeared to understand the information presented. The minor agreed to participate voluntarily in the research.

Signature of person obtaining assent: _____

Printed Name of person obtaining assent: _____

Date: _____

Appendix C: Interview/Survey Cover Letter and Consent Form (Manuscript 2)

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Parent Cover Letter

Dear [Parent],

Over the past school year of working with Virginia Tech, your child has been an ambassador to [his/her] classmates and other community members by helping them make healthier choices about sugary drinks. We hope that your child has enjoyed being a Virginia Tech ambassador, and has felt like a leader and role model for classmates, friends and family. We have enjoyed working with each of the ambassadors!

We would like to have a short conversation with your child about his or her experience as an ambassador. This will help us understand how we can make the program better for future ambassadors in the region. If you would like [child] to participate in this conversation, please sign the attached consent form. Please talk to your child about participating in this conversation so they understand the reason.

Please contact the research team at Virginia Tech with any questions or concerns:

Dr. Jamie Zoellner (540-231-3670; zoellner@exchange.vt.edu)
Hannah Lane (540-797-3465; hglane07@vt.edu)

Thank you!

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Parent Informed Consent

Title of Project: Follow-up interview: “Youth Ambassadors Camp: a method to involve middle school youth in developing a program to reduce sugary drink intake for their classmates”

Investigators:

Jamie Zoellner, PhD, RD, Department of Human Nutrition, Foods and Exercise
Hannah Lane, PhD Student, Department of Human Nutrition, Foods and Exercise

I. Purpose of this Project

The main reasons for doing this interview and survey is to learn more about your child's experience as a youth ambassador. This will help us make the program better for future ambassadors.

II. Procedures

Your son or daughter and the other ambassadors will be asked to stay after school to complete a short survey and a 15-20 minute interview. During the interview and survey, the ambassadors will be asked some questions about the camp, grocery store visit, and PSA film, including how it made them feel about themselves and their community.

III. Risk

This study does not have many risks. We will encourage your child to share honest opinions, but he or she will never be required to share if he or she feels uncomfortable.

IV. Benefits

This project will help us improve the program for future ambassadors, so that we can continue to teach kids to be healthy role models in their communities. We also hope your child will become a leader and a role model for his or her peers and will continue to help the community.

V. Extent of Anonymity and Confidentiality

Your child's identity will be protected during the study. Only the Virginia Tech team will be able to access the information that we collect, and nothing will have your child's name on it. The consent forms or other forms with your child's name will be stored in a locked room that requires key card access. At no time will the research team release any data without your permission. The results of this study may be written up for publication, but no names or identifications will be written.

VI. Compensation

Your child will not receive compensation for this interview.

VII. Freedom to Withdraw

Your child can withdraw from the interview at any time without penalty.

VIII. Subject's Responsibilities

You and your child voluntarily agree to participate in this interview.

IX. Researcher Contact Information

For questions about the research project, contact:

Dr. Jamie Zoellner, PhD, RD, Dept of Human Nutrition, Foods and Exercise
zoellner@vt.edu
540-231-3670
Hannah Lane, PhD Student, Dept of Human Nutrition, Foods and Exercise
hglane07@vt.edu
540-797-3465

For questions about your child's rights as a human subject, please contact:

Dr. David Moore, Associate Vice President for Research Compliance
moored@vt.edu
540-231-4991

X. Parent's Permission

I have read and understood the Consent Form. I have had all of my questions answered, and I know that if I have questions about the project or my child's rights as a human research subject in the future I can contact any member of the research team, listed above. I have received a copy of this consent form to keep. I hereby acknowledge all above information and give my consent for my child to participate as a youth ambassador for this project.

Parent's Signature: _____

Parent Printed Name: _____

Son or Daughter's Name: _____

Date: _____

Researcher's Signature: _____

Printed Name: _____

Date: _____

Appendix D: Focus Group I Script (Manuscript 2)

Focus Group One: Understanding Drink Choices Among Middle Schoolers in Central Appalachia - Guided by the Theory of Planned Behavior

Supplies

Snacks
Water bottles
Drink Picture/Posters and tape
Colored pencils/crayons
Sticky notes/sticky dots
BEV-Q and PYD-SF

Script

“Hello, my name is _____, and I am a student at Virginia Tech. I am excited to work with you all as you help us create a program that will help you and your peers learn to make healthy drink choices. This may seem like a very specific topic, but we believe it is a very important one! As role models in your community, I know that you all can help me make this program fun and a good learning experience for your peers. We are going to begin our camp by getting to know each other a bit better. I want to learn how and why you and your friends enjoy drinking certain beverages. Since you guys are the experts here, any information you can give us will be very helpful.

Before we begin, help yourself to some snacks and water that we have provided, and then I will go over how what we are going to do this morning.

[GROUND RULES AND BASELINE SURVEYS - 5 minutes]

“Okay, now that we all have some snacks, we can get started. First, I want to make sure everyone understands that we are recording these sessions because we want to remember what everyone says, but we also want to pay attention to you instead of scribbling notes. We [the facilitator and note taker] might recognize your voices when we listen later, but we will not share the actual tape with anyone else. Any time that we use a quote that you said during one of these sessions, it will be anonymous. We also hope that that you all will not discuss what was talked about during these sessions outside of this room, so that everyone in this group feels comfortable sharing information that can stay private. Your parents and teachers will not know what is said here unless you choose to tell them. Does everyone understand, and is everyone okay with that?

Okay, next I want to go over a few ground rules. This isn't school, so I won't make you raise your hand and be called on, but I do want to make sure that everyone who has something to say gets to say it. I am going to pass around these colored sticky notes – if you have something to say and you don't want to interrupt whoever is talking, you can show me your sticky note so I'll know that you would like to say something. Also, these questions have no right or wrong answer. Our reason for asking you questions is not to see how much you know, but to hear your ideas. We hope you will feel willing to share those with us.

Finally, I want to remind you of why you have been chosen as youth ambassadors. The adult who nominated you feels that you are a role model to your friends and classmates and that you are confident, smart, and respectful. Please be respectful of the other ambassadors by not interrupting when they are speaking, listening to what they have to say, and being polite even if you don't agree with them. We're going to call this room the "safe zone," where we are all free to express how we feel without being teased.

Does anyone have any questions about these ground rules?"

[PAUSE FOR QUESTIONS]

[Pre-Surveys 10-15 minutes]

To get us started, we are going to do some quick surveys. I will go over the instructions and read the questions out loud. If you have questions, you can ask them, but please answer the questions on your own without talking to your neighbor. Like I said before, there are no right or wrong answers.

[Distribute BEV-Q, TPB Questionnaire, and civic orientation scale]

[Read questions aloud]

[Icebreaker Activity – 15 minutes]

Okay, now that the surveys are done, we are going to do an activity and have a discussion to get to know each other a little better. First, I want everyone to write down all of the things you had to drink yesterday on individual sticky notes. Do your best to remember everything, starting with when you woke and ending with when you went to sleep. Think about what you had to drink with breakfast, lunch and dinner, and then think about what you had in between meals or with snacks. If you can't remember, then you can think about you would drink throughout a normal day. We'd like for you to indicate what you were doing while you were drinking it and how long it took you, like, "watching TV for one show." When you're done, I want you to add all of your sticky notes to the board. [Estimated time needed: 5 minutes]

Okay, so has everyone added their sticky notes to the board? There are no drinks you forgot to write down, right? Now I would like you to work as a group to read all of the sticky notes and put the ones that are similar or the same into the same groups. There is no right or wrong way to do this, but I'm thinking you will not have more than 4 or 5 groups. [If confusion] For example, I see here that one you wrote "Pepsi" and another wrote "Coke." Since these are similar, you can probably put them in the same category, but they are probably different from "Milk," which might go in a different group. Does anyone have any questions? [Have them work on sorting and address questions as needed. If they end up with more than 5 groups, ask them if there are any groups they can combine or re-arrange. The goal is to come close to the hypothesized groups:

1. Soda pop
2. Energy drinks
3. Sports drinks/juice/tea
4. Milk

5. Water

Okay, does everyone feel good with these categories? Okay, so let's talk about each one for a few minutes. Remember that during this discussion, you do not have to raise your hand to speak, but do your best not to interrupt and show me your sticky note if you have something to say.

