SHORT-TERM OUTCOME EVALUATION OF HEALTHY HABITS, HEALTHY U:

A SCHOOL-BASED CANCER PREVENTION PROGRAM

by

Alicia Anderson

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Alicia Anderson

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The following individuals read and discussed the thesis submitted by student Alicia Anderson, and they evaluated her presentation and response to questions during the final oral examination. They found that the student passed the final oral examination.

Theodore W. McDonald, Ph.D.   Chair, Supervisory Committee

Mary E. Pritchard, Ph.D.   Member, Supervisory Committee

Caile E. Spear, Ph.D.   Member, Supervisory Committee

The final reading approval of the thesis was granted by Theodore W. McDonald, Ph.D., Chair of the Supervisory Committee. The thesis was approved for the Graduate College by John R. Pelton, Ph.D., Dean of the Graduate College.

DEDICATION

I dedicate this work to Dr. Caile E. Spear. Dr. Spear has been an outstanding boss, mentor, and friend whose encouragement and support has helped me grow professionally and personally. She graciously hired me as her graduate assistant, which has provided many wonderful work experiences. Her belief in providing "real world" experiences to students meant that Healthy Habits, Healthy U not only provided me the opportunity to be involved but it also has offered approximately 25 internships and volunteer opportunities to Boise State students. Her passion for teaching and helping students is admirable. Dr. Spear has shown me how to be a more thoughtful, caring, individual who puts others before oneself.

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ABSTRACT

Healthy Habits, Healthy U (HHHU) is a school-based cancer prevention program. This program is a collaborative effort among Boise State University, St. Luke's Mountain States Tumor Institute, and the Boise School District. HHHU started in April 2013 as a community outreach initiative designed to teach and reinforce positive health habits in students. HHHU lessons target eighth-grade students and offer a unique approach highlighting the relationships among nutrition, physical activity, sugar-sweetened beverages, and cancer risks, through a variety of educational materials.

The purpose of this study was to assess program efficacy by evaluating short-term outcomes. The study evaluated the effectiveness of HHHU at increasing students' knowledge regarding cancer, and how the risk of developing cancer is affected by nutrition, physical activity levels, and the consumption of sugar-sweetened beverages (SSBs). Additionally, the study evaluated students' ability to identify positive behavioral intentions. A quasi-experimental design using pretest/posttest surveys, which were administered by Health teachers to students in both the intervention group (IG) and delayed intervention group (DIG), was used to evaluate the program.

The HHHU program was presented to 969 Boise School District (BSD) eighth-grade students. Of those, 439 participated in the short-term outcome evaluation of the program (n = 439), yielding a 45% response rate. Results of the study indicate that the HHHU program increases students' knowledge related to how their health habits (nutrition, physical activity, and sugar-sweetened beverages) increase or decrease the risk

of developing cancer. However, the program did not increase general cancer knowledge or improve students' skills in establishing behavioral intentions.

This preliminary study of the short-term outcomes of the HHHU program is promising and indicates that the program is effective in increasing students' knowledge across a number of cancer-related domains. HHHU should continue to be used as a school-based cancer prevention program in the BSD. Further research is necessary to further validate and establish reliability metrics for the HHHU program.

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CHAPTER 1: INTRODUCTION

Healthy Habits, Healthy U (HHHU) is a collaborative effort among Boise State University, St. Luke's Mountain States Tumor Institute (MSTI), and the Boise School District (BSD). Through effective collaboration, these three institutions have developed a cancer prevention program for junior high school students. The HHHU lessons target eighth-grade students and offer a unique approach highlighting the relationships among nutrition, physical activity, sugar-sweetened beverages (SSBs), and cancer risks, through a variety of educational materials. These materials include: an age-appropriate video about cancer with a discussion on prevention; a hands-on activity to compare non-cancerous and cancerous organs; and tools to help students continue practicing healthy habits throughout the year. Appendix A depicts a complete logic model that describes the program. HHHU was piloted in the Spring of 2014 at two BSD junior high schools and was expanded to all eight BSD junior high schools in Fall 2014. During the 2014-2015 school year, the program reached over 1,700 eighth-grade students.

HHHU is a primary prevention program, which provides a classroom presentation designed to help reduce cancer risks in Idaho through school-based education about lifestyle choices (nutrition, physical activity, and the consumption of SSBs) and their connections to cancer. Primary prevention aims to avoid the onset of disease through changing behaviors, educating about risk factors, and promoting healthy behaviors (The Association of Faculties of Medicine of Canada, 2015). Creating positive lifestyle choices at a young age could potentially help reduce the risk of developing cancer.

Statement of the Problem

According to the Comprehensive Cancer Alliance for Idaho (CCAI, 2014), cancer has been the leading cause of death in Idaho since 2008 for both men and women. The Idaho Department of Health and Welfare (2015) reported that cancer was the leading cause of death in Idaho in 2013, with 21.8% of all deaths caused by cancer. Cancer was also ranked the number one cause of death for age groups 45-54, 55-64, and 65-74 (Idaho Department of Health and Welfare, 2015). In 2012, the top two leading causes of cancer deaths in Idaho were lung/bronchus cancer and colorectal cancer (CCAI, 2014). However, the American Institute of Cancer Research (2015) has stated that lifestyle choices can reduce cancer risk, and that about 50% of the most common cancers could be prevented.

Nationwide, approximately one-third of cancer deaths are a result of poor nutrition and sedentary behaviors (American Cancer Society [ACS], 2015). The Centers for Disease Control and Prevention (CDC, 2015) reported that only 48% of adults meet the recommended 30 minutes of physical activity a day. Furthermore, less than 30% of adolescents meet the recommended 60 minutes of physical activity per day. Physical activity can improve health and those who are active live longer and are at a lower risk for some diseases, such as cancer (CDC, 2015).

A diet high in fruits and vegetables is ideal to maintain a healthy weight and prevent some chronic diseases, including cancer (CDC, 2015). In the United States, 29% of high school students eat less than one fruit and 33% eat less than one vegetable per day (CDC, 2011). In Idaho, 34% of adolescents consume fruit less than one time per day and 32% consume vegetables less than one time per day (CDC, 2015).

Because the BSD recognizes the importance of educating its students about healthy lifestyle habits, it requires eighth-grade students to take a one-semester Health course. Health teachers cover a wide variety of topics including: healthy relationships, mental and emotional health, nutrition, physical activity, tobacco, drug and alcohol abuse, and disease prevention. Cancer is briefly covered in Chapter 19, titled "Noncommunicable Diseases," of the students' textbook. Basic information about cancer and prevention is discussed in the text with a primary focus on skin cancer (Bronson, Cleary, Hubbard, & Zike, 2014). Therefore, cancer prevention and education is appropriate and highly desirable for junior high students in the BSD.

Purpose

The purpose of this study was to evaluate HHHU to establish its efficacy. Teachers administered surveys to eighth-grade students to determine the effectiveness of the HHHU program on increasing their knowledge of health habits that can decrease cancer risks. Measurement of short-term outcomes included change in students' knowledge about cancer and the relationships between nutrition, physical activity, consumption of SSBs, and cancer risks. It also assessed behavioral intention to change negative health behaviors.

Hypotheses

The following hypotheses were made prior to performing the study:

1. The HHHU program will increase eighth-grade students' knowledge about cancer.

2. The HHHU program will increase eighth-grade students' knowledge of the relationship between proper nutrition and risk for cancer.

3. The HHHU program will increase eighth-grade students' knowledge of the relationship between physical activity and risk for cancer.

4. The HHHU program will increase eighth-grade students' knowledge of the relationship between the intake of SSBs and risk for cancer.

5. The HHHU program will increase eighth-grade students' ability to identify positive behavioral intentions to reduce the risk for cancer.

Limitations

Several limitations were identified in the study. First, the results of the study may not be generalizable to other school districts in Idaho, particularly given that the BSD is in an urban center and most of Idaho is classified as either rural or frontier. The generalizability of the results may also be compromised somewhat because randomization did not occur at the individual level. Second, Health teachers implemented the Day 1 lesson plan and HHHU team members taught the Day 2 lesson plan. Due to the variety of teaching styles of both Health teachers and HHHU team members in delivering the curriculum, fidelity of the program may be compromised.

The third limitation includes threats to internal validity, such as testing effects, history, response bias, and diffusion of treatment. A testing effect may have occurred because the study used a pretest/posttest design. Taking a pretest could influence posttest scores because the participants have seen the survey. Events or history could include news reports about cancer, a diagnosis of cancer in a family member or friend, or the coverage of cancer as a health topic in the classroom before or during the intervention. Events such as these could have affected posttest scores. Additionally, response bias may have influenced the students' responses. Students may have falsely answered survey

questions by choosing the answers they thought were desired by their teachers or members of the research team. This type of bias would increase the chances of making a Type I error. Diffusion of treatment may have occurred if students who had received the intervention and took the posttest talked to other eight-grade students who were in Health classes but had not yet received the intervention. The posttest scores of students who had Health classes later in the day may have been influenced by information they heard from other students who took Health earlier in the day.

Another possible limitation is that this study focused on individual-level change, mainly behavioral intention and increased knowledge, rather than community-level change. There was no follow-up to determine whether behavior change occurred; therefore, only behavioral intention can be established.

Delimitations

The HHHU program was only implemented in eight BSD junior high schools. There were not enough resources (time, staff, or money) to reach more junior high schools/middle schools in the Treasure Valley during the implementation period. The program was only delivered to students in eighth-grade Health classes. All eighth-grade students are required to take Health, in either the Fall or Spring semester. Only students enrolled in Health for the Fall 2015 semester were recruited for this study.

Definition of Terms

Diffusion of Treatment – "Participants communicate with other participants about the research condition" (Neutens & Rubinson, 2014, p. 69).

Healthy Habits, Healthy U (HHHU) – Cancer prevention program that was developed by personnel of Boise State University, St. Luke's MSTI, and the BSD.

History – "Events that occur at the same time as the study" (Neutens & Rubinson, 2014, p. 67).

Response Bias – "Respondents deliberately falsify their answers" (Neutens & Rubinson, 2014, p. 104).

Sugar Sweetened Beverage (SSBs) – Drinks with added sugar, such as high-fructose corn syrup, brown sugar, corn sweetener, cane sugar, etc. (NYC Health, n.d.).

Testing Effect – "Testing before the experiment begins can affect the participants" performance on the posttest" (Neutens & Rubinson, 2014, p. 68).

CHAPTER 2: LITERATURE REVIEW

The purpose of the literature review is to provide information that supports the need for school-based cancer prevention programs, such as HHHU. The first section of the literature review will provide an overview of cancer, including definitions and current cancer statistics. The second section will discuss health factors that contribute to the development of cancer, such as level of physical activity, nutrition, and consumption of SSBs. The third section will cover current treatments, costs, coverage, and prevention measures for cancer. The final section will present information on other school-based prevention programs related to cancer or other chronic diseases to support the need for school-based cancer prevention interventions.

Background on Cancer

According to CCAI (2014), cancer has been the leading cause of death in Idaho since 2008. In 2012, the top two leading causes of cancer deaths in Idaho were lung/bronchus cancer and colorectal cancer (CCAI, 2014). The U.S. Cancer Statistics Working Group (2014) reported that the top four cancer sites for the United States in 2011 for all races were prostate, breast, lung/bronchus, and colon/rectum cancers.

According to the ACS (2015), cancer is a group of diseases involving abnormal cell growth. Cancerous cells develop when DNA is damaged or mutates. These damaged cells may then invade other tissue. Normally, the immune system kills off these abnormal cells; however, on occasion, this does not happen and cancer develops (ACS, 2015). Cancer is a genetic disease because the mutation happens in the DNA. Some mutations

are hereditary, whereas others are acquired. Acquired genetic changes occur during one's lifetime and often result from environmental and lifestyle causes such as tobacco use, exposure to the sun, and other poor health choices (National Cancer Institute, 2015).

