# INCREASING HEALTH LITERACY IN ADOLESCENTS

by

Claire Buckingham

A scholarly project submitted in partial fulfillment

of the requirements for the degree

of

Doctor of Nursing Practice

in

Family and Individual

MONTANA STATE UNIVERSITY

Bozeman, Montana

April 2018

©COPYRIGHT

by

Claire Buckingham

2018

All Rights Reserved

# DEDICATION

This DNP project is dedicated to my former UB/MSIP students of Wyoming. Without all of you, I would never have gained a passion for teaching and working with the adolescent age group. Although it has been many years, I have never forgotten your excitement to learn when given the opportunity and encouragement to do so. My thanks to the participants of this project; you took the project seriously, asked great questions and provided excellent feedback. My deep appreciating to Mr. Scott; this project would not have been possible without your willingness to give me time in your classroom with your students. Thank you.

# ACKNOWLEDGEMENTS

I would like to express my gratitude and appreciation to the many people that made this project possible.

Thank you to Ms. McGinnis, Mr. Scott and his students for their interest and participation in this project. Ms. McGinnis took interest in the project and took the time to find a health instructor that was as well. Mr. Scott you gave up class time to let a graduate student survey your students and present about health literacy. I am grateful you allowed me this opportunity and assisted me by getting consent forms out to parents and the pre-test survey completed.

I am very grateful to my committee chair, Jean Shreffler-Grant, PhD, RN. Your support, encouragement, editing, understanding, and patience were vital to the completion of this project. I would like to thank my committee members, Laurie Glover, MN, FNP-BC, Maria Wines, PhD, RN, and Glenna Burg, MS, RN, CNE, for their input, support, and time.

My most heartfelt thanks to my family and friends. Your never-ending support, encouragement, council, and love were vital to me and the success of this project. You all are my foundation, my rocks upon which I continue to strive to do for others what you do for me.

TABLE OF CONTENTS

1. INTRODUCTION ..... 1

Background ..... 1
Purpose of the Project ..... 4
Significance of the Project ..... 4
Nursing Theory ..... 5

2. REVIEW OF THE LITERATURE ..... 8

Health Literacy ..... 8
Measuring Health Literacy and Interventions ..... 12
Health Literacy in Schools ..... 14
Adolescent Health Literacy and the Internet ..... 17
Evaluating Online Health Information ..... 19
Health Literacy Instruments ..... 20

3. METHODS ..... 24

IRB Approval ..... 24
Population ..... 25
Project Design ..... 25
Educational Intervention ..... 26
Data Collection ..... 29
Data Analysis ..... 30

4. RESULTS ..... 32

5. DISCUSSION AND CONCLUSION ..... 38

Discussion of the Results ..... 38
Limitations of the Project ..... 41
Implications for Clinical Practice ..... 42
Relation of the Project to Nursing Theory ..... 44
Recommendations for Future Research ..... 44
Conclusion ..... 45

REFERENCES CITED ..... 47

TABLE OF CONTENTS CONTINUED

APPENDICES .....52

APPENDIX A: Health Literacy Instruments .....53
APPENDIX B: The Newest Vital Sign .....55
APPENDIX C: E-Health Literacy Scale (e-HEALS) .....57
APPENDIX D: School District Letter of Permission .....59
APPENDIX E: IRB Approval Letter .....61
APPENDIX F: Letter of Consent for Parents/Guardians .....63
APPENDIX G: Participant Informed Consent .....66
APPENDIX H: Pre-test Survey .....68
APPENDIX I: Adolescent Health Literacy PowerPoint .....72
APPENDIX J: Presentation Handout .....81
APPENDIX K: Post-test Survey .....83

# ABSTRACT

Nearly half of American adults have difficulty understanding and using health information. Despite numerous efforts to address health literacy, measurable improvements have been limited. Measures and improvements in the health literacy of adolescents are even more inadequate. Adolescents are developing important life skills and health behaviors which makes this an opportune stage in life to intervene and improve health literacy. The purpose