Let's start with this one (start with the soda pop, and end with the water?). If you were to put a "Title" on this group, what would you call it?

[Write title above the group, continue to do this for every category]

[Ask the following series of questions for each drink category – 10 minutes on each group]

[Attitudes] Let's think about the drinks in this [Group X].

"What are some reasons you enjoy drinking these? Or, if you didn't add a drink to this category, what are some reasons why you think others enjoy drinking them?"

Okay, how about people that don't drink these drinks. What are some reasons they might not enjoy drinking them?"

[Attitudes] "What might be healthy about drinking these drinks?

How about what might be unhealthy?"

[Perceived Behavioral Control] "Tell me about the types of things that might make you decide to drink these types of drinks?

How much control do you have over these things that you mentioned?

[Intention] "Have you ever thought about drink more/less (depending on drink category) of this type of drink? "

"If you did want to drink more/less (depending on drink category) of these types of drinks, what would make it hard?

How about what would make it easy?"

[Subjective Norms] Let's talk about your family, friends, and other people that you know in your community. First, I want you to think about the groups of drinks that you drink. Do you think that your family members would add the same sticky notes?

[Probe]

"How about your friends and classmates? *If no*, what types of drinks do they enjoy instead?"

“Are the reasons your family and friends drink this drink the same reasons you have?”

If yes, “What is the main reason?”

If not, “How are they different?”

“When you are hanging out with your friends, do you make different choices about what you drink? How?”

[Subjective Norm] “If you wanted to drink more/less (depending on group) of this type of drink, do you think your family and friends would help you and support you?

Would it be important to them for you to drink more/less? Why or why not?”

[Repeat for all drink categories]

[WRAP-UP ACTIVITY – 15 mins]

“We are almost out of time for today, and I want to try one last activity. This has been a great discussion! I want you to draw a picture of the locations in your home, school, or community where you normally get or buy the drinks that you frequently enjoy. If you normally get these drinks with your friends and family, you can include them in the drawing too. Here is my example – my favorite drink is [], I usually get it at [], and I like to enjoy it with [].” If we have time, we can go around and describe our drawings to the group. If you don’t mind, I will collect your drawings – we might re-visit them later.”

[7 minutes to draw, 7 minutes to share]

Appendix E: Focus Group II Script (Manuscript 2)

Focus Group II Script

Supplies

Snacks
Water bottles
Colored pencils/crayons
\$5 gift cards
Survey instrument

Script

We appreciate the time you have spent with us and your ideas and opinions really helped us make this the best program it can be! We hope that you learned a thing or two, too. Of course we hope that you learned a thing or two about sugary drinks and how to make good, healthy decisions, but we also hope that you learned about your community and yourself.

First, feel free to grab some water and a few snacks.

[Post-Surveys 10-15 minutes]

First, we are going to take a look back at how far we've come since the beginning of the summer. Remember these surveys? We are going to take them one more time.

[Distribute survey and go over instructions]

[Read questions aloud]

[Conceptual Foundations] We're going to start our discussion just like we started our camp. Just like I said then, remember that there are no right or wrong answers. [Show them the 5 groups they sorted in the first sessions]. Remember these? Let's look at these groups again. Knowing what you know now, I want to try this activity again. I want you to take all of the sticky notes and re-arrange them so that the sugary drinks are in one category and the non-sugary drinks are in another.

[5-7 minutes for activity]

Awesome! Remember when we asked you about what was healthy and unhealthy about each category? What would you say now about these two categories?

What is unhealthy about this group?

How about this one?

[Intention] Tell me about your feelings about drink sugary drinks specifically. After this program, have you thought about changing how much you drink? What would make it hard/easy?

[Conceptual Foundations] Okay, let's shift gears a bit. Now I want to hear a little bit about what you learned about sugary drinks in your community during this program. Knowing what you know now, do you feel like sugary drinks are a problem in your community?

[Civic Orientation] Do you think it is as much of a problem in your community as they are in others? Or more of a problem?

What are some of the "costs" of this problem?

Do you think we can prevent this problem from getting worse?

[Critical Skills] Okay, so we know that sugary drinks cost our community a lot. I want to talk a little bit about what our community might look like without these costs. I am going to pass out your drawings of your community from our first meeting. I want you to take a look at your drawing. After working with us these past few days, how do you feel about them?

[Brief discussion ~5 minutes]

Knowing what you do now, I want you to draw a similar picture, but this time I want you to draw it in the future, after everyone in your community knows what you do about making healthy drink choices. Then we'll discuss them.

[7 minutes to draw, 10 minutes to share]

Okay, these are great! Now that we have thought about how you see your future community, let's talk a little bit about what you learned working with us this summer.

[Critical Skills] Has working with us this summer helped you to come up with ideas to help your community look more like your drawing?

[Probes]

Let's talk about some of those ideas. What ideas do you have that could help your community drink less sugary drinks and be a better place to live?

[Critical Skills/Civic Orientation] These are good ideas! Tell me about how you might see yourself and others in this group helping make these ideas happen?

[Probes]

How might you take what you learned in this class and use it to help people in your community?

What specific parts of the program might you share with them?

[Civic Orientation] Last, I want you to think about how this project this summer has changed you as a person.

What are some of the skills that you learned (probe: self-control, independence, decision making) while working with us?

How can you use these skills to make the community look more like your picture?

How has this program changed the choices you make? Not just about sugary beverages, but in general?

How has this program made you feel about yourself? How about how it has made you feel about your connection to and your involvement in your community?

Finally, if a friend or classmate asked you what you did this summer, what would you tell them about this project?

[Closing]

We hope that all of you will help us get your friends and classmates interested in participating, and we also hope that you will continue to help us with the activities. We hope that you learned a lot over the summer, because we learned a lot from you! Thanks again so much for all of your help. We look forward to see you again when school starts and hope that you will continue to be involved with this program in the future.

Before we leave, do you have any other comments you would like to share about your experience or what we plan to do in the future?

Appendix F: Satisfaction Surveys (Manuscript 2)

Lesson_____

We want to know how you felt about this lesson. There are no right or wrong answers - we just want to know about your opinion. If you are not sure how to answer a question, please raise your hand and we will help you. Please answer the questions about Lesson _____.

					
During this lesson, the instructors used words that I could understand.	Not at all	Not so much	Sort of	Mostly	Very much
I learned something new from this lesson.	Not at all	Not so much	Sort of	Mostly	Very much
I liked doing this lesson.	Not at all	Not so much	Sort of	Mostly	Very much
My friends and classmates would like this lesson.	Not at all	Not so much	Sort of	Mostly	Very much
My friends and classmates would learn something new from this lesson.	Not at all	Not so much	Sort of	Mostly	Very much
I think this lesson is important for my friends and classmates to learn about.	Not at all	Not so much	Sort of	Mostly	Very much
During the lesson, I was able to share my ideas and feelings.	Not at all	Not so much	Sort of	Mostly	Very much
The lesson instructors listened to my ideas and feelings.	Not at all	Not so much	Sort of	Mostly	Very much
I feel like I can be a role model by telling people what I know about the topic of this lesson.	Not at all	Not so much	Sort of	Mostly	Very much

Discussion Questions - Lesson _____

What are two new things you learned from this lesson that you didn't know before?

1.

2.