Approximately one-third of cancer deaths are a result of poor nutrition and sedentary behaviors (ACS, 2015). The American Institute of Cancer Research (2015) indicated that approximately 50% of the most common cancers could have been prevented by reducing negative health habits or by adopting positive ones. The CDC (2015) stated that a person can reduce his or her risk of cancer by not smoking, limiting the consumption of alcohol, decreasing exposure to ultraviolet rays, eating the suggested servings of fruits and vegetables, engaging in the suggested level and duration of physical activity, and attending routine doctor visits.

Health Factors Contributing to Cancer

Lifestyle choices influence the risk of developing cancer. Behaviors such as poor nutrition, lack of physical activity, and the consumption of SSBs increase the risk of developing cancer. Tobacco use and drinking large amounts of alcohol also increase the chance of developing cancer. These risk factors are described below in greater detail.

<u>Nutrition</u>

Research shows that consuming certain types of food increases the risk of developing cancer, whereas consuming other types decreases the risk. According to Corse (2012), consuming large amounts of red and/or processed meats is associated with an increased risk of colorectal (CRC) and gastric cancer. The risk for breast cancer increases with the increased consumption of alcohol and saturated fats (Corse, 2012).

On the other hand, consuming a nutritious diet has been shown to reduce cancer risks. Dietary components can play a significant role in cancer prevention through epigenetic mechanisms. However, the bioactive dietary component(s), as well as the cellular target(s), in these processes are unknown (Supic, Jagodic & Magic, 2013). For example, eating large amounts of fruits and vegetables is correlated with lowering the risk of gastric and lung cancer in smokers (Corse, 2012). An increased intake of cereal fiber has been shown to decrease the risk of gastric cancer and CRC (Corse, 2012). An 11-year follow-up to the European Prospective Investigation in Cancer and Nutrition (EPIC) study reported an inverse association between dietary fiber intake and CRC (Murphy et al., 2012). These findings suggest the intake of foods high in fiber should be used in the prevention of CRC (Murphy et al., 2012).

In addition, researchers have reported that there is an inverse correlation between dairy consumption and the risk for CRC cancer. Murphy et al. (2013) found that total milk (skim and whole milk), cheese, yogurt, total dairy intake, and dietary calcium (from a dairy source) were all associated with a decreased risk of CRC. Their study supported others that suggest dairy products and calcium are potentially beneficial to the prevention of CRC (Murphy et al., 2013).

Physical Activity

Studies have shown that physical activity decreases the risk of some cancers. According to Chao et al. (2004), physical activity is a likely cancer-prevention strategy because of its many health benefits. Consistent with previous studies, Chao et al. (2004) found a correlation between increased physical activity and lower risk of CRC. Friedenreich, Neilson, and Lynch (2010) reported in their meta-analysis that individuals

who engaged in high levels of physical activity reduced the risk of colon cancer by 20%

to 25% when compared to individuals who engaged in low levels of activity. There is a

greater reduction in the risk of CRC with increased levels of activity, indicating that 30 to

60 minutes of moderate to vigorous intensity physical activity per day may be needed to

reduce the risk of CRC (Friedenreich et al., 2010). Recreational physical activity has also

found to be associated with lower risk of CRC in both men and women (Chao et al.,

2004). Increased amounts of recent recreational physical activity are related to a

decreased risk of colon cancer, even if activity began late in life. According to Wolin,

Yan, Colditz, and Lee (2009), participating in physical activity reduced the overall risk of

colon cancer by approximately 24% in both men and women.

Chen, Yu, and Li (2014) reported that physical activity can protect against

esophageal and gastric cancers. The protective benefit from physical activity could result

from reduced insulin resistance and lowered fasting insulin levels. Cancer is differentially

associated with both inflammatory and anti-inflammatory adipocytokines (bioactive

product produced by adipose tissue); physical activity decreases inflammatory

adipocytokines and increases anti-inflammatory adipocytokines. This differential

adipocytokine response could also be a protective benefit of physical activity, however

the underlying mechanisms are currently unclear (Chen et al., 2014). More research is

needed to identify these mechanisms, such as whether having an inactive lifestyle or

participating in only non-aerobic physical activity is related to an increased risk of

cancer, and whether the intensity of physical activity affects the association (Chen et al.,

2014).

Brenner (2014) reported that between 8% and 13% of all cancer cases in Canada could be attributed to inadequate amounts of physical activity and between 4% and 5% of all cancer cases could be connected to excessive body weight. A study conducted by de Vries et al. (2010) modeled the potential effects of excess body weight and physical inactivity on the incidences of CRC in seven European countries. It was projected that 18% of male and 21% of female colon cancer cases could be avoided if the most extreme intervention recommendations were met. These recommendations are to achieve 150 minutes of physical activity per week and a body mass index of 21 (de Vries et al., 2010).

Sugar-Sweetened Beverages

There are a number of proposed mechanisms by which fructose increases cancer progression (Laguna et al., 2014). It is thought that cancer growth is influenced by dietary fructose through processes related to the particular metabolic characteristics of the cancerous cells. For instance, fructose, often found in sweeteners may aid in tumorigenesis (formation of tumors) by introducing the key enzyme in the oxidative branch of the pentose phosphate pathway (metabolic process). Other ways fructose stimulates cancer growth involve its ability to increase the production of reactive oxygen species and directly damaging DNA (Laguna et al., 2014).

Wang et al. (2014) stated that several epidemiological studies have suggested there is an increased risk of CRC in relation to an increased intake of refined sugars. A positive association was found between fructose intake and CRC incidence in men (Wang et al., 2014). Fuchs et al. (2014) reported that an increase in SSB consumption was positively correlated with increased risk of cancer recurrence or mortality, especially if two or more servings of SSBs were consumed per day.

However, research is conflicting as to whether or not sugar intake increases the risk of CRC. The associations found between SSB consumption and CRC is inconsistent. As reported by Wang et al. (2014), sugar intake and sweetened foods were not correlated to the risk of CRC in men and women. It was found that there was no association between intake of soft drinks, sweetened foods, sugars, sucrose and fructose, and risk of CRC (Wang et al., 2014). However, a myriad of other illnesses are linked to the intake of SSBs, such as weight gain, diabetes, hypertension, and coronary artery disease (Fuchs et al., 2014).

Laguna, Alegret, and Roglans (2014) reported supporting evidence of the relationship between increased dietary fructose and cancer. There has also been evidence, which supports that a high dietary glycemic load is correlated with an increased risk for hepatocellular cancer (HCC), especially in patients with hepatitis. A large cohort study found a positive association between total sugar intake and HCC (Laguna et al., 2014).

It has been reported that added sugar, fructose, glucose, and sucrose are associated with pancreatic cancer (Rossi et al., 2010). There have also been significant findings that free fructose (not bound to another sugar) consumption increased the risk of pancreatic cancer (Laguna et al., 2014). Rossi et al. (2010) reported that there was a positive association between glycemic index and risk for pancreatic cancer. Food groups with a high glycemic index that were correlated with a high glycemic load were measured independently. It was then found that sugar from items such as candy, honey, and jam were positively associated with pancreatic cancer. The intake of fruit and total carbohydrates are inversely related to pancreatic cancer (Rossi et al., 2010). There is also conflicting research as to whether or not glycemic index and glycemic load are associated

with an increased risk of pancreatic cancer (Rossi et al., 2010). Conversely, some studies have reported no association between sugar or carbohydrate intake and pancreatic cancer (Rossi et al., 2010).

Current Cancer Treatments, Costs, Coverage, and Prevention

Treatments

According to the ACS (2015), the common methods for treating most types of cancer are surgery, chemotherapy, and radiation therapy. Surgery provides the best results for tumor-based cancers and is used to diagnose, treat, and prevent cancer occurrence. Chemotherapy involves use of a drug to treat cancer, whereas radiation therapy is a form of treatment using high-energy particles to kill cancer cells. Other treatments include targeted therapy, immunotherapy, and stem cell transplants (ACS, 2015).

Costs and Coverage

The United States spent $2.5 trillion on personal health care expenditures in 2013 (U.S. Department of Health and Human Services, 2015). According to Mariotto, Yabroff, Shao, Feuer, and Brown (2010), the national cost of cancer care in the United States in 2010 was $124.57 billion. If survival rates and costs remain stable, medical expenditures for cancer care are projected to reach $158 billion in 2020. Researchers have projected that cancer costs will likely exceed this estimate because of the increased cost of new technology and treatment, making the new estimated cost closer to $173 billion, or even as high as $207 billion (Mariotto et al., 2010).

In 2014 the United States spent $373.9 billion on pharmaceutical drugs (Leonard, 2015). The global spending on cancer drugs in 2014 was $91 billion and the United

States accounted for 41% of this figure (Rabin, 2014). An article released by Kaiser

Health News reported that cancer drugs average a cost of $10,000 per month or more

(Rabin, 2014). There has been a shift to having treatment administered at hospitals

because many private doctors' offices have been consolidated. Kaiser Health News stated

that the same drug costs three times more at a hospital than at an outpatient doctor's

office. This increases the cost to the patient by about $134 per dose.

According to the ACS (2015), The Patient Protection and Affordable Care Act

(ACA) should improve the quality and cost of health care in the United States for those

with cancer or who are at risk of developing cancer. The ACA is intended to make

private health insurance affordable, particularly for those with pre-existing conditions.

The ACA has made significant changes to individual health care plans. These changes

include but are not limited to: mandating coverage of pre-existing conditions, not being

able to cancel coverage if a person becomes sick, prohibiting charges to individuals who

are sick more than those who are healthy, making cancer screening and most prevention

measures available at little to no cost to the patient, and disallowing denial of health care

services to people who are part of a clinical trial. Under the ACA, most insurance plans

are required to cover the care needed for cancer patients and cancer survivors (ACS,

2015).

Prevention

An essential component of health care reform is the prevention of chronic disease

and improvement of public health (Democratic Policy and Communication Center, 2015).

Developing healthy communities is a key priority. One way to develop healthy

communities is to shift the focus of the current health care system toward health

promotion and disease prevention. The ACA planned to create a multi-agency council to establish health policies, as well as national prevention and health promotion strategies. Grants will be awarded to eligible parties to promote individual and community health, as well as disease prevention. The Health and Human Services Secretary will fund public health research and protocols to study prevention practices (Democratic Policy and Communication Center, 2015).

Health care reform efforts are encouraging hospitals to focus on wellness, prevention, and population health. This requires hospital leaders to seek partnerships outside of their institutions (Stempniak, 2014). Hospitals are broadening their scope of community partnerships and stakeholders. Therefore, partnerships between hospitals and organizations such as churches and schools are developing to expand community engagement to benefit more members of the community (Stempniak, 2014).

School-Based Programs

One way to effectively reach an optimal number of students is through school-based health programs. Children spend a large portion of their lives in school, which provides educators the opportunity to teach students knowledge and skills needed to maintain positive health behaviors (CDC, 2015). Dilley (2009) reported that school-based programs (which include procedures, policies, and creation of an environment in which healthy behaviors are promoted) are critical for improving the health of students. Schools can provide physical education, nutrition education, and offer programs that promote healthy eating behaviors and physically active lifestyles (Boonpleng et al., 2013). Studies (e.g., Planet Health and Be Smart Against Cancer) indicate schools can impact the health of their students because they have the appropriate tools and capacity.

Teachers play a key role in schools and contribute to cognitive and behavioral changes in students. Teachers interact with the school administrators, students, and families, all of which are necessary to facilitate these changes (Barros et al., 2014). A study conducted by Barros et al. (2014) indicated that with program development training, teachers were able to create cancer prevention programs with a wide variety of content and formats conducive to their schools. Allara et al. (2014) found that teachers were willing to deliver preventive material to students, especially during the students' adolescent years when risky health behaviors may first develop.

Adolescence is a stage in life when individuals develop behaviors that shape adulthood; therefore, prevention of risky behaviors through school involvement is promising for this population (Lana, Olivo del Valle, Lopez, Faya-Prnia, & Lopez, 2013). There is also evidence to support the effectiveness of school-based interventions on topics such as dietary risks, sedentary behaviors, and alcohol misuse (Dilley, 2009). This finding is significant because all of these topics are lifestyle choices that influence the risk of developing cancer.