What did you like best about this activity?

Was there anything that you did not like about this activity?

If you could change one thing about this activity, what would it be?

Appendix G: Pre/Post Survey for Manuscript 2

ID # _____

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Prefer not to answer

How old are you? _____

What grade will you start in the fall?

- ☐ 5th
- ☐ 6th
- ☐ 7th
- ☐ 8th
- ☐ 9th
- ☐ Other _____

BEVERAGE SURVEY

For this set of questions you will be asked to tell us your usual drink choices from the past one month. There are 15 different beverage types in this section. For each of the drink type, please report "how often" you had the beverage, and about "how much" you had each time you drank the beverage.

For example:

- If you drank 5 glasses of water per week, choose the option that indicates 4-6 times per week
- If each time you drank water, you drank about 1 cup, then select 1 cup.

Please do NOT count beverages used in cooking or other preparations, such as milk in cereal.

If you add milk to tea and coffee, count this in the beverage category called tea/coffee with cream, NOT in the milk category.

Beverage Questionnaire (BEVQ-15)

Instructions:

In the past month, please indicate your response for each beverage type by marking an "X" in the bubble for "how often" and "how much each time".

1. Indicate how often you drank the following beverages, for example, if you drank 5 glasses of water per week, mark 4-6 times per week.

2. Indicate the approximate amount of beverage you drank each time, for example, if you drank 1 cup of water each time, mark 1 cup under "how much each time".

3. Do not count beverages used in cooking or other preparations, such as milk in cereal.

4. Count milk added to tea and coffee in the *tea/coffee with cream beverage category* NOT in the milk categories.

Participant ID _____

Date _____

Type of Beverage	HOW OFTEN (MARK ONE)							HOW MUCH EACH TIME (MARK ONE)				
	Never or less than 1 time per week (go to next beverage)	1 time per week	2-3 times per week	4-6 times per week	1 time per day	2+ times per day	3+ times per day	Less than 6 fl oz (3/4 cup)	8 fl oz (1 cup)	12 fl oz (1 1/2 cups)	16 fl oz (2 cups)	More than 20 fl oz (2 1/2 cups)
Water	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
100% Fruit Juice	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sweetened Juice Beverage/ Drink (fruit ades, lemonade, punch, Sunny Delight)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Whole Milk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reduced Fat Milk (2%)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Low Fat/Fat Free Milk (Skim, 1%, Buttermilk, Soy milk)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Soft Drinks, Regular	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Diet Soft Drinks/Artificially Sweetened Drinks (Crystal Light)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sweetened Tea	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tea or Coffee, with cream and/or sugar (includes non-dairy creamer)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tea or Coffee, black, with/ without artificial sweetener (no cream or sugar)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Beer, Ales, Wine Coolers, Non-alcoholic or Light Beer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hard Liquor (shots, rum, tequila, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wine (red or white)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Energy & Sports Drinks (Red Bull, Rockstar, Gatorade, Powerade, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other (list):	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Virginia Polytechnic Institute and State University, 2010.

OPINIONS ABOUT SUGARY DRINKS

Participant ID: _____

Date: _____

Administer Initials: _____

Check if Entered: _____

The following questions ask you to rate how you feel about sugary drinks. Let's first review what counts as a sugary drink and what does not.

Sugary drinks include:	Sugary drinks DO NOT include:
• Regular Soft Drinks or Soda such as Coke or Pepsi, Sprite or 7-up, Dr. Pepper, Mountain Dew • Sugar-Sweetened Juice Beverages such as fruit aides, lemonade, punch or Kool-Aid, Sunny Delight • Sweetened Tea (Tea with sugar) • Coffee with Sugar Think about these types of drinks when you respond to the next set of questions.	• Diet Soft Drinks or Sodas such as Diet Coke or Diet Pepsi, Diet Sprite or Diet 7-up, Diet Dr. Pepper, Diet Mountain Dew • Unsweetened tea or other beverages with artificial sweeteners such as Splenda, Equal, or Sweet n Low • 100% fruit juice DO NOT think about these types of drinks when you respond to the next set of questions.

All of the questions will ask you about drinking less than 1 cup of sugary drinks each day.

Less than 1 cup equals **0 to 1 cups** total of sugary drinks for an entire day.

Sugary drinks include: • Regular Soft Drinks or Soda such as Coke or Pepsi, Sprite or 7-up, Dr. Pepper, Mountain Dew • Sugar-Sweetened Juice Beverages such as fruit aides, lemonade, punch or Kool-Aid, Sunny Delight • Sweetened Tea (Tea with sugar) • Coffee with Sugar Think about these types of drinks when you respond to the next set of questions.
--

PART A: Your beliefs about sugary drinks

The next questions ask what you think about drinking less than 1 cup of sugary drinks per day. Pick the number that is **closest to how you feel** for each question and circle it.

For you, drinking less than 1 cup of sugary drinks each day would be:

1	2	3	4	5
extremely enjoyable	sort-of enjoyable	neither enjoyable or unenjoyable	sort-of unenjoyable	extremely unenjoyable
1	2	3	4	5
extremely healthy	sort-of healthy	neither healthy or unhealthy	sort-of unhealthy	extremely unhealthy
1	2	3	4	5
extremely unsatisfying	sort-of unsatisfying	neither satisfying or unsatisfying	sort-of satisfying	extremely satisfying
1	2	3	4	5
extremely wise	sort-of wise	neither wise or unwise	sort-of unwise	extremely unwise
1	2	3	4	5
extremely boring	sort-of boring	neither boring or exciting	sort-of exciting	extremely exciting
1	2	3	4	5
extremely harmful	sort-of harmful	neither harmful or beneficial	sort-of beneficial	extremely beneficial

PART B: What other people think about you drinking sugary drinks

The next questions ask you about what other people (like your friends and family) think about you drinking sugary drinks. Pick the number that is **closest to how you feel** for each question and circle it. Remember to think about your friends and family when answering.



1
strongly
disagree



2
sort-of
disagree



3
neither disagree
or agree



4
sort-of
agree



5
strongly agree

1. Most people who are important to you want you to drink less than 1 cup of sugary drinks each day.

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

2. For most people whose opinions you care about, how would they feel about you drinking less than 1 cup of sugary drinks each day?

1
completely
disapprove

2
sort-of
disapprove

3
neither
disapprove or
approve

4
sort-of
approve

5
completely
approve

3. Most people who are important to you will drink less than 1 cup of sugary drinks each day.

1
completely
untrue

2
sort-of
untrue

3
neither untrue
or true

4
sort-of
true

5
completely true

PART C: Barriers to drinking less than 1 cup of sugary drinks each day

These next questions are concerned with how much control you believe you have over limiting your sugary drinks to 1 cup or less each day. Pick the number that is **closest to how you feel** for each question and circle it.

1. You have complete personal control over limiting your sugary drinks to less than 1 cup each day, if you really wanted to.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

2. Limiting your sugary drinks to less than 1 cup each day is mostly up to you if you wanted to.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

3. Limiting your sugary drinks to less than 1 cup of sugary drinks each day if you wanted to do so would be:

1	2	3	4	5
extremely difficult	sort-of difficult	neither difficult or easy	sort-of easy	extremely easy

PART D: Motivation to limit sugary drinks to less than 1 cup each day

The next questions ask you about your motivation to limit your sugary drinks to less than 1 cup each day. Pick the number that is **closest to how you feel** for each question and circle it.