School-Based Health Education Programs

Planet Health, developed by the Harvard School of Public Health Prevention Research Center, is an interdisciplinary program that focuses on improving the health and well being of sixth through eighth-grade students (Gortmaker, 2014). This obesity prevention program was incorporated into classes such as English, math, science, social studies, and physical education. Planet Health concentrates on classroom education and behavioral modifications. The specific objectives focus on increasing physical activity and decreasing sedentary behaviors, as well as increasing overall fruit and vegetable

intake, and decreasing the consumption of fatty foods (Budd & Volpe, 2006). Planet

Health meets the Massachusetts state curriculum standards and trains teachers in specific

classes to teach one lesson on each objective (Budd & Volpe, 2006). A randomized

control study found that the school-based obesity intervention program successfully

reduced the BMI of girls (Budd & Volpe, 2006). Austin, Field, Wiecha, Peterson, and

Gortmaker (2005) reported that Planet Health had a considerable protective impact on

girls who had not begun dieting in middle school at the start of the study.

The Los Angeles Unified School District (LAUSD) promotes a school-based

nutrition education program in low-income schools in Los Angeles that aims to improve

students' fruit and vegetable intake. The program is a collaboration among school

administrators, parents, teachers, and health experts (Prelip, Kinsler, Thai, Erausquin, &

Slusser, 2012). This program is administered through the Network for a Healthy

California-LAUSD (Network-LAUSD), and includes teacher training, standard nutrition

education, and parent involvement (Prelip et al., 2012). Researchers reported that this

multicomponent nutrition education program was successful with outcomes indicating an

improvement in knowledge about and attitudes toward nutrition. This study also reported

that behavioral change is a challenge and that positive attitudes and increased knowledge

are not the only factors that affect change (Prelip et al., 2012).

The Adolescent Substance Abuse Program (ASAP) is an anti-drug program for

junior high school-aged students. ASAP was developed by medical students at the

University of Chicago Pritzker School of Medicine. The program aims to prevent drug

use through education about the relationships between organs, healthy body systems, and

drug use. The ASAP program allows students to view diseased and normal organ

specimens in small groups and discuss their comparisons with a medical student. There are three 45-50 minute lessons given one week apart. In the first lesson, students learn about organ function and the effects of substance abuse. The second lesson allows the students to view the healthy and diseased organs. Then finally, the students engage in role-playing activities to help them develop skills to resist the social pressures of drug use (Cromwell, 1998).

ASAP was reportedly well received by students and teachers. In an interview, a sixth-grade student reported learning a great deal about human organs and that seeing the "disgusting" organs would make them think twice about smoking (Cromwell, 1998). Students enjoyed having the medical students present the information rather than "old doctors." A sixth-grade science teacher shared that the lessons were invaluable and that the students listened better to the medical students than the teacher (Cromwell, 1998). An assessment indicated that seventh graders who received the ASAP lessons were less likely to abuse substances when compared to seventh graders who did not participate in the program. Another teacher reported that observing the human organs made the lessons "real" and the students could visually see what drugs do to the body (Cromwell, 1998). According to Cromwell (1998), the program has been evaluated by direct feedback from verbal follow-up with students, teachers, and administrators, all of whom rated the program as exceptional, however no formal evaluation has been conducted.

School-Based Cancer Prevention Programs

Cancer education programs, which increase awareness for cancer-related risk factors and promote healthy lifestyles, are fundamental initiatives in primary prevention (Barros et al., 2014). Programs including "Be Smart Against Cancer" and "Cancer,

Educate to Prevent" provide evidence supporting the success of school-based cancer prevention programs. These programs are summarized below.

"Be Smart Against Cancer" (BSAC) is a school-based cancer prevention program developed using the Theory of Planned Behavior (Ajzen, 1991). This program covers cancer and lifestyle choices associated with cancer risks. The program is one week in length and covers four specific areas: "What is Cancer?," "Nonsmoking," "Sun Protection," and "Physical Activity, Healthy Nutrition and Limited Alcohol Consumption." Each lesson requires one school day and the fifth day is used to summarize the program. BSAC utilizes different teaching methods, such as group discussions, worksheets, video clips, role-playing, and quizzes to enhance knowledge (Stölzel et al., 2014).

BSAC aimed to increase knowledge and awareness of cancer-related risk factors and to increase intention to participate in protective behaviors. These indicators were tested using a pretest/posttest design. BSAC effectively increased knowledge regarding cancer and related risk factors and increased awareness. The program also improved health-promoting intentions (Stölzel et al., 2014).

"Cancer, Educate to Prevent" is a cancer prevention program that trains biology teachers to plan and implement prevention programs for their schools. The program focuses on five of the most common cancers: CRC, gastric, breast, cervical, and skin cancers. Teachers are taught the basic principles of the biology of cancer, its epidemiology, and its prevention. The teachers are also instructed on how to select, validate, and organize relevant information. The training includes 20 hours of 'e-learning' and five hours of classroom-based sessions. The training models cover: Basics

of Cancer Biology, Prevention, Development of Cancer Prevention Projects, Strategies for Cancer Awareness, and Prevention (Barros et al., 2014).

The evaluation of "Cancer, Educate to Prevent" suggested that teachers are capable of developing and implementing successful cancer prevention programs in their schools. Evidence to support the effectiveness of these programs is seen in the analysis of the pretest/posttest data. When comparing the experimental group's pre-tests and post-tests, there was a significant increase in knowledge about cancer in three of the four topics including breast cancer, colorectal cancer and skin cancer. Overall knowledge about cancer also increased (Barros et al., 2014).

Limitations of School-Based Programs

Schools often have limited resources, budgets, and other curricula that must be followed. Due to these limitations, teachers may not deliver a cancer prevention program as intended, increasing the risk of discrepancies in the delivery of the program (Whittemore et al., 2013). Therefore, the fidelity and effectiveness of the program may be compromised. Abood et al. (2008) suggested that teacher bias could also limit the effectiveness of school-based prevention programs. When asked, teachers felt it was necessary to have proper training on the implementation of the prevention program (Whittemore et al., 2013).

Prelip et al. (2013) reported that positive outcomes in improved knowledge and attitudes do not necessarily lead to behavioral change. The focus of the BSAC study was to evaluate awareness and intention; therefore there was no long-term follow-up to determine whether students' behaviors did in fact change as a result of what they had learned in the program (Stölzel et al., 2014). Abood et al. (2008) suggested that

behavioral intentions may not result in behavioral changes and that further research is necessary to determine whether behavioral changes occurred.

Conclusion

According to the ACS (2015), one-third of cancer deaths are related to nutrition and sedentary behaviors. The American Institute of Cancer Research (2015) stated about 50% of the most common cancers are preventable through healthy lifestyle choices. Research presented in the literature review of this paper supports the idea that risk factors such as poor nutrition, lack of physical activity, and the intake of sugary foods can increase cancer risk. This review also provides evidence supporting the need for school-based health education programs.

HHHU is a school-based cancer prevention program that aims to prevent cancer through education about health behaviors, and is thus similar to other programs. HHHU utilizes the skills of and trains local health teachers, and Boise State University students to implement the program. This implementation strategy is similar to that of "Cancer, Educate to Prevent," Planet Health, and Network-LAUSD. Like most other school-based cancer prevention programs, HHHU includes discussions about nutrition, physical activity, consumption of SSBs, and tobacco use and the related risk of developing different types of cancers. Similar to BSAC, HHHU uses different modes of delivery, including reading articles, class discussions, videos, a hands-on activity, and summary worksheets to engage all learners.

However, HHHU differs in some respects from the previously described cancer programs. HHHU not only aims to educate students on healthy and unhealthy behaviors that influence cancer risks, but also physically shows students what cancer "looks like"

through observation of non-cancerous and cancerous tissue samples. This activity allows students to observe how a person's health habits can affect him or her internally. Through this activity, students are encouraged to critically think and make the connection between their health habits and the risk of cancer. Additionally, HHHU has incorporated behavioral intention-based education through classroom discussion about students' own health habits. Furthermore, HHHU worksheets include behavioral intention questions in which students identify three of their current unhealthy habits and three healthy replacement habits. They then choose one habit they intend to change in the next 30 days.

The literature supports the need for cancer education in schools. Primary prevention strategies could help reduce the risk of cancer and schools provide the opportunity to reach a vulnerable population. A program such as HHHU that was developed using the Theory of Planned Behavior and created using the expertise of health care professionals, health educators, and teachers, has the potential to effectively reduce cancer risk. Therefore, evaluating the short-term outcomes of HHHU is necessary to assess and improve the effectiveness of the program.

CHAPTER 3: METHOD

Program Implementation

The program coordinator contacted all BSD eighth-grade health teachers via email to schedule the program activities. Teachers were trained to implement the HHHU Day 1 curriculum during the district meeting in August 2015.

The HHHU program was taught over two consecutive days. The program was developed to allow the teachers to instruct the first day of the program and the HHHU team to teach the second day of the program. On Day 1, an age-appropriate video was shown to students followed by a class discussion about cancer. Then, students read articles pertaining to health habits and cancer risks; topics included physical activity, nutrition, consumption of SSBs, tobacco usage, and sun safety. After reading the articles, groups of students made a poster about the articles and reported out to classmates (see Appendix B).

The program coordinator, a community cancer educator, and a Boise State University faculty member along with teaching assistants (TAs) taught the Day 2 lesson. At the beginning of the Fall 2015 semester, Boise State University TAs were trained to deliver the second lesson of the HHHU program. Training was completed in approximately four hours. The Day 2 lesson began with a brief overview of the first lesson. Students were then given an organ identification worksheet to record their observations between two human tissue samples. Finally, students completed a worksheet summarizing what they had learned from the HHHU program and reported their

behavioral intentions to engage in cancer-prevention habits for the next 30 days (see
Appendix C).

Participants

The participants in this study were eighth-grade students. All eligible participants
were enrolled in a Health class during the Fall 2015 semester in the BSD. The BSD
consists of eight junior high schools: East Junior High, Fairmont Junior High, Hillside
Junior High, Les Bois Junior High, North Junior High, Riverglen Junior High, South
Junior High, and West Junior High. Only those who had a signed parental consent form
and student assent form were included in the data analysis. The total population of
eligible eighth-grade health students was 969. Eighth-grade students in the BSD not
enrolled in Health and eighth-grade students in other school districts were not included in
this study.

Study Design

This study used a quasi-experimental, modified nonequivalent control group
design (Neutens & Rubinson, 2014). This design featured a pretest and posttest for both
the experimental and the control group. Randomization did not occur at the individual
level because intact groups (schools) were part of the study. Therefore, schools were
randomly assigned to either the experimental or the control group. The design was
modified because the control group received the intervention after the posttest.

Measurement Tool

The measurement tools that were used included a multiple choice and Likert-
scale-based pretest (see Appendix D) and posttest (see Appendix E). The Likert scale is
commonly used in public health evaluation and is an important part of survey research.

Likert scales can be used to evaluate attitudes, beliefs, or behaviors (Losby & Wetmore, 2012).

The pretest included 13 questions. There were seven Likert-scale-based questions that asked participants to rank their level of agreement or identify statements about cancer and health habits that increase or decrease cancer risks. The pretest included three true/false and three multiple-choice questions about cancer, treatment, and the relationship between health habits and cancer risk. The pretest took approximately five minutes to complete.

The posttest was composed of the same 13 questions as the pretest. The posttest contained a table in which participants were prompted to identify three negative health habits and three positive replacement health habits. Lastly, participants chose one current negative health habit and positive replacement habit, from the table, which they intended to change in the next 30 days and described how they would make the change. The posttest took approximately 10 minutes to complete.

Prior to survey implementation, an eighth-grade Health teacher reviewed the surveys for content to ensure they were written appropriately for eighth-grade students.

Procedure

All materials and procedures were submitted to the Institutional Review Board for the Protection of Human Subjects at Boise State University and were approved before the start of the study (see Appendix F). The BSD also received all materials and procedures and were approved before the start of the study.