1. You plan to limit your sugary drinks to less than 1 cup each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

2. How many days per week do you intend to limit your sugary drinks to less than 1 cup?

1	2	3	4	5	6	7
---	---	---	---	---	---	---

3. How motivated are you to limit your sugary drinks to less than 1 cup each day?

1	2	3	4	5
extremely unmotivated	sort-of unmotivated	neither unmotivated or motivated	sort-of motivated	extremely motivated

4. How determined are you to limit you sugary drinks to less than 1 cup each day?

1	2	3	4	5
extremely undetermined	sort-of undetermined	neither undetermined or determined	sort-of determined	extremely determined

PART E: Plans to limit your sugary drinks to less than 1 cup each day

The next questions ask you about your plans to limit your sugary drinks to less than 1 cup each day. Pick the number that is **closest to how you feel** for each question and circle it.

1. You have made plans for when you are going to limit your sugary drinks to less than 1 cup each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

2. You have made plans for where you are going to limit your sugary drinks to less than 1 cup each day (for example: at home or at school).

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

3. You have made plans on what drinks you will use as a replacement for your sugary drinks each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

4. You have made plans on how you are going to limit your sugary drinks to less than 1 cup each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

MEDIA LITERACY

This next section is about the media and ads as it relates to sugary drinks. Some of the questions are also about sugary drink companies. When you think of sugary drink companies, please think about companies like Coca-Cola or PepsiCo or Nestea.



1
strongly
disagree



2
sort-of
disagree



3
neither disagree
or agree



4
sort-of
agree



5
strongly agree

1. Grocery store or convenient store deals on sugary drinks, like buy-one-get-one free and other sales, are designed to get people addicted to sugar.

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

2. Sugary drink companies are very powerful, even outside of the beverage business

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

3. Sugary drink companies only care about making money.

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

4. Certain sugary drink brands are designed to appeal to people like me.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

5. When designing an ad campaign, sugary drink companies think very carefully about the people they want to buy their beverages.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

6. Wearing a shirt with a sugary drink logo on it makes you a walking advertisement.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

7. Sugary drink ads link drinking these beverages to things people want, like love, good looks, and power.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

8. Two people may see the same movie or TV show and get very different ideas about it.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

9. Different people can see the same sugary drink ad in a magazine and feel completely different about it.

1	2	3	4	5
strongly	sort-of	neither	sort-of	strongly agree
disagree	disagree	disagree or	agree	
		agree		

10. A sugary drink ad may catch one person's attention but not even be noticed by another person.

1	2	3	4	5
strongly	sort-of	neither	sort-of	strongly agree
disagree	disagree	disagree or	agree	
		agree		

11. People are influenced by TV and movies, whether they realize it or not.

1	2	3	4	5
strongly	sort-of	neither	sort-of	strongly agree
disagree	disagree	disagree or	agree	
		agree		

12. People are influenced by advertising.

1	2	3	4	5
strongly	sort-of	neither	sort-of	strongly agree
disagree	disagree	disagree or	agree	
		agree		

13. When people make movies and TV shows, every camera shot is very carefully planned.

1	2	3	4	5
strongly	sort-of	neither	sort-of	strongly agree
disagree	disagree	disagree or	agree	
		agree		

14. There are hidden messages in sugary drink ads.

1	2	3	4	5
strongly	sort-of	neither	sort-of	strongly agree
disagree	disagree	disagree or	agree	
		agree		

15. Most movies and TV shows that show people drinking sugary drinks make it look more attractive than it really is.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

16. Sugary drink ads show a healthy lifestyle to make people forget about the health risks, such as weight gain and diabetes.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

17. When you see a buy-one-get-one-free or other type of sugary drink sale, it's usually not actually a good deal in the long run.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

18. When you see a sugary drink ad, it is very important to think about what was left out of the ad.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

19. Advertisements usually leave out a lot of important information.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

PUBLIC HEALTH LITERACY

The next section is about how you feel about your role in your community and the problems in your community. When you think of your community, think about your friends and family, your school, and the area you live around and see everyday.

Please pick the answer that is **closest to how you feel**:

- | | | | | | |
|--|-------|------------------|------------------|-----------------|------------|
| 1. I am important to my community. | Never | Some of the time | Most of the time | All of the time | Don't Know |
| 2. I feel a strong connection to my community. | Never | Some of the time | Most of the time | All of the time | Don't Know |
| 3. I feel good about myself because I help others. | Never | Some of the time | Most of the time | All of the time | Don't Know |

For the next questions, please pick the answer that is **closest to how you feel**:

4. Sugary drinks are a problem for my community.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

5. When me or my family and friends drink too many sugary drinks, everyone in my community is affected.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

6. My community is more affected by drinking too many sugary drinks than other communities

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

7. Drinking too many sugary drinks does not have to be a problem in my community forever.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

8. I know how to help people in my community drink less sugary drinks.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

Appendix H: Youth Ambassador Exit Survey (Manuscript 2)

Follow-up survey

We want to know how you feel about yourself and your role in your community after being an ambassador with Virginia Tech Sip Smarter program. Please circle the answer that is closest to **how often you agree** with the sentences.

After being an ambassador...

I am better at standing up for what I believe.	Never	Almost never	Sometimes	Almost always	Always
I am more interested in community and world problems.	Never	Almost never	Sometimes	Almost always	Always
I feel better about myself.	Never	Almost never	Sometimes	Almost always	Always
I learned I can do things I didn't think I could do before.	Never	Almost never	Sometimes	Almost always	Always
I believe I can make a difference in the world.	Never	Almost never	Sometimes	Almost always	Always
I care about making the world a better place for everyone.	Never	Almost never	Sometimes	Almost always	Always
It is important for me to try to make a difference in the world.	Never	Almost never	Sometimes	Almost always	Always
I want to use what I have learned as an ambassador to help others be healthier.	Never	Almost never	Sometimes	Almost always	Always

Appendix I: Youth Ambassador Exit Interview Script (Manuscript 2)

Follow-up interview script

First, I want to make sure it is okay if I record this. It will make it easier to pay attention to what you are saying instead of having to write everything down really quickly. Okay, thanks. This interview is not going to take very long, maybe 15 minutes or so. I just want to ask you a few questions about your experience as an ambassador for Virginia Tech's Sip Smarter program. You started as an ambassador by participating in our summer camp, where you helped us develop Sip Smarter and make sure that it would be fun and interesting for your classmates. You also helped us develop an awesome flyer and handed out with the hot chocolate at Food City back near Christmas. You also helped us with the phone calls to the parents after each Sip Smarter and Move More lesson. Finally, you wrote and acted out that awesome PSA!

So after doing all of that, what have you learned about the health of your community? Remember, your community is your school, your house, your family, your friends, all the people around you and the places where you hang out a lot.

What have you done since the camp started to make the people and community better?

As a group...

As an individual...

Tell about what those things were like. What did you learn? How did it make you feel (did it make a difference)?

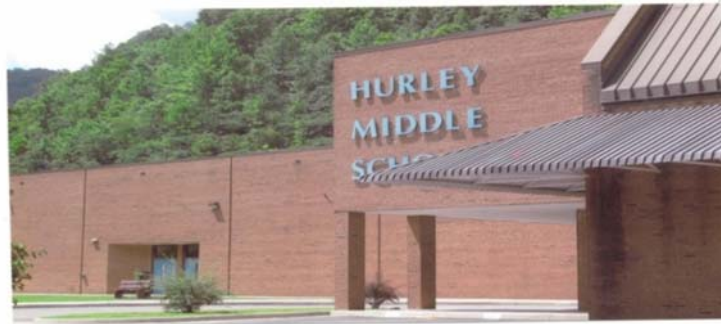
What do you want to do in the future to help your community keep being healthy?

What would you need to do to make this happen?

How has being an ambassador helped you learn about your community and how to do things to help you community?

Okay, those are pretty much all the questions we have for you. Do you have anything else you want to add about being an ambassador?

Appendix J: Letter of Support (Manuscript 3)



Hurley Elementary/Middle School

6911 Hurley Road

Hurley, VA 24620

Mrs. Ruth Tester, Principal

Ms. Michelle Bailey, Student Coordinator

276-566-8523

Fax 27--566-7751

14 September 2015

Dear Hannah and Jamie,

As principal of Hurley Elementary Middle School, I am happy to offer this letter of collaboration for your ongoing project, "Kids SIPsmartER: a pilot study to reduce sugar-sweetened beverage consumption and promote community engagement among middle school youth in Central Appalachia" It has been a pleasure helping recruit the youth ambassadors and working with you over the past few months to create the project plan and garner local support for your pilot study.

Like many children in this community, the students at Hurley Elementary Middle School consume excessive amounts of sugary drinks, and do not realize how harmful these drinks are to their health. Our staff members recognize the importance of reducing this consumption among our students, their families, and their community. We fully supported the youth ambassador camp this summer by providing students who are great role models in their class, and will continue to support delivery of the program that these ambassadors helped create in our 6th and 7th grade classes.

As partners on this pilot project, we will provide the following during the 2015-2016 year:

- Presentation and signatures of support from the Buchanan County School Board
- Private rooms/space to complete assessments at three time points
- Time and staff support during 6th and 7th grade science class to deliver the program one hour per week for six weeks in Fall 2015 and six weeks in Spring 201
- Assistance with use of the automated call system to parents
- Participation in post-intervention interviews workshops on the feasibility and future success of this initiatives

- Logistical support and assistance with necessary security clearances and informed consent process

I believe that this pilot program, and the potential for a long-term program that may follow, will influence our students beyond reducing their sugary drink consumption. The program is designed to improve their leadership and decision making skills, to show them that they can make a long-term difference in their community. I also look forward to the important pilot data that this project will generate for our medically underserved youth in Buchanan County, and the potential to use the pilot data to collaborate with Virginia Tech on future community-based efforts.

Please feel free to contact me if you have further questions regarding the support from Hurley Middle School.

Sincerely,

Ruth Tester

Ruth Tester
Principal
Hurley Elementary Middle School
276-566-8523

Appendix K: Parent Cover Letter, Consent Form, and Video Release (Manuscript 3)

XX September 2015

Dear Parent,

As a 6th or 7th grader at Hurley Elementary Middle School, your child will be joining a program that is sponsored by Virginia Tech researchers called Healthy Hurley. This program will occur during science class, once a week for sixteen weeks. During eight weeks of this program, your child will learn about the health benefits of drinking less sugary drinks, such as pop and energy drinks. During the other eight weeks, your child will learn about how important it is to get physical activity and play group games and activities.

As part of the program, your child will take some surveys that ask about their sugary drink intake. These surveys help the VT researchers know how what parts of the program work and what parts do not. All 6th and 7th grade children, including your child, will be a part of the program and take the surveys, but the survey information will not be used unless you return the consent form that came with this letter. For parents who sign and return the consent form to participate in the research project, there are additional activities, such as measuring your child's height and weight, your child joining a focus group, and parent phone calls on healthy tips. The consent form has detailed information about the project, including benefits of the program and compensation for joining the research project.

This program will help make Hurley Elementary Middle School a healthier place, and we are so excited that your child will get to join us! We thank you for signing this consent form to help VT researchers continue their programs at our local schools! Please feel free to contact the research team with any questions

Sincerely,

Ruth Tester
Principal
Hurley Elementary Middle School

Jamie Zoellner, PhD, RD
Associate Professor
Virginia Tech
540-231-3670

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
Parent Informed Consent

Title of Project: Healthy Hurley: a program to improve health behaviors and increase community involvement in middle school students”

Investigators:

Jamie Zoellner, PhD, RD, Department of Human Nutrition, Foods and Exercise

Hannah Lane, PhD Student, Department of Human Nutrition, Foods and Exercise

I. Purpose of this Project

The main reason for doing this project is provide a program to middle school students to help them improve their health and become more involved in their community. The program will focus on both the health benefits of drinking less sugary drinks and increasing physical activity. The classes will be hands-on and fun. After taking the classes, we hope students will want to make healthy choices. We also hope students will improve their leadership skills and want to become involved in other activities in their community.

II. Procedures

The sugary drinks program is eight weeks long and the physical activity is eight weeks long. Both programs will be provided during the regular school hours. Each program will be delivered one day per week, over eight weeks, during your child’s science class. All children attending science class will receive both programs. Your child will receive one program in the fall of 2015 and the other program in the spring of 2016. We will flip a coin to decide which class your child will receive first. In total, your child will attend sixteen classes for about 16 hours.

During the first week and last week of each class, your child will be asked to fill out a short survey with questions about their sugary drink and exercise choices. The survey will also ask questions about their leadership skills and how they feel about helping their community. The other six weeks will be the classes. In the sugary drinks classes, your son or daughter will work in groups, play educational games, and act out skits. In the exercise class, your son or daughter will play team games, dance, run, and do other basic types of activity. Since these activities will part of the science class, all children attending science class will take the survey and receive both programs.

As a part of the research project, there are additional activities. For parents who sign and return this consent form, we will also take your child’s height and weight. During the last week, your child may be asked to be part of a focus group to give information about how he or she felt about the program. This will be audio recorded and last about one

hour. Additionally, parents will receive one phone call a week from the school's One Call system that will give you tips on how to help your child stay healthy. These calls will last about 510 minutes.

By signing and returning this form, you are:

- allowing your child's survey data to be included in the program evaluation report
- allowing height and weight information to be collected from your child
- allowing your child to volunteer for the focus group
- agreeing to receive one phone call a week from the school's One Call system on healthy tips.

If you do not return this form, your child's survey data will be destroyed, their height and weight will not be collected, they will not be eligible to participate in the focus group, and you will not receive telephone calls.

III. Risk

This study does not have many risks. We will encourage your child to take part in all of the activities and share honest opinions, but he or she will never be required to participate or share if he or she feels uncomfortable.

During the physical activity class, we will encourage your child to go at his or her own pace and make sure that he or she always feels comfortable. With any physical activity program, there is small risk for light-headedness, fainting, falls, or exhaustion, as well as chest pains or trouble breathing. We do not expect these things to happen, but we will help your child find the level of activity that is comfortable to prevent these things from happening. We will use the information provided by the Hurley Middle School staff and teachers to decide whether any child has an injury or illness that would make it difficult to participate in the activities. While we do not think that any discomfort or injuries will happen during the types of activities we will be doing, we will do our best to contact you if they do. We will seek medical help if needed, but we do not have the funds to pay for any medical costs.

IV. Benefits

There is no guarantee that your child will experience any changes to his or her health after participating in either class. However, we hope that your child will learn why and how to make healthier choices about drinking sugary drinks and getting physical activity. We also hope they will improve his or her leadership skills and want to be more involved in the community. The evaluation of this program may also help Hurley Middle School offer similar programs in the future.

All children will receive a Virginia Tech t-shirt at the end of the program.

V. Extent of Anonymity and Confidentiality

Your child's identity will be protected during the study. Only the Virginia Tech team will be able to access the information that we collect, and nothing will have your child's name on it. The consent forms or other forms with your child's name will be stored in a locked room that requires key card access. At no time will the research team release any data without your permission. The results of this study may be written up for publication, but no names or identifications will be written.

VI. Compensation

In addition to all children receiving a Virginia Tech t-shirt at the end of the program, children may also receive prizes such as water bottles during the program.

If you sign and return the consent form to participate in the research project, there is small compensation for the time involved. If your child is part of the focus group, he or she will receive a \$5 gift card. Parents will also receive a \$5 gift card when the program starts to thank you for your time for completing the calls.

VII. Freedom to Withdraw

Your child can withdraw from the study at any time without penalty. If you choose to withdraw your child from the study, please notify a member of the research team to let them know.