Informed consent documents (see Appendix G) were sent to all parents of eligible participants. The informed consent documents were sent to parents by the teachers either

electronically or in paper form and were signed/returned before the start of the study. The teachers also invited all students sign an assent form (see Appendix H) prior to the HHHU curriculum start date. Both documents informed the students and their parents about the study and clearly stated that participating in the study was voluntary. The informed consent document and the assent form must have been signed/returned in order for each student to participate in the study. Students who did not comply were not included in the data. However, these students did receive the program with all worksheets and surveys.

Eight junior high schools were randomly assigned to either the experimental group or the control group. The experimental group was the intervention group (IG). The control group was the delayed intervention group (DIG). The DIG completed the pretest and posttest without having the intervention. After the posttest, the DIG received the intervention, followed by a second posttest. These procedures are based on a study conducted by Abood et al. (2008), in which the evaluation of a school-based obesity prevention program was designed with an IG and a DIG.

Teachers were provided the pretests and posttests for their classes. The pretests and posttests were coded with the student identification number consisting of school, teacher, term, year, class, and group assignment. Envelopes were provided to the teachers to allow them to keep materials separated by class, which the research team picked up from each school after the posttest.

The teachers in the IG scheduled the HHHU program to be presented to their classes on a Thursday and Friday in October and November 2015. Two weeks prior to the intervention, the teacher administered the pretest to all students. On the scheduled

Thursday, the teacher presented Day 1 of the HHHU program to all class periods. The

HHHU team presented Day 2 of the HHHU program to all class periods on Friday. After

the completion of the HHHU program, the IG group received the posttest.

Teachers in the DIG scheduled the HHHU program to be presented to their

classes on a Thursday and Friday in November and December 2015. The pretests were

administered to all class periods on a Friday four weeks prior to the intervention. Two

weeks after the pretest, the teachers administered the posttest to all class periods on a

Friday. Two weeks after the posttest was given, the DIG received the intervention. On the

scheduled Thursday, the teacher presented Day 1 of the HHHU program to all class

periods. The members of the research team presented Day 2 of the HHHU program to all

class periods on Friday. After the completion of the HHHU program, the DIG group

received a second posttest.

After all forms (informed consent, assent, pretest, and posttests) were collected,

they were organized into eligible and not eligible participants. All eligible participants'

pretest/posttests were scored and entered into Statistical Package for the Social Sciences

Version 22 (SPSS) for statistical analysis. See Appendix H for a complete scoring rubric.

All data was kept in a locked cabinet in Room #203 in the Bronco Gym/Kinesiology

building at Boise State University.

Statistical Analysis

Independent-samples *t*-tests were performed on pretest scores for each Likert-

scale item to test for possible preexisting differences between participants in the IG and

the DIG, with an alpha level of $p \leq 0.001$. One-way analyses of covariance (ANCOVA),

controlling for variance in pretest scores, were performed on posttest scores for each

Likert-scale item to test for possible differences between participants in the IG and the DIG, with an alpha level of $p \leq 0.001$.

Chi-square tests were performed on pretest scores for multiple-choice items to determine whether there were preexisting differences between participants in the IG and the DIG, with an alpha level of $p \leq 0.001$. Chi-square tests were performed on posttest scores for multiple-choice items to test for possible differences between participants in the IG and the DIG, with an alpha level of $p \leq 0.001$.

Qualitative data from the IG posttest and the DIG posttest was analyzed and quantified using a rubric (see Appendix I). Descriptive statistics were conducted to examine the health topics that participants identified in the "Your Health Habits" table. A percentage correct score was given for the table. Chi-square tests were used to determine whether there was a statistically significant difference between participants in the IG and DIG and the percentage correct on the table. Descriptive statistics and chi-square tests were also used to examine the behavioral intention questions.

CHAPTER 4: RESULTS

The HHHU program was presented to 969 BSD eighth-grade students. Of those, 439 participated in the short-term outcome evaluation of the program (n = 439), yielding a 45% response rate. All participants were enrolled in eighth-grade Health classes in the BSD during Fall 2015. An alpha level of $p \leq 0.001$ was used for all statistical tests to control for the increased potential for family-wise error incurred by using multiple independent-samples t-tests, one-way ANCOVAs, and chi-square tests.

Intervention Group and Delayed Intervention Group Comparison

<u>Multiple Choice and Likert-Scale Questions</u>

Independent-samples t-tests were performed on Likert-scale questions to determine whether there were statistically significant differences between participants in the IG and DIG in their knowledge about cancer and health habits that influence the risk of developing cancer. There were no statistically significant differences between the IG and DIG pretests scores on any of the items. There were, however, statistically significant differences between the two groups' posttest scores on all seven Likert-scale questions. Chi-square tests were performed on multiple-choice questions to determine whether there were statistically significant differences between the IG and DIG participants in their knowledge about cancer and health habits that influence the risk of developing cancer. There were no statistically significant differences between the IG and DIG participants' pretest scores on any of the items. There were statistically significant differences between the two groups' posttest scores on two of the six multiple-choice questions.

General Cancer Information

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about whether cancer is a disease caused by abnormal cell growth, an independent-samples *t*-test was performed on Q1 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about whether cancer is a disease caused by abnormal cell growth. The results of this analysis showed that participants in the IG ($M = 4.64$, $SD = 0.82$) had statistically significantly higher knowledge scores about whether cancer is a disease caused by abnormal cell growth than participants in the DIG ($M = 4.12$, $SD = 0.89$), $F (1, 352) = 36.61$, $p < .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 9.4% of the difference in knowledge scores ($\eta^2 = .094$).

An initial chi-square test was performed to determine whether there were preexisting differences in responses to Q2, which asked whether human bodies usually destroy cancer cells, between members of the IG and the DIG. The result of this analysis on pretest scores was not statistically significant ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about human bodies destroying cancer cells prior to the intervention. An analysis of posttest scores on the same item revealed that there was no statistically significant difference in knowledge about human bodies destroying cancer cells ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about our bodies destroying cancer cells after the IG had the intervention.

An initial chi-square test was performed to determine whether there were preexisting differences in responses to Q4, which asked about the side effects of chemotherapy, between members of the IG and the DIG. The result of this analysis on pretest scores was not statistically significant ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about side effects of chemotherapy prior to the intervention. An analysis of posttest scores on the same item revealed that there was no statistically significant difference in knowledge about the side effects of chemotherapy ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about the side effects of chemotherapy after the IG had the intervention.

An initial chi-square test was performed to determine whether there were preexisting differences in responses to Q6, which asked students to identify mutation based on the given definition, between members of the IG and the DIG. The result of this analysis on pretest scores was not statistically significant ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about cell mutation prior to the intervention. An analysis of posttest scores on the same item, however, revealed that there was a statistically significant difference in knowledge about cell mutation, χ^2 (1, $N = 437$) $= 20.43$, $p < .001$. This result was accounted for by a greater percentage of IG participants (61.8%) answering correctly about cell mutation than DIG participants (38.2%).

An initial chi-square test was performed to determine whether there were preexisting differences in responses to Q7, which asked whether or not chemotherapy only targets cancer cells, between members of the IG and DIG. The results of the analysis on pretest scores was not statistically significant ($p > .05$), and therefore it was concluded

that the two groups did not differ in knowledge about whether or not chemotherapy only targets cancer cells prior to the intervention. An analysis of posttest score on the same item revealed that there was no statistically significant difference in knowledge about whether or not chemotherapy only targets cancer cells ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about whether or not chemotherapy only targets cancer cells after the IG had the intervention.

Nutrition

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about fast food/processed food increasing the risk of developing cancer, an independent-samples t-test was performed on Q5 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about fast food/processed food increasing the risk of developing cancer. The results of this analysis showed that participants in the IG ($M = 4.61$, $SD = .80$) had statistically significantly higher knowledge scores about fast food/processed food increasing the risk of developing cancer than participants in the DIG ($M = 3.91$, $SD = .98$), $F (1, 371) = 66.28$, $p < .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 15.2% of the difference in knowledge scores ($\eta^2 = .152$).

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about whether eating fruits and vegetables decreases the risk of developing cancer, an independent-samples t-test was performed on Q8 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-

way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about whether eating fruits and vegetables decreases the risk of developing cancer. The results of this analysis showed that participants in the IG ($M = 4.67$, $SD = .70$) had statistically significantly higher knowledge scores about whether eating fruits and vegetables decreases the risk of developing cancer than participants in the DIG ($M = 4.27$, $SD = .76$), $F(1, 397) = 30.73$, $p = .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 7.2% of the difference in knowledge scores ($\eta^2 = .072$).

Physical Activity

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about physical activity decreasing the risk of developing cancer, an independent-samples t-test was performed on Q3 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about physical activity decreasing the risk of developing cancer. The results of this analysis showed that participants in the IG ($M = 4.38$, $SD = 1.09$) had statistically significantly higher knowledge scores about physical activity decreasing the risk of developing cancer than participants in the DIG ($M = 3.75$, $SD = 1.14$), $F(1, 376) = 32.58$, $p < .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 8.0% of the difference in knowledge scores ($\eta^2 = .080$).

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about sedentary behaviors increasing the risk of developing

cancer, an independent-samples *t*-test was performed on Q10 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about sedentary behaviors increasing the risk of developing cancer. The results of this analysis showed that participants in the IG ($M = 4.49$, $SD = .71$) had statistically significantly higher knowledge scores about sedentary behaviors increasing the risk of developing cancer than participants in the DIG ($M = 3.34$, $SD = 1.06$), $F(1, 357) = 193.05$, $p < .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 35.1% of the difference in knowledge scores ($\eta^2 = .351$).

An initial chi-square test was performed to determine whether there were preexisting differences in responses to Q12, which asked students to identify the answer that was not a health benefit of exercise, between members of the IG and DIG. The results of the analysis on pretest scores was not statistically significant ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about the health benefits of exercise prior to the intervention. An analysis of posttest scores on the same item revealed that there was no statistically significant difference in knowledge about the health benefits of exercise ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about the health benefits of exercise after the IG had the intervention.

Sugar-Sweetened Beverages

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about the consumption of SSBs increasing the risk of

developing cancer, an independent-samples *t*-test was performed on Q9 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about the consumption of SSBs increasing the risk of developing cancer. The results of this analysis showed that participants in the IG ($M = 4.53$, $SD = .77$) had statistically significantly higher knowledge scores about the consumption of SSBs increasing the risk of developing cancer than participants in the DIG ($M = 3.62$, $SD = .95$), $F (1, 363) = 105.42$, $p < .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 22.5% of the difference in knowledge scores ($\eta^2 = .225$).

An initial chi-square test was performed to determine whether there were preexisting differences in responses to Q13, which asked if consuming two or more sodas per week is linked to cancer, between members of the IG and the DIG. The result of this analysis on pretest scores was not statistically significant ($p > .05$), and therefore it was concluded that the two groups did not differ in knowledge about how consuming two or more sodas per week is linked to cancer prior to the intervention. An analysis of posttest scores on the same item, however, revealed that there was a statistically significant difference in knowledge about how consuming two or more sodas per week is linked to cancer, $\chi^2 (1, N = 433) = 66.94$, $p < .001$. This result was accounted for by a greater percentage of IG participants (72.2%) answering correctly about how consuming two or more sodas per week is linked to cancer than DIG participants (27.8%).

Health Habits That Reduce the Risk of Cancer

Question 11 asked all participants to circle all health habits that reduce the risk of developing cancer. A list of 10 items was given for participants to choose from, of which six were correct. The correct responses included do not smoke/vape, eat fruits and vegetables, maintain a healthy weight, engage in at least 60 minutes of physical activity per day, protect one's skin from the sun, and avoid secondhand smoke.