VIII. Subject's Responsibilities

By signing and returning this form, you and your child voluntarily agree to participate in this study. Your child's survey data will be included in the evaluation, height and weight will be collected and included in the evaluation, and he or she may participate in a focus group. You will receive between 6-12 phone calls.

IX. Researcher Contact Information

For questions about the research project, contact:

Dr. Jamie Zoellner, PhD, RD, Dept of Human Nutrition, Foods and Exercise
zoellner@vt.edu
540-231-3670
Hannah Lane, PhD Student, Dept of Human Nutrition, Foods and Exercise
hglane07@vt.edu
540-797-3465

For questions about your child's rights as a human subject, please contact:

Dr. David Moore, Associate Vice President for Research Compliance
moored@vt.edu
540-231-4991

X. Parent's Permission

I have read and understood the Consent Form. I have had all of my questions answered, and I know that if I have questions about the project or my child's rights as a human research subject in the future I can contact any member of the research team, listed above. I have received a copy of this consent form to keep. I hereby acknowledge all above information and give my consent for my child's data to be included in the program evaluation report.

Parent's Signature: _____

Parent Printed Name: _____

Son or Daughter's Name: _____

Date: _____

Researcher's Signature: _____

Printed Name: _____

Date: _____

Healthy Hurley Video Release Form

During the sugary drink and physical activity programs, photos or videos may be taken of your child. If you would allow the use of print and electronic media of your child to highlight activities and advertise the program locally, please sign below, and indicate whether you would like your child's name to be mentioned or stay confidential.

I agree for the use of photographs or videos of my child by Virginia Tech **with** my child's name

I agree for the use of photographs or videos of my child by Virginia Tech **without** my child's name

Parent Name (please print): _____

Child Name (please print): _____

Parent Signature: _____

Date: _____

Appendix L: Pre/Post surveys (Manuscript 3)

Name _____

Are you a boy or a girl?

☐ Boy

☐ Girl

How old are you? _____

Beverage Questionnaire (BEVQ-15)

Instructions:

In the past month, please indicate your response for each beverage type by marking an "X" in the bubble for "how often" and "how much each time".

Participant ID _____

1. Indicate how often you drank the following beverages, for example, if you drank 5 glasses of water per week, mark 4-6 times per week.
2. Indicate the approximate amount of beverage you drank each time, for example, if you drank 1 cup of water each time, mark 1 cup under "how much each time".
3. Do not count beverages used in cooking or other preparations, such as milk in cereal.
4. Count milk added to tea and coffee in the *tea/coffee with cream beverage category* **NOT** in the milk categories.

Date _____

	HOW OFTEN (MARK ONE)							HOW MUCH EACH TIME (MARK ONE)				
Type of Beverage	Never or less than 1 time per week (go to next beverage)	1 time per week	2-3 times per week	4-6 times per week	1 time per day	2+ times per day	3+ times per day	Less than 6 fl oz (3/4 cup)	8 fl oz (1 cup)	12 fl oz (1 1/2 cups)	16 fl oz (2 cups)	More than 20 fl oz (2 1/2 cups)
Water	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
100% Fruit Juice	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sweetened Juice Beverage/ Drink (fruit ades, lemonade, punch, Sunny Delight)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Whole Milk	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reduced Fat Milk (2%)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Low Fat/Fat Free Milk (Skim, 1%, Buttermilk, Soymilk)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Soda Pop, Regular	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Diet Soda Pop/Artificially Sweetened Drinks (Crystal Light)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sweetened Tea	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tea or Coffee, with cream and/or sugar (includes non-dairy creamer)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tea or Coffee, black, with/ without artificial sweetener (no cream or sugar)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Beer, Ales, Wine Coolers, Non-alcoholic or Light Beer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hard Liquor (shots, rum, tequila, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wine (red or white)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Energy & Sports Drinks (Red Bull, Rockstar, Gatorade, Powerade, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other (list):	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

BEVERAGE SURVEY

For this set of questions you will be asked to tell us your usual drink choices from the past one month. There are 15 different beverage types in this section. For each of the drink type, please report "how often" you had the beverage, and about "how much" you had each time you drank the beverage.

For example:

- If you drank 5 glasses of water per week, choose the option that indicates 4-6 times per week
- If each time you drank water, you drank about 1 cup, then select 1 cup.

Please do NOT count beverages used in cooking or other preparations, such as milk in cereal.

If you add milk to tea and coffee, count this in the beverage category called tea/coffee with cream, NOT in the milk category.

OPINIONS ABOUT SUGARY DRINKS

Participant ID: _____

Date: _____

Administer Initials: _____

Check if Entered: _____

The following questions ask you to rate how you feel about sugary drinks. Let's first review what counts as a sugary drink and what does not.

Sugary drinks include:	Sugary drinks DO NOT include:
• Regular Soft Drinks or Soda such as Coke or Pepsi, Sprite or 7-up, Dr. Pepper, Mountain Dew • Sugar-Sweetened Juice Beverages such as fruit aides, lemonade, punch or Kool-Aid, Sunny Delight • Sweetened Tea (Tea with sugar) • Coffee with Sugar Think about these types of drinks when you respond to the next set of questions.	• Diet Soft Drinks or Sodas such as Diet Coke or Diet Pepsi, Diet Sprite or Diet 7-up, Diet Dr. Pepper, Diet Mountain Dew • Unsweetened tea or other beverages with artificial sweeteners such as Splenda, Equal, or Sweet n Low • 100% fruit juice DO NOT think about these types of drinks when you respond to the next set of questions.

All of the questions will ask you about drinking less than 1 cup of sugary drinks each day.

Less than 1 cup equals **0 to 1 cups** total of sugary drinks for an entire day.

Sugary drinks include: • Regular Soft Drinks or Soda such as Coke or Pepsi, Sprite or 7-up, Dr. Pepper, Mountain Dew • Sugar-Sweetened Juice Beverages such as fruit aides, lemonade, punch or Kool-Aid, Sunny Delight • Sweetened Tea (Tea with sugar) • Coffee with Sugar Think about these types of drinks when you respond to the next set of questions.
--

PART A: Your beliefs about sugary drinks

The next questions ask what you think about drinking less than 1 cup of sugary drinks per day. Pick the number that is **closest to how you feel** for each question and circle it.

For you, drinking less than 1 cup of sugary drinks each day would be:

1	2	3	4	5
extremely unenjoyable	sort-of unenjoyable	neither enjoyable or unenjoyable	sort-of enjoyable	extremely enjoyable
1	2	3	4	5
extremely unhealthy	sort-of unhealthy	neither healthy or unhealthy	sort-of healthy	extremely healthy
1	2	3	4	5
extremely unsatisfying	sort-of unsatisfying	neither satisfying or unsatisfying	sort-of satisfying	extremely satisfying
1	2	3	4	5
extremely unwise	sort-of unwise	neither wise or unwise	sort-of wise	extremely wise
1	2	3	4	5
extremely boring	sort-of boring	neither boring or exciting	sort-of exciting	extremely exciting
1	2	3	4	5
extremely harmful	sort-of harmful	neither harmful or beneficial	sort-of beneficial	extremely beneficial

PART B: What other people think about you drinking sugary drinks

The next questions ask you about what other people (like your friends and family) think about you drinking sugary drinks. Pick the number that is **closest to how you feel** for each question and circle it. Remember to think about your friends and family when answering.



1
strongly
disagree



2
sort-of
disagree



3
neither disagree
or agree



4
sort-of
agree



5
strongly agree

1. Most people who are important to you want you to drink less than 1 cup of sugary drinks each day.

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

2. For most people whose opinions you care about, how would they feel about you drinking less than 1 cup of sugary drinks each day?