To test for possible preexisting differences between participants in the IG and DIG regarding knowledge about health habits that reduce the risk of developing cancer, an independent-samples t-test was performed on Q11 pretest scores. The results of this analysis confirmed that no such difference existed ($p > .05$). A one-way ANCOVA, controlling for variance in pretest scores, was performed to test for possible differences in posttest knowledge about health habits that reduce the risk of developing cancer. The results of this analysis showed that participants in the IG ($M = 5.27$, $SD = 1.28$) had statistically significantly higher knowledge scores about health habits that reduce the risk of developing cancer than participants in the DIG ($M = 5.02$, $SD = 1.47$), $F (1, 428) = 23.44$, $p < .001$. Group membership (i.e., whether the participants were in the IG or the DIG) accounted for approximately 5.2% of the difference in knowledge scores ($\eta^2 = .052$).

Descriptive Statistics for the "Your Health Habits" Table

Participants in the IG were asked to identify three of their own unhealthy habits and a healthy replacement habit for each. The top three health topics reported as unhealthy habits with appropriate replacement habits were: 1) lack of exercise (N = 191, 75.8%); 2) poor nutrition (N =190, 75.4%); and 3) consumption of SSBs (N=144,

57.1%). Participants in the DIG were also asked to identify three of their own unhealthy habits and a healthy replacement habit for each. The top three health topics reported as unhealthy habits with appropriate replacement habits were: 1) lack of exercise (N=127, 71.3%); 2) poor nutrition (N=124, 69.7%); and 3) consumption of SSBs (N= 79, 44.4%) (see Table 1).

Among IG participants, 215 (85.3%) correctly identified three unhealthy habits with three linked healthy replacement habits, earning a score of 100%. Twenty-eight (11.1%) correctly identified two unhealthy habits with linked healthy replacement habits, earning a score of 67%. Six (2.4%) identified only one unhealthy habit with a linked healthy replacement habit, earning a score of 33%.

Among DIG participants, 117 (65.7%) correctly identified three unhealthy habits with three linked healthy replacement habits, earning a score of 100%. Thirty-five (19.7%) correctly identified two unhealthy habits with linked healthy replacement habits, earning a score of 67%. Twenty (11.2%) identified only one unhealthy habit with a linked healthy replacement habit, earning a score of 33%. There was a statistically significant difference between the percentage correct of unhealthy habits linked with healthy replacement habits identified by participants in the IG and the DIG conditions (χ^2 (3) = 26.3, $p \leq 0.001$) (see Table 2).

Behavioral Intention

All participants were asked to identify an unhealthy habit that they intended to change in the next 30 days, including the healthy replacement habit and two descriptions of how they were going to change their habit-related behavior. Among IG participants, 238 (95.2%) correctly identified an unhealthy habit and 241 (96.4%) identified a healthy

replacement habit. Two hundred-three (81.2%) of participants in the IG provided two descriptions and 44 (17.6%) provided one description. Of those who provided one or two descriptions, 222 (88.8%) linked the first description directly to the habit they intended to change. Of those who provided two descriptions, 171 (72.8%) linked the seconded description directly to the habit they intended to change (see Table 3).

Among DIG participants, 158 (91.3%) correctly identified an unhealthy habit and 160 (92.5%) identified a healthy replacement habit. One hundred thirty-three (77.8%) of participants in the DIG provided two descriptions and 28 (15.1%) provided one description. Of those who provided one or two descriptions, 144 (84.2%) linked the first description directly to the habit they intended to change. Of those who provided two descriptions, 122 (71.3%) linked the second description (see Table 3). A chi-square test revealed that there was no statistical difference between the IG and DIG posttest scores for any part of the behavioral intention question ($p > .05$).

Overall Health Topics Reported by Participants

Health topics mentioned by participants in both the IG and DIG included: drugs and alcohol, tobacco, exercise, nutrition, SSBs/sugar consumption, sunscreen, screen time, and other. Topics included in the other category were sleep, environmental factors such as air pollution, and weight. The top three health topics mentioned for both groups were exercise, nutrition, and SSBs/sugar consumption. Exercise was the most frequently identified by participants in the IG (N = 205, 81.3%). The participants in the DIG most frequently identified nutrition (N = 137, 77.0%). Nutrition was the second-most common health topic mentioned by the IG participants (N = 201, 79.8%). Exercise was the second-most common health topic mentioned by the DIG participants (N = 136, 76.4%).

SSBs/sugar consumption was the third-most frequently mentioned health topic for both

the IG (N = 164, 65.1%) and the DIG (N = 103, 57.9%) participants (see Table 4).

CHAPTER 5: DISCUSSION AND CONCLUSION

HHHU is a school-based cancer prevention program focusing on eighth-grade students that offers a unique approach by highlighting the relationships among nutrition, physical activity, SSBs, and cancer risks through a variety of educational materials. The purpose of this study was to evaluate HHHU's efficacy in improving eighth-grade students' knowledge about cancer, how their health habits can influence the risk of developing cancer, and behavioral intention. All eligible participants were eighth-grade students enrolled in Health class during the Fall 2015 semester in the BSD. A quasi-experimental non-equivalent control group design was used to evaluate the program. Pretest/posttest surveys were administered to eighth-grade students in the IG and DIG to measure change in student knowledge. It was hypothesized that HHHU would increase students' knowledge about: 1) cancer; 2) the relationship between proper nutrition and cancer; 3) the relationship between physical activity and cancer; and 4) the relationship between the consumption of SSBs and cancer. Additionally, it was hypothesized that HHHU would increase students' ability to identify positive behavioral intentions to reduce the risk of cancer.

Analysis of Findings

Pretest scores were similar (i.e., not statistically significantly different) between participants in the IG and participants in the DIG on all items, suggesting that any statistically significant posttest differences could be associated with participation in HHHU's education program. There were a number of such differences found, and in

each case, participants in the IG had more favorable posttest scores than participants in the DIG. For example, there was a statistically significant difference between the IG and DIG participants on survey items related to the definitions of cancer and mutation, as seen by participants in the IG having higher posttest knowledge scores than DIG participants. When comparing posttest knowledge scores between IG participants and DIG participants, there was a statistically significant differences between the groups on the survey items related to nutrition; these differences showed that IG participants more often correctly recognized that eating fast food/processed food increases the risk of cancer, and that eating fruits and vegetables decreases the risk of developing cancer. There were also statistically significant posttest differences between participants in the IG and DIG on survey items related to physical activity; these differences showed that IG participants more often correctly identified that sedentary behaviors increase the risk of developing cancer, and that physical activity decreases the risk of developing cancer. Additionally, there was a statistically significant difference between participants in the IG and DIG on survey items related to the consumption of SSBs and the increased risk of cancer, as seen by participants in the IG having higher knowledge scores than DIG participants. Participants in the IG also had statistically significantly higher knowledge scores about health habits that reduce the risk of developing cancer than participants in the DIG. Finally, there was a statistically significant difference between the percentages correct of unhealthy habits linked with healthy replacement habits identified by participants in the IG than participants in the DIG.

Although there were many statistically significant posttest differences between IG and DIG participants, such differences were not found on all items. For example, there

were not statistically significant differences between the participants in the IG and

participants in the DIG when comparing posttest knowledge scores related to general

cancer; participants in both conditions were equally likely to correctly identify that

human bodies destroy cancer cells, the side effects of chemotherapy, and whether or not

chemotherapy only targets cancer cells. There also was no statistically significant

difference between participants in the IG and the DIG when comparing posttest

knowledge scores about the health benefits of exercise. Finally, there was not a

statistically significant difference between the IG and DIG participants when comparing

posttest scores regarding the ability to identify positive behavioral intentions to reduce

cancer risks.

In most respects, HHHU appeared successful in improving students' knowledge

about cancer risks, specifically related to health habits that increase or decrease the risk

of developing cancer. HHHU improved students' knowledge about the relationships

between: 1) proper nutrition and cancer risks; 2) physical activity and cancer risks; and 3)

the consumption of SSBs and cancer risks. However, HHHU did not improve students'

knowledge in several areas. This could be due to the very conservative alpha levels set to

control for family-wise error. Posttest scores on the items regarding the side effects of

chemotherapy, and whether or not human bodies destroy cancer cells, would have been

statistically significant at the standard .05 alpha level. Behavioral intentions did not seem

affected by the intervention. Although unfortunate, this is consistent with some literature

on the lack of consistency between knowledge and behavior. For example, Prelip et al.

(2013) reported that improved knowledge and attitudes do not necessarily lead to

behavioral change, and this may be particularly true for ingrained health behaviors such as food consumption and exercise.

HHHU was similar to other programs discussed in the literature review in that it was a class-based intervention designed to improve students' knowledge about cancer. Similar to cancer prevention programs such as BSAC and "Cancer, Educate to Prevent," the HHHU lessons focused on factors that contribute to the risk of developing cancer including poor nutrition and physical inactivity (Barros et al., 2014; Stölzel et al., 2014). Like these other programs, HHHU was successful in increasing students' knowledge across multiple domains.

HHHU was a collaborative effort among Boise State University, St. Luke's MSTI, and the BSD, which has created a community partnership to help reduce the risk of cancer in Idaho. Through effective collaboration, health educators developed the HHHU lesson plans, which were provided to the BSD Health teachers, along with other materials necessary for implementation. This level of preparations is dissimilar from "Cancer, Educate to Prevent," which required teachers to develop and implement their own cancer prevention education program (Barros et al., 2014). Additionally, HHHU is a two-day program that is easily incorporated into Health teachers' class schedules. Some school-based cancer prevention programs such as BSAC last up to a week in duration, requiring a substantially greater resource commitment on the part of teachers and schools (Stölzel et al., 2014). HHHU was similar to other school-based cancer prevention programs in the type of information included in the curriculum and modes of delivery to engage all learners. However, it differed by providing the opportunity for students to view actual human tissue samples. HHHU also utilized health educators to present the

Day 2 lesson, and thus provided internship opportunities for college students studying health education. HHHU strengthened community partnerships to meet the needs of the community and the organizations that are involved. Because HHHU is a relatively low-investment alternative to some other cancer prevention education programs, it seems valuable and effective for the use by health educators and school districts.

Limitations

This study was conducted in a single urban school district, and therefore the results may not be generalizable to other school districts—particularly rural ones. It is suggested that future research on the efficacy of the program should be conducted in rural school districts throughout Idaho. Additionally, the generalizability of the results may be impacted somewhat because randomization did not occur at the individual (i.e., student) level. Using a 'true' experimental design would have been ideal to evaluate the HHHU program; however, it is highly unlikely this type of study design could have been used (as individual randomization is often not feasible in studies of this type).

To promote standardization of program delivery, checklists containing the components of each lesson were included in the lesson plans and trainings were conducted in an effort to ensure program fidelity. Unfortunately, due of time constraints, occasional use of substitute teachers, and teachers excluding parts of the program for whatever reasons, the fidelity may have been compromised. In future studies, researchers should hold additional trainings or meet individually with all teachers and teaching assistants to ensure correct program implementation. It is suggested that researchers require all teachers and teaching assistants to complete the checklists for each class period.

Another limitation to this study included the lack of a follow-up component to assess whether or not program participation led to the retention of critical information. Such a follow-up assessment would be valuable in future studies. One way to assess retention without much resource investment would be to add several HHHU-related questions to the final course exam. Follow-up assessments at perhaps three and six months would be ideal, if at all feasible.

Conclusion

Cancer has been the leading cause of death in Idaho since 2008 for both men and women (CCAI, 2014). Lifestyle choices influence the risk of developing cancer, and approximately one-third of cancer deaths in the United States are a result of poor nutrition and sedentary behaviors (ACS, 2015). However, approximately 50% of the most common cancers could be prevented by reducing negative health habits and by adopting positive ones (American Institute of Cancer Research, 2015). Primary prevention efforts focus on education about risk factors and promote healthy behaviors to avoid the onset of disease (The Association of Faculties of Medicine of Canada, 2015). Students spend a substantial portion of their young lives in school, which provides educators the opportunity to teach their students the knowledge and skills needed to maintain positive health behaviors (CDC, 2015). HHHU is an example of and effective partnership among a hospital, university, and school district. HHHU was adopted by the school district to be a part of the Health curriculum and offers a unique experience to "see inside" of the human body. This study, although it has some limitations, provides promising evidence that HHHU is an effective, low-investment intervention that may help reduce negative

health habits and increase positive health habits in participating students, likely reducing

their future risk of developing cancer.

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TABLES

Table 1

Frequency and Percentage of Participants that Correctly Identified a Negative Health Habit and a Linked Replacement Habit on the Posttest

	Intervention Group n= 253		Delayed Intervention Group n = 186	
	Posttest		Posttest	
Health Topic	Frequency	%	Frequency	%
Drugs and Alcohol	4	1.6	1	0.6
Tobacco	7	2.8	5	2.8
Exercise	191	75.8	127	71.3
Nutrition	190	75.4	124	69.7
SSB/Sugar	144	57.1	79	44.4
Sunscreen	47	18.7	19	10.7
Screen Time	49	19.4	27	15.2
Other	29	11.5	13	7.3

Table 2

The Frequency of Percentages that Participants in the Intervention Group and Delayed Intervention Group Scored when Identifying Three Unhealthy Habits with a Linked Replacement Habit

	Percent Correct				
Group	0.0	33.0	67.0	100.0	Total
Intervention Group	3	6	28	215	252
Delayed Intervention Group	6	20	35	117	178

Note. $\chi^2 = 26.3$, df $= 3$, $p < 0.001$

Table 3

Frequency and Percentage of Participants in the Intervention Group and Delayed Intervention Group that Correctly Identified a Negative Health Habit with a Linked Replacement Habit and One or Two Descriptions of How to Make the Behavior Change Including Whether or Not the Descriptions are Linked to the Identified Habit.

	Intervention Group n= 253		Delayed Intervention Group n = 186	
	Posttest		Posttest	
	Frequency	%	Frequency	%
Unhealthy Habit	238	95.2	158	91.3
Healthy Habit	241	96.4	160	92.5
Two Descriptions	203	81.2	133	77.8
One Description	44	17.6	28	15.1
Incorrect Description	3	1.2	10	5.8
Linked 1	222	88.8	144	84.2
Linked 2	171	72.8	122	71.3

Table 4

Frequency and Percentage of Health Topics Identified by Participants in the Intervention Group and Delayed Intervention Group

	Intervention Group n = 253		Delayed Intervention Group n = 186	
	Posttest		Posttest	
Health Topic	Frequency	%	Frequency	%
Drugs and Alcohol	6	2.4	2	1.1
Tobacco	11	4.4	5	2.8
Exercise	205	81.3	136	76.4
Nutrition	201	79.8	137	77.0
SSB/Sugar	164	65.1	103	57.9
Sunscreen	49	19.4	20	11.2
Screen Time	157	62.3	103	57.9
Other	34	13.5	14	7.9

APPENDIX A

Healthy Habits, Healthy U Logic Model

Healthy Habits, Heathy U Logic Model

Situation/ Priorities	Inputs	Outputs		Outcomes	
		Activities	Participants	Short	Long
High rates of cancer in Idaho High rates of obesity in Idaho Cancer prevention is needed Minimal cancer education in the Boise schools **Process Evaluation Priorities** Fidelity **Program Priorities** Health Behaviors • Nutrition • PA • SSBs Knowledge about cancer and cancer prevention Behavioral Intention	Boise State University • Dr. Spear • Dr. McDonald • Dr. Pritchard Mountains States Tumor Institute • Dr. Zuckerman • Vicky Jekich • Pathology Boise School District • Chris Taylor Teachers Teaching Assistants Time Organs **Development** Lesson Plans Worksheets Parent Handouts	Scheduling Training **Day 1** Cancer Video Class Discussion Articles Posters Report out Checklist **Day 2** Class discussion/recap Demonstrations Interactive Activity/ worksheets Summary/ Behavioral Intention worksheet Checklist	Students 8th graders Teachers Parents	Learning Increase Knowledge • SSB • Nutrition • Physical Activity Increase Cancer awareness Change in attitude Behavioral Intention • Increase PA • Eat nutritiously • Decrease SSBs • Other healthy behaviors	Improve health behaviors Decrease trends in cancer rates Increase PA Increase sports enrollment Long term program – 4th, 8th, 10th grades Cancer Prevention on YRES

Assumptions: School/teachers/students buy into the need for evaluation of the program. There is a need for cancer education and prevention.

External Factors: Students may have learned about cancer in health class by the time the HHHU program in delivered. Those with family members or friends who have cancer may have knowledge of cancer unrelated to the program.

APPENDIX B

Healthy Habits, Healthy U Lesson Plan Day One Eighth Grade

Healthy Habits, Healthy U Lesson Plan Day One Eighth Grade

NOTE:

✓ *Day 1 Lesson plan is taught by classroom teacher and provides background about cancer prevention through good nutrition and physical activity.*
✓ *Day 2 Lesson Plan is taught by BSU/St. Luke's MSTI presenters and provides an interactive, hands-on approach to reinforce the lessons learned on Day 1.*

Background for Presenter

The World Cancer Research Fund estimates that about one-quarter to one-third of the new cancer cases expected to occur in the US in 2013 will be related to overweight or obesity, physical inactivity, and poor nutrition, and thus could also be prevented." (Cancer.org, 2013) Since 2008, cancer has been the leading cause of death in Idaho. (ccaidaho.org)

Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells. If the spread is not controlled, it can result in death. Cancer may be caused by both external factors (tobacco, infectious organisms, chemicals, and radiation) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism). These causal factors may act together or in sequence to initiate or promote the development of cancer. Ten or more years often pass between exposure to external factors and detectable cancer. Cancer may be treated with any of the following: surgery, radiation, chemotherapy, hormone therapy, biological therapy, and targeted therapy.

The **Day 1 Lesson Plan** covers information about cancer risks and prevention, especially through healthy eating habits and physical activity. Included in today's lesson is a brief video that provides students with an overview to understand the importance of nutrition and physical activity. The **Day 2 Lesson Plan** reviews information shared on Day 1 and includes a hands-on activity relating to organ identification and the relationship to organ and digestive health with healthy foods, beverages and physical activity.

We can't get cancer from someone who has the disease. One big way to keep us healthy and prevent cancer is to never use tobacco in any form (cigarettes, cigars, chew or pipes) and always use sunscreen. Using sunscreen protects our skin and being tobacco free helps protect our lungs. The good news is regular physical activity and consuming healthy food and beverages reduces our chances of developing some kinds of cancer. Our bodies need water and good food like fruits, vegetables, whole grains and lean meats combined with daily physical activity to help us build strong defenses against cancer.

8th Grade Lesson Plan Day 1 Checklist		
Check Here		
Y	**N**	Provide the students with a brief introduction for HHHU
		Show the cancer video
		Divide students into groups (approx. 4 per group)
		Have the students read 1 of the 5 articles
		Have students create a poster based on information in the article they read
		Document report option utilized (Option A or B) _____
		Provide recap of information and introduction to Day 2 Lesson Plan.

Outline for *Healthy Habits, Healthy U* Lesson Plan
(Lesson to be taught by classroom teacher the day before HHHU presenters work with the 8th grade Health classes)

LESSON PLAN - Day 1 - 8th Grade

***Essential Question: What is cancer?**

Background Knowledge & Objective: Students will complete a 2 min. quick write answering this question and several students will be called on to share their responses.

TIME & COMPONENT	*TALKING POINTS , STEPS/ACTIVITIES*	INTERACTION/ GROUPING AND MATERIALS NEEDED
minutes **Intro** Teacher states objective :	*Today we will be able to answer the essential questions by reading and discussing and presenting key information from several articles about cancer.* *Tomorrow we will examine real organs with the help of special presenters from BSU or St. Luke's MSTI so that we can learn more about our organs and how our lifestyle choices and cancer affects them.*	Whole group
1 minute **Teacher explains**	*This is one of those topics that we know does just that—as some of our students have/had cancer. And, some of our loved ones have had it, too.* *Please be mindful of this as we learn about this topic today and tomorrow and if anyone needs to talk with the teacher or counselor about their feelings around this disease, we are here for you.*	Whole group
15 minutes **Learning Activity**	**Teacher will play the video:** http://www.upworthy.com/everything-youve-always-wanted-to-about-cancer-but-your-doctor-was-too-busy-to-tell-you?c=upw1 *Now that you have this background about cancer, we have an activity planned. First, the class will be divided into groups (four* students per group) to apply critical reading strategies to an assigned article relating to one of the following four topics:* • *What is Cancer?* • *What are the basic treatment options?* • *What are some causes related to cancer and what are carcinogens?* • *What lifestyle choices can decrease a person' risk of developing cancer?* *After that, each group will present a poster with the important facts from their assigned article. The groups will do a silent gallery walk of the other posters writing down two facts from each poster.*	Whole Group View video Small Group activity Assigned articles: Titles: 1. How and Why do carcinogens cause cancer? 2. Teens poor breakfast choices predict health problems later 3. Cancer Basics 4. Diet related illnesses 5. When being overweight is a problem 6. Study says sugar can be deadly (recent Idaho statesman article)
20	**Reporting option A:** Each group will present a poster with the important	Small Group

minutes **Evidence of learning/ Closure**	facts from their assigned article. The groups will do a silent gallery walk of the other posters writing down two facts from each poster. **Closure Option A:** To close the lesson, each student will turn in an index card with their two facts from each poster. **OR** **Reporting Option B:** Each group will post 2-3 important facts under the appropriate heading on a poster/chart paper that will be reviewed as a closure to the class **Closure Option B:** Each group will have a reporter that will read the 2 to 3 key facts from their groups segment to the class. These large poster/charts can be left up for the start of the day 2 class. (Note: teacher can modify groupings and add related topics to accommodate various class sizes.)	poster presentation with important facts; silent walk, w/2 facts gathered on index card from each poster OR Small group read posts 2 to 3 key facts on a poster/ chart paper; Reporter reads 2 to 3 key facts from their group's segment
End	(Index cards and/or posters are collected or displayed for Day 2 Lesson.) *Great job, everyone! That's the end of the Healthy Habits, Healthy U lesson for Day 1.* *Tomorrow, for our Day 2 lesson, you'll be learning more from some guest speakers.* *They'll be sharing great information about healthy lifestyles and they have a very interesting activity planned to show you how the choices you make today – such as the foods and beverages you consume, and the physical activities you do -- can affect your body, including your organs!*	Whole group **Index card/poster displayed or collected**

APPENDIX C

Healthy Habits, Healthy U Lesson Plan Day Two Eighth Grade

Healthy Habits, Healthy U Lesson Plan Day Two Eighth Grade

8th grade Lesson Plan Day 2 Checklist		
Check Here		
Y	**N**	Passed out handouts, worksheets, parent handout
		Was the agenda written on the board for the class?
		Recap of the information covered from day 1
		Divided class into small groups to discuss cancer, the potential risk factors of developing cancer and what was learned from day 1 video
		Introduction of the organs, along with a discussion of the function of each organ
		Photos of organs were used
		Distribute organs to the groups,
		Students complete front of worksheet
		Talk about how to reduce the risk of cancer (health habits)
		Students complete back of worksheet
		Pass out survey to the students after closing discussion

Time & Component	Talking Points/Activities	INTERACTION / GROUPINGS AND MATERIALS NEEDED
1 minute **Intro**	***Divide into groups before class starts.** *Place handouts on the desks in advance, the worksheet, the parent handout and scratch paper.* To help keep presentation on time, on the board write out what the agenda is for the class period. What is cancer? Causes? Organs – Colon, Liver, Kidney and Lung (fun fact) Detailed observation Color, Texture, Function, size Summary, Current Health Behaviors, Future Health Behaviors *Hello my name is _____ we're here representing St. Luke's Mountain States Tumor Institute and Boise State University.* **Have the TA's and other introduce themselves *Yesterday, your teacher introduced you to the Healthy Habits, Healthy U program. Today we are presenting Day 2 of the Lesson Plan.* *We're excited to share ways that you can be healthy and help reduce your risk for diseases, such as cancer. We will discuss more about eating healthy foods, being physically active, and drinking non SSBs because these are three of the ways we can help the cells in our bodies work properly so we can be healthy.*	Whole group
1 minute **Recap**	*Yesterday you discussed nutrition and physical activity, and saw a video about cancer—you learned about what it is and how to reduce your risk of getting it.* *We want to reiterate that we recognize you may know someone, friend or family that have or had cancer and if you need to talk with someone about this please speak with your teacher.*	Whole group