1
completely
disapprove

2
sort-of
disapprove

3
neither
disapprove or
approve

4
sort-of
approve

5
completely
approve

3. Most people who are important to you will drink less than 1 cup of sugary drinks each day.

1
completely
untrue

2
sort-of
untrue

3
neither untrue
or true

4
sort-of
true

5
completely true

PART C: Barriers to drinking less than 1 cup of sugary drinks each day

These next questions are concerned with how much control you believe you have over limiting your sugary drinks to 1 cup or less each day. Pick the number that is **closest to how you feel** for each question and circle it.

4. You have complete personal control over limiting your sugary drinks to less than 1 cup each day, if you really wanted to.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

5. Limiting your sugary drinks to less than 1 cup each day is mostly up to you if you wanted to.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

6. Limiting your sugary drinks to less than 1 cup of sugary drinks each day if you wanted to do so would be:

1	2	3	4	5
extremely difficult	sort-of difficult	neither difficult or easy	sort-of easy	extremely easy

PART D: Motivation to limit sugary drinks to less than 1 cup each day

The next questions ask you about your motivation to limit your sugary drinks to less than 1 cup each day. Pick the number that is **closest to how you feel** for each question and circle it.

9. You plan to limit your sugary drinks to less than 1 cup each day.

- | | | | | |
|----------------------|---------------------|---------------------------------|------------------|----------------|
| 1 | 2 | 3 | 4 | 5 |
| strongly
disagree | sort-of
disagree | neither
disagree or
agree | sort-of
agree | strongly agree |

10. How many days a week do you plan to limit your sugary drinks to less than 1 cup?

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|

11. How motivated are you to limit your sugary drinks to less than 1 cup each day?

- | | | | | |
|--------------------------|------------------------|--|----------------------|------------------------|
| 1 | 2 | 3 | 4 | 5 |
| extremely
unmotivated | sort-of
unmotivated | neither
unmotivated or
motivated | sort-of
motivated | extremely
motivated |

4. How determined are you to limit you sugary drinks to less than 1 cup each day?

- | | | | | |
|---------------------------|-------------------------|--|-----------------------|-------------------------|
| 1 | 2 | 3 | 4 | 5 |
| extremely
undetermined | sort-of
undetermined | neither
undetermined or
determined | sort-of
determined | extremely
determined |

PART E: Plans to limit your sugary drinks to less than 1 cup each day

The next questions ask you about your plans to limit your sugary drinks to less than 1 cup each day. Pick the number that is **closest to how you feel** for each question and circle it.

5. You have made plans for when you are going to limit your sugary drinks to less than 1 cup each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

6. You have made plans for where you are going to limit your sugary drinks to less than 1 cup each day (for example: at home or at school).

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

7. You have made plans on what drinks you will use as a replacement for your sugary drinks each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

8. You have made plans on how you are going to limit your sugary drinks to less than 1 cup each day.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

MEDIA LITERACY

This next section is about the media and ads as it relates to sugary drinks. Some of the questions are also about sugary drink companies. When you think of sugary drink companies, please think about companies like Coca-Cola or PepsiCo or Nestea.



1
strongly
disagree



2
sort-of
disagree



3
neither disagree
or agree



4
sort-of
agree



5
strongly agree

20. Grocery store or convenient store deals on sugary drinks, like buy-one-get-one free and other sales, are designed to get people addicted to sugar.

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

21. Sugary drink companies are very powerful, even outside of the beverage business

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

22. Sugary drink companies only care about making money.

1
strongly
disagree

2
sort-of
disagree

3
neither
disagree or
agree

4
sort-of
agree

5
strongly agree

23. Certain sugary drink brands are designed to appeal to people like me.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

24. When designing an ad campaign, sugary drink companies think very carefully about the people they want to buy their beverages.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

25. Wearing a shirt with a sugary drink logo on it makes you a walking advertisement.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

26. Sugary drink ads link drinking these beverages to things people want, like love, good looks, and power.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

27. Two people may see the same movie or TV show and get very different ideas about it.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

28. Different people can see the same sugary drink ad in a magazine and feel completely different about it.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

29. A sugary drink ad may catch one person's attention but not even be noticed by another person.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

30. People are influenced by TV and movies, whether they realize it or not.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

31. People are influenced by advertising.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

32. When people make movies and TV shows, every camera shot is very carefully planned.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

33. There are hidden messages in sugary drink ads.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

34. Most movies and TV shows that show people drinking sugary drinks make it look more attractive than it really is.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

35. Sugary drink ads show a healthy lifestyle to make people forget about the health risks, such as weight gain and diabetes.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

36. When you see a buy-one-get-one-free or other type of sugary drink sale, it's usually not actually a good deal in the long run.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

37. When you see a sugary drink ad, it is very important to think about what was left out of the ad.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

38. Advertisements usually leave out a lot of important information.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

PUBLIC HEALTH LITERACY

The next section is about how you feel about your role in your community and the problems in your community. When you think of your community, think about your friends and family, your school, and the area you live around and see everyday.

Please pick the answer that is **closest to how you feel**:

- | | | | | | |
|--|-------|------------------|------------------|-----------------|------------|
| 4. I am important to my community. | Never | Some of the time | Most of the time | All of the time | Don't Know |
| 5. I feel a strong connection to my community. | Never | Some of the time | Most of the time | All of the time | Don't Know |
| 6. I feel good about myself because I help others. | Never | Some of the time | Most of the time | All of the time | Don't Know |

For the next questions, please pick the answer that is **closest to how you feel**:

12. Sugary drinks are a problem for my community.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

13. When me or my family and friends drink too many sugary drinks, everyone in my community is affected.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

14. My community is more affected by drinking too many sugary drinks than other communities.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

15. Drinking too many sugary drinks does not have to be a problem in my community forever.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

16. I know how to help people in my community drink less sugary drinks.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

PHYSICAL ACTIVITY

The last question on the survey asks about your physical activity in the last week (seven days).

During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

PROGRAM ENJOYMENT

We want to know how you felt about this program. There are no right or wrong answers - we just want to know your opinion. Please answer the questions about the program you were part of in the last six weeks (either Sip Smarter or Move More).

1. I liked this program.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

2. I learned something new from this program.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

3. Other kids my age would like this program.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

4. It is important for other kids my age to get this program.

1	2	3	4	5
strongly disagree	sort-of disagree	neither disagree or agree	sort-of agree	strongly agree

Appendix M: Student Focus Group Guide (Manuscript 3)

Sip Smarter Focus Group Script

Group #: _____

Set up, directions, and assent

[Chairs in a circle around the table]

We appreciate you volunteering for this focus group! Today we want hear what you thought about the program, so that we can make it even better for future 6th and 7th graders. This will take about 30 minutes. We're going to start with what we call "ground rules."

We want everyone to feel okay about sharing your honest opinion, which means that you each need to respect your classmates. You do not have to agree with their opinion, but you have to respect it by listening and not interrupting. If you would like to say something, you do not need to raise your hand before you say something, but wait until other people are finished.

We are going to record this focus group so that we can listen to it later instead of having to write down everything you say now. We will take your names out of it after we write it down later and you'll just be Kid 1 or 2. Is that okay with all of you?

[Obtain verbal assent from all participants]

Okay I will record you all giving us permission, and then the recorder will be on for the whole meeting.

[Turn on the recorder]

Okay, so everyone is okay with this being recorded, right?

Focus Group Script

Okay, I'm going to start by recapping what you learned in Sip Smarter.

You learned about...