4 minutes **Small groups share answers**	*Our first activity is to answer the question,* W**hat is cancer and what causes cancer?**" **What are three items you learned from yesterday's articles, video, and class discussion?** Remind them of the video they saw and the brief discussions about cancer. *Please brainstorm ideas and answers with your group members and after a few minutes we will go around and share each group's answers with the class.* **<u>Bring whole group back together.</u>** *<u>Short</u> class discussion of what they learned from Day 1.* **Very good answers! So, cancer occurs when our cells start to make mistakes or mutate and it's when these cells start to grow rapidly that tumors form. We can reduce our risk for many diseases such as cancer by living healthier lives through eating healthy, reducing the intake of SSBs, and being physically active.**	Small group
20-23 minutes **Introducin g Organs Hands-On activity**	*Many of you may have heard about how unhealthy eating and lack of physical activity can affect your heart, right? But did you also know that these bad habits can also affect other organs in your body?* *The digestive system is made up of different parts of your body including some organs such as the colon, liver, and kidneys. Digestion is the process of breaking food down into basic nutrients. This allows your body to get the nutrients and energy it needs from the food you eat.* *Please get out your worksheets, and we will fill in the first and second columns together. Does anyone know the function of either the colon, liver, or kidney?* (Discuss the function of each organ before handing out the organs for observation.) Speaker notes on organs, if needed: • <u>Large Intestines/Colon</u>: Removes some water, salt, and some nutrients as is forms stool. This is a long organ that moves food that was undigested and help us get this "solid waste" (poop) out of our body. • <u>Kidney</u>: Your kidneys are bean-shaped organs, each about the size	Small group Whiteboard or similar -Sets of organs, attached to clipboards -Set of organ photos, enlarged - Organ Identification Handout Worksheet to record observations

of your fist. They are located near the middle of your back, just below the rib cage, one kidney on each side. The kidneys are like "trash collectors" and help filter our waste from the blood. Your body gets rid of this "fluid waste" (pee) when you go to the bathroom.

- Liver: This organ is located up under your ribcage. The job of your liver is to filter your blood from the digestive tract plays an important part in digestion. It detoxifies chemicals. The liver processes nutrients into forms that the rest of the body can use. The liver produces bile, which aids in the digestion of fat.

- Lungs: The lungs are protected by the ribcage. The job of the lungs is to move fresh air into the body and to remove unwanted gases from the body. The lungs move the oxygen from the air into the blood stream. The blood carries the oxygen to the cells in our bodies. The blood stream carries the waste gas, or carbon dioxide back to the lung, which we exhale.

Knowing the functions of these organs, why are they prone to cancer?

Yesterday we talked about how eating good foods like whole fruits and vegetables, drinking water, and being physically active helps our bodies stay strong to fight against cancer. Today we are going to look at different organs both healthy and ones that show signs of the disease.

Now we are going to look at different organs, the colon, liver, and kidney! I do want you to know that these organs came from people who donated their organs so people like you can learn how to keep your bodies strong and healthy against disease such as cancer. All organs are specially sealed but as a precaution please do not take them out of the bags. You make touch them, but please don't poke them with your pencil or other sharp objects. We want to respect the organs. If you choose not to look at the organs there are pictures of the organs that you can look at to write you descriptions of what you see.

Explain process of viewing the organs.

In your groups we want you to look at each organ and answer a few questions that we have outlined on the sheet.

(Hold up worksheet for clarification)

We want you to name the organ, decide which one is non-cancerous and which one is cancerous, and finally describe the differences you see between the organs, including color, texture, size, and change in function.

As you go through this activity think about the functions of the organ and why might these organs be prone to cancer.

Please use this as a time to work with your small groups.

Distribute organs to the groups

Observation Record Sheet Questions:

1. *Which organ looks healthy and which one looks cancerous?*
   Did you know that the cells right here (cancerous area) are not doing their job that you mentioned above or they are not working properly.

   What part looks unhealthy? Why?
2. *Discuss the job of the organ and how it helps the digestive process. Discuss how health choice may positively or negatively influence each organ.*

Did all of you enjoy looking at the organs? I'd like to start with the first organ. Would someone like to tell me what this organ was and what its function is in the body?

Post Lab Discussion:
(Student answers)
- *Whole group discussion of observations-recorded for each organ (*Hold up pictures of organs as the observations are discussed)
- *Discuss the function and how the cancer impairs the organ from functioning properly.*
- *Discuss the relationship between nutrition, physical activity and the increased risk for cancer.*

(Ask leading questions if you need to, so the two days of information come full circle.)

7-10 minutes **Reducing the Risk Discussion**	*Let's continue:* - *What health practices can help reduce the risk of developing cancer?* (e.g. avoid carcinogens, consume healthy food & beverages, daily physical activity; also refer to Day 1 posters) - *Two habits you could continue to do or begin to reduce your risk* (e.g. walk/ride bike, drink water instead of soda, have an apple or banana instead of a cookie) - *What foods, drinks, and activities can you substitute? E.g. fruit or carrots for a bag of chips, 30 minutes of walking for 30 minutes of TV, or replace on soda with water.* *Great suggestions! Let's recap what we've learned today.*	Whole group Page 2 (back) of Organ ID handout
3 minute **End Lesson**	*The choices we make now and the actions we take now can reduce our chance of developing diseases like cancer in the future. Eating healthy food and being physically active helps our bodies to stay strong and to keep our cells healthy.* *We have a handout for you to take home to your family. It has information and websites that will provide you more information about healthy habits and related diseases. There is also a map on the back to guide you and your family to becoming healthy.* *To help support you as you continue your personal journey to healthy Habits for a Healthy U, we have a special gift for you! This is a collapsible water bottle –you can use it to keep your body refreshed and hydrated with water, rather than unhealthy sugary drinks.* *Thank you for participating in our Healthy Habits, Healthy U program. We all want each and every one of you to live healthy lives.* **Pass out post survey to each student.** *Please take this short survey. After it's completed please raise your hand and we will come around to pick them up and give you a water bottle to stay on the healthy path, at home and at school!* **Thank you again from the Healthy Habits, Healthy U team!**	Pass out survey and collect when distributing "giveaway item." Provide the "giveaway item" to students.

Healthy Habits, Healthy U 8th Grade Worksheet

Student Name _____   Teacher Name_____   Period_____

Write down the name of the organ in the column 1 and its function in column 2.
View the pair of organs and decide which organ looks non-cancerous or cancerous. Write the correct organ number in column 3 or 4.
Describe the differences (e.g. color, texture, size, and changes in function) you see between the non-cancerous and cancerous organs.

#1 Organ Name	#2 Organ Function	#3 Non-Cancerous Description	#4 Cancerous Description
		Organ #_____	Organ #_____
		Organ #_____	Organ #_____
		Organ #_____	Organ #_____
		Organ #_____	Organ #_____

APPENDIX D

Healthy Habits, Healthy U Pretest

Healthy Habits, Healthy U Pretest

Term: School: Period: Teacher: Name:

Answer the following questions. Circle your answers. Either circle your level of agreement with the statement or answer the multiple choice and T/F questions.

1. Cancer is a disease caused by rapid abnormal cell growth:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

2. Our bodies usually destroy mutated cells:

        A. True

        B. False

3. Physical activity <u>decreases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

4. What are the side effects of chemotherapy?

        A. Hair loss

        B. Nausea/vomiting

        C. Skin rashes

        D. Fatigued/tired a lot

        E. All of the above

5. Eating fast food/processed food <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

6. When a cell's set of instructions or DNA makes a "typo" it is called a:

      A. Transformation

      B. Alteration

      C. Change

      D. Mutation

      E. None of the above

7. Chemotherapy only targets cancer cells:

      A. True

      B. False

8. Eating fruits and vegetables <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

9. Drinking sugar-sweetened beverages <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

10. Sedentary behaviors (e.g., watching TV/computer, sitting too much) <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

11. Which of the following habits can <u>reduce</u> your cancer risk? (**<u>Circle all that apply</u>**)

      A. Don't smoke/vape

      B. Watch at least three hours of TV per day

      C. Eat red meat every day

      D. Eat fruits and vegetables

      E. Maintain a healthy weight

      F. Engage in at least 60 minutes of physical activity per day

      G. Drink soda

      H. Protect your skin from the sun

      I. Drink alcohol

      J. Avoid secondhand smoke

12. Exercise improves health in all ways EXCEPT:

      A. Controls weight

      B. Maintains strong bones

      C. Decreases risk of heart disease

      D. Increases risk of cancer

13. The consumption of two or more sodas in a week is linked to cancer.

      A. True

      B. False

APPENDIX E

Healthy Habits, Healthy U Posttest

Healthy Habits, Healthy U Posttest

Term: School: Period: Teacher: Name:

Answer the following questions. Circle or write your answers. Either circle your level of agreement with the statement or answer the multiple choice and T/F questions.

1. Cancer is a disease caused by rapid abnormal cell growth:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

2. Our bodies usually destroy mutated cells:

     A. True

     B. False

3. Physical activity <u>decreases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

4. What are the side effects of chemotherapy?

     A. Hair loss

     B. Nausea/vomiting

     C. Skin rashes

     D. Fatigued/tired a lot

     E. All of the above

5. Eating fast food/processed food <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

6. When a cell's set of instructions or DNA makes a "typo" it is called a:

      A. Transformation

      B. Alteration

      C. Change

      D. Mutation

      E. None of the above

7. Chemotherapy only targets cancer cells:

      A. True

      B. False

8. Eating fruits and vegetables <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

9. Drinking sugar-sweetened beverages <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

10. Sedentary behaviors (e.g., watching TV/computer, sitting too much) <u>increases</u> my risk of developing cancer:

Strongly disagree   Disagree   Neutral   Agree   Strongly Agree   I don't know

11. Which of the following habits can <u>reduce</u> your cancer risk? (**Circle all that apply**)

      A. Don't smoke/vape

      B. Watch at least three hours of TV per day

      C. Eat red meat every day

      D. Eat fruits and vegetables

      E. Maintain a healthy weight

      F. Engage in at least 60 minutes of physical activity per day

      G. Drink soda/sugar-sweetened beverages

      H. Protect your skin from the sun

      I. Drink alcohol

      J. Avoid secondhand smoke

12. Exercise improves health in all ways EXCEPT:

      A. Controls weight

      B. Maintains strong bones

      C. Decreases risk of heart disease

      D. Increases risk of cancer

13. The consumption of two or more sodas in a week is linked to cancer.

      A. True

      B. False

Many of us have unhealthy habits that increase our risk for cancer. The good news is we can change those habits and reduce our risks. Think about your current health habits and **fill in the table below.**

Your Health Habits	
Your unhealthy habits	**Healthy replacement habit**
A.	
B.	
C.	

Improving our health habits. Answer the questions below.

From the table above, select one **unhealthy** habit you plan to change in the next 30 days and name the **healthy** replacement habit you want to achieve:

Unhealthy Habit

_____

Healthy Replacement Habit:

_____

Clearly describe 2 ways you will achieve your healthy replacement habit in the next 30 days:
1._____
_____
2._____
_____

APPENDIX F

Healthy Habits, Healthy U Institutional Review Board Approval

Healthy Habits, Healthy U Institutional Review Board Approval

BOISE STATE UNIVERSITY
RESEARCH AND ECONOMIC DEVELOPMENT

Date: September 02, 2015

To: Alicia Anderson   cc: Caile Spear

From: Social & Behavioral Insitutional Review Board (SB-IRB)
          c/o Office of Research Compliance (ORC)

Subject: SB-IRB Notification of Approval - Original - 193-SB15-143
          Healthy Habits, Healthy U Short-Term Outcome Evaluation

The Boise State University IRB has approved your protocol submission. Your protocol is in compliance with this institution's Federal Wide Assurance (#0000097) and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46).

Protocol Number:	193-SB15-143	Received:	8/10/2015	Review:	Expedited
Expires:	9/1/2016	Approved:	9/2/2015	Category:	7

Your approved protocol is effective until 9/1/2016. To remain open, your protocol must be renewed on an annual basis and cannot be renewed beyond 9/1/2018. For the activities to continue beyond 9/1/2018, a new protocol application must be submitted.

ORC will notify you of the protocol's upcoming expiration roughly 30 days prior to 9/1/2016. You, as the PI, have the primary responsibility to ensure any forms are submitted in a timely manner for the approved activities to continue. If the protocol is not renewed before 9/1/2016, the protocol will be closed. If you wish to continue the activities after the protocol is closed, you must submit a new protocol application for SB-IRB review and approval.

You must notify the SB-IRB of any additions or changes to your approved protocol using a Modification Form. The SB-IRB must review and approve the modifications before they can begin. When your activities are complete or discontinued, please submit a Final Report. An executive summary or other documents with the results of the research may be included.

All forms are available on the ORC website at http://goo.gl/D2FYTV

Please direct any questions or concerns to ORC at 426-5401 or humansubjects@boisestate.edu.

Thank you and good luck with your research.

Mary E. Pritchard

Dr. Mary Pritchard
Chair
Boise State University Social & Behavioral Insitutional Review Board

1910 University Drive Boise, Idaho 83725-1139
Phone (208) 426-5401   orc@boisestate.edu
This letter is an electronic communication from Boise State University

APPENDIX G

Healthy Habits, Healthy U Informed Consent Document

Healthy Habits, Healthy U Informed Consent Document

INFORMED CONSENT

Study Title: Healthy Habits Healthy U Short-Term Outcome Evaluation

Principal Investigator: Alicia Anderson   **Co-Investigator:** Dr. Spear

Collaborators: Boise State University, Mountain States Tumor Institute, Boise School District

This consent form will give you the information you will need to understand why this research is being done and why your student is being invited to participate. It will also describe what you will need to do to have your student participate as well as any known risks, inconveniences, or discomforts that may occur while participating. We encourage you to ask questions at any time. If you decide to have your student participate, you will be asked to sign this form and it will be a record of your agreement to allow your student to participate. You will be given a copy of this form to keep.

➢ **PURPOSE AND BACKGROUND**
Healthy Habits, Healthy U (HHHU) is a school-based cancer prevention program that is implemented in the Boise School District (BSD). The purpose of this research is to examine the short-term outcomes of the HHHU program. To determine the program's effectiveness we need data to show the students' increase in knowledge. All eighth-grade students in the BSD will receive this program as a part of their health class curriculum. By allowing your student to participate in this study, you will be giving the research team permission to use your student's worksheets as research data in order to evaluate the effectiveness of the HHHU program. If you do not give permission for your student's data to be used, they will still participate in the HHHU program and complete all of the worksheets as part of their normal classroom assignments, we will just not use their data to evaluate the success of the HHHU program.

➢ **PROCEDURES**
If you agree to allow your student to be in this study, you are agreeing that we may use the following worksheets presented as part of the HHHU program that all eighth grade students in the Boise School District enrolled in health class experience:
- Students will take a 5-minute pretest to assess knowledge about cancer (as part of curriculum).
- Students will take a 10-minute posttest two weeks later to assess knowledge about cancer (as part of curriculum).

The surveys will be taken two weeks apart. The intervention group will take the pretest, and then two weeks later they will receive the intervention (Healthy Habits, Healthy U program). After the intervention, the intervention group will take the posttest. The control group will take the pretest, and then two weeks later take posttest, without the intervention. After the posttest, the control group will receive the intervention.

➢ **RISKS**

As the program we are evaluating is part of your child's normal health class curriculum, participation in this study should impose no further risks. However, should the student feel discomfort after participating in this study, we advise you to seek counseling services for your student.

➢ **BENEFITS**

There will be no direct benefit to the student for participating in this study. However, the information provided may help show the effectiveness of the program. Providing evidence that HHHU positively impacts its participants will improve funding and ensure the program continues to grow and improve to meet the needs of the community.

➢ **EXTENT OF CONFIDENTIALITY**

Reasonable efforts will be made to keep the personal information in your research record private and confidential. Any identifiable information obtained in connection with this study will remain confidential and will be disclosed only with your permission or as required by law. The members of the research team and the Boise State University Office of Research Compliance (ORC) may access the data. The ORC monitors research studies to protect the rights and welfare of research participants.

Your student's name will not be used in any written reports or publications that result from this research. Data will be kept for three years (per federal regulations) after the study is complete and then destroyed.

➢ **PAYMENT**

Neither you nor your student will be paid for your participation in this study.

➢ **PARTICIPATION IS VOLUNTARY**

Your student does not have to be in this study if you do not want to. They may also refuse to answer any questions they do not want to answer. If your student volunteers to be in this study, they may withdraw from it at any time without consequences of any kind.

➢ **QUESTIONS**

If you have any questions or concerns about your student's participation in this study, you may contact the Principal Investigator, Alicia Anderson: 208-921-9551 or HealthyHabits@boisestate.edu or aliciaanderson@boisestate.edu. You may also contact the Co-Principal Investigator, Dr. Spear: 208-426-3656 or cspear@boisestate.edu.

If you have questions about your rights as a research participant, you may contact the Boise State University Institutional Review Board (IRB), which is concerned with the protection of volunteers in research projects. You may reach the board office between

8:00 AM and 5:00 PM, Monday through Friday, by calling (208) 426-5401 or by writing: Institutional Review Board, Office of Research Compliance, Boise State University, 1910 University Dr., Boise, ID 83725-1138.

DOCUMENTATION OF CONSENT
I have read this form and decided that you may use my child's classroom worksheets as research data in order to evaluate the HHHU program. The general purposes of the research project, the particulars of involvement and possible risks have been explained to my satisfaction. I understand I can withdraw my chid at any time.

_____
Student's Name

Printed Name of Parent/Guardian	**Signature** of Parent/Guardian	Date

Signature of Person Obtaining Consent	Date

APPENDIX H

Healthy Habits, Healthy U Assent Form

Healthy Habits, Healthy U Assent Form

ASSENT FORM

My name is Alicia Anderson and I am a graduate student at Boise State University. I am conducting a research project on the Healthy Habits, Healthy U school-based cancer prevention program. I am doing this study because I am trying to see if Healthy Habits, Healthy U increases your knowledge about cancer. I am asking you to be a part of this study because you are a student in the Boise School District enrolled in health in Fall 2015. This form will tell you a little bit about the study so you can decide if you want to be in the study or not.

All eighth-grade students in the Boise School District will receive the Healthy Habits, Healthy U program. This study will take place in your normal classroom as part of your normal schoolwork. Part of the program requires you to complete pretest and posttest worksheets about your knowledge of cancer. If you want to be in this study, you will be allowing the research team to use your worksheets as data. Some students may not want to answer question about cancer. You do not have to answer any question you do not want to. You can also stop being in this study at any time.

If you choose to participate in the study, some good things may happen. You will help show that Healthy Habits, Healthy U increases the knowledge of the students that receive the program. If the program is shown to be successful, then it may be able to secure funding and staff to continue to grow the program so more students in Idaho can benefit from Healthy Habits, Healthy U.

Please talk about this study with your parents before you decide if you want to be in it. I will also ask your parents to give their permission. Even if your parents say you can be in the study, you can still say that you do not want to. It is okay to say "no" if you do not want to be in the study. No one will be mad at you and it will not affect your grade. If you choose to be in the study, but change your mind later and want to stop, you can.

You can ask me any questions about this study the next time you see me. You can also talk to my advisor Dr. Spear or your mom or dad about this study. After all your questions have been answered, you can decide if you want to be in this study or not. ***If you want to be in this study, please sign.***

If you don't want to, please do not sign.

PRINT your name	Date
SIGN your name	Date

APPENDIX I

Healthy Habits, Healthy U Participant Coding and Grading Rubric

Healthy Habits, Healthy U Participant Coding and Grading Rubric

Coding

Intervention Group (schools Bolded)	1
Delay Intervention Group (schools unBolded)	2

School	Code (S)
East	1
Fairmont	2
Hillside	3
Le Bois	4
North	5
River Glen	6
South	7
West	8

Teacher	Code (T)
No Teacher	0
Chigbrow (East)	1
Hall (Le Bois)	2
Twiss (Hillside)	3
Hickey (West)	4
Newbery (West)	5
Bromley (North)	6
Tipton (Fairmont)	7
Bellan (Riverglen)	8
Rutton-Turner (South)	9

Term	Code (T)
Fall	1

Year	Code (YR)
2015	15

Class	Code (C)
No Class	0
Period 1	1
Period 2	2
Period 3	3
Period 4	4
Period 5	5
Period 6	6
Period 7	7
Period 8	8

Student ID	Code (S#)
Student #1	01
Student #2	02
...	...
Student #X	XX

Fall 2015 Rubric

Correctly matched health habits (Table)

Yes (1) or No (0)	Identified unhealthy habit with	appropriate replacement
D+RH	Drug/Alcohol Use	Limiting, not using, abstaining from
T+RH	Tobacco Use, Around a lot of secondhand smoke	Limiting, not using, abstaining from, stay away from secondhand smoke
E+RH	Sedentary behaviors/ physical inactivity (TV, video games, Netflix, don't exercise)	Exercise, physical activity, sports, walking/running
N+RH	Unhealthy food options (no junk food, processed foods, red meat, etc.)	Healthy food options (F/V, chicken, fiber, fish, whole grains), reduce the neg. habit
S+RH	Sugar Products (candy, SSBs, Energy drinks, sports drinks)	Healthy drinking options (water, milk, juice…) reduce the neg. habit
SC+RH	Don't use sunscreen, too much sun	Use sunscreens, stay inside, hat, long sleeves
O	Other (Pollution, Sleep, overweight et.)	lose weight, get more sleep

Percent correct of negative health behavior and positive replacement behavior. Identifying 3 (100%) 2 (67%) 1 (33%)

Overall topics mentioned (all qualitative data)

Yes (1) or No (0)	Topics
D	Drug/Alcohol Use
T	Tobacco Use
E	Exercise/Sedentary behaviors
N	Nutrition (no junk food, F/V, processed foods, red meat, etc.)
S	Sugar Products (candy, SSBs, etc.)
SC	Sunscreen
ST	Screen Time (Computers, TV, gaming)
O	Other (pollution, sleep, weight)

Behavioral Intention Question

Unhealthy Habit- correctly identified an unhealthy habit **[Yes (1) or No (wrong answer) (0)]**
Healthy Replacement Habit - correctly identified a healthy replacement habit **[Yes (1) or No (wrong answer (0)]**

Score	2	1	0	99
Quantity	2 answers	1 answer	Wrong answer Unrelated	no answer

Doesn't Count	Counts

- Chemicals
- Genetics
 - Be healthy
- if unclear and we don't know what it means it counts as wrong.
	-Daily regular exercise counts as a description
	-Example for description of sunscreen could be, "Use sunscreen so you don't get a sunburn" or "Use sunscreen so you don't get skin cancer".
	-Will never choose to smoke or drink, are examples of avoiding tobacco and alcohol
	- Code 'coffee' as a sugar sweetened beverage, ditto for monster, sugary foods, candy, water, etc.
	- Eat less junk food
	- Mother smokes (second hand smoke)
	 Pollution and other environmental factors (e.g., Hair spray)
	-Sleep
	- Go outside
	Eat something other than [junk food]
	
	    ● Note: AT stands for alcohol and tobacco, and ATOD stands for alcohol tobacco & other drugs.
	    ● SSBs = Sugar-Sweetened Beverages (or water)
	    ● PA = Physical activity
	    ● F/V = fruits or vegetables