- The different kinds of sugary drinks and how to look at the label to know if they have sugar.
- How to set goals for reducing sugary drinks, track progress, and overcome barriers.
- What can happen to your health, your town, and your environment when you drink more than the recommended amount of sugary drinks
- Advertising, and how sugary beverage companies spend a lot of money, and use tactics like celebrities, tricks, and bribery, to target you and get you to buy their drinks.
- How to be a healthy role model by teaching others about what you learned in Sip Smarter

1. **So, see paper on the wall with the 4 words? [Read words and explain meaning]. I want you to take 4 sticky notes and write what about Sip Smarter was...**

Fun—Enjoyable, entertaining, humorous

Helpful—Provided information that helped support you making healthier drink decisions

Surprising—New information, unexpected activities, or shocking facts

Inspiring—inspired you to change your behaviors or help others

When you are done put your sticky notes on the corresponding paper on the wall.

- Discuss words, and probe to get more information on what they thought about the program.
 - What could we have done to make it MORE...fun, helpful, surprising, and inspiring?
 - For those who have decided to drink less sugary drinks, what kinds of things helped you to do this? For those who have not made this decision, what are your barriers and what would help?
2. **Do you feel that it is important to continue to teach Sip Smarter here at Hurley? Why or why not?**
 - How might this affect your school, family and friends, and community?
 3. **Do you have other ideas on how to reduce sugary drinks in your community?**
 - What else might we be able to do besides having a classroom lesson like Sip Smarter?
 4. **Is there anything more you want to tell me?**

Appendix N: Teacher Satisfaction Survey (Manuscript 3)

Teacher Survey

We want to know how you felt about this lesson, including what you liked, disliked, or might do differently.

We highly value your opinion, as you know these students well. We also want to know how you would feel about teaching this lesson on your own in the future. Note that your consent for us to use this information is implied by filling out and turning in this survey. Circle the answer that fits best with how you felt about the lesson. Throughout the day, also consider your answers to the open-ended questions.

Lesson # _____ Circle One: Sip Smarter or Move More

During this lesson, the instructor used words and phrases that my students could understand.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
The instructor did a good job of engaging my students in the activities during this lesson.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
The handouts, worksheets, and activities were appropriate for my students.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
My students learned something new from this lesson.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
My students liked doing this lesson.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
This lesson helped my students learn to be role models to their friends and family members	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
The topic of this lesson is important for my students to learn about.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
This topic could fit into the science curriculum at my school.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
I feel confident that I could teach this lesson as part of the science curriculum in the future.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree
I would enjoy teaching this lesson in the future.	Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree

Instruction

What did you like about the instruction?

What about the instruction could have been improved?

What other tools/strategies would you use if you were to teach this lesson?

Content

Did you feel like there was any content that was not necessary?

What content might you add or emphasize more?

Additional Notes or Observation

Appendix O: Teacher Interview Guide (Manuscript 3)

Key Informant Phone Interview Scripts

Thanks so much for agreeing to help us with this program! Your input is invaluable and we could not have done it without your help. As you know, our next step for this program is to make it a regular part of your curriculum so that kids can learn about the dangers of sugary drinks and start drinking less of them every year. This interview and the information you provided will help us figure out how best to do that! We hope that you will feel comfortable being honest with us, and you won't hurt our feelings!

First, I want to make sure you are okay with this interview being recorded. The purpose of recording the interview is so that I can pay more attention to our conversation and don't have to worry about typing up super detailed notes. There are no real risks associated with this recording, and your identity will be confidential in any publications. We will create transcripts of the recording, which will be kept indefinitely in a locked room with key code access, and only the research team will listen to it. If any quotes are used in publication, a pseudonym will be used. There are no real benefits to you, although we do hope we can use this information to make the program a part of your curriculum in the future. Are you okay with this being recorded?

Interviewer Signature: _____

Let's start by hearing your overall thoughts about the program. We will go in more detail about certain aspects, but for now can you tell me, in general, how you felt about Healthy Hurley.

What were your favorite aspects of the program? [lessons, goal setting activities, engagement activities, etc.]

What are some aspects of the program that you think you would like to change?

Has sitting on these lessons changed your personal habits around sugary drinks? How about physical activity?

How was this program different from other programs you have had at Hurley (like 4-H)?

Okay, let's talk a little bit about your students. Have you heard anything from your students since we started this program about what they thought? Some of them gave us their thoughts, but perhaps you have heard other thoughts that they didn't share with us?

Did they give specific input on what they liked and didn't like?

Have you noticed any changes in your students since we started this program?
[Probe] We encouraged them to make independent decisions, be role models, and want to help their community. Have you observed anything that indicates any changes in those aspects?

Finally, I want to talk a bit about the parents. Have you heard any thoughts from any parents about the program?

We would like to get the parents more involved in the future. Other than the call between lessons, what suggestions do you have to get them more involved?

Okay, so let's talk about the checklists you filled out for the individual lessons last semester. For the most part, it seems like you felt the lessons were engaging and appropriate for your students. We might have you elaborate on your comments.

- Get more feedback on what they liked/disliked
- Get ideas for changing the content to better integrate it in the curriculum

Okay great. So overall it seems like you liked the lessons and feel like they are important for your students, so let's talk not about how you feel about teaching these lessons. Overall, you seem to feel confident and willing to teach them as part of your science class.

How do you feel about other teachers at your school and in other schools in this community? Do you think they will think there is a need for this program in their school? Should it be taught as part of a different class

What ideas do you have to help you and other teachers at Hurley and other schools in the area to learn the materials and teach the lessons?

If we did a training to teach you and other teachers the material, about how long do you think that should last?

Would you prefer that they be in person, over the phone, or through a Webinar?

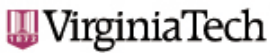
Okay, one more thing. If you were to rate the importance of reducing sugary drinks in your school and community on a scale of 1 to 5, with 1 being not at all important and 5 being extremely important, what would you say?

What did you choose that answer? [If probe needed, we are looking to understand what they have observed about the problems of sugary drinks at Hurley]

What are some obstacles you think the kids will face? Do you have any other ideas, besides this program, that might help them overcome these obstacles?

Okay, great! Before we wrap up, is there anything else you would like to share about this program and how it fits in with your school and community in the future.

Appendix P: IRB Memorandum 1 (Manuscript 2)



Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website <http://www.irb.vt.edu>

MEMORANDUM

DATE: July 21, 2015
TO: Jamie M Zoellner Dr, Hannah Grace Lane, Kathleen J Porter, Natalie Woodford
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires April 25, 2018)
PROTOCOL TITLE: Youth Ambassadors: a method to involve middle school youth in developing a program to reduce sugary drink intake for their classmates
IRB NUMBER: 15-381

Effective July 20, 2015, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 6,7
Protocol Approval Date: May 11, 2015
Protocol Expiration Date: May 10, 2016
Continuing Review Due Date*: April 26, 2016

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Appendix Q: IRB Memorandum 2, Manuscript 2



Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website <http://www.irb.vt.edu>

MEMORANDUM

DATE: April 15, 2016
TO: Jamie M Zoellner Dr, Hannah Grace Lane, Kathleen J Porter, Natalie Woodford
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)
PROTOCOL TITLE: Youth Ambassadors: a method to involve middle school youth in developing a program to reduce sugary drink intake for their classmates
IRB NUMBER: 15-381

Effective April 15, 2016, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 6,7
Protocol Approval Date: May 11, 2016
Protocol Expiration Date: May 10, 2017
Continuing Review Due Date*: April 26, 2017

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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Appendix R: IRB Memorandum 1 (Manuscript 3)



Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website <http://www.irb.vt.edu>

MEMORANDUM

DATE: December 1, 2015
TO: Jamie M Zoellner Dr, Hannah Grace Lane, Kathleen J Porter, Donna Jean P Brock
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires July 29, 2020)
PROTOCOL TITLE: Healthy Hurley: a program to improve health behaviors and increase community involvement in middle school students
IRB NUMBER: 15-830

Effective December 1, 2015, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 4,6,7
Protocol Approval Date: September 24, 2015
Protocol Expiration Date: September 23, 2016
Continuing Review Due Date*: September 9, 2016

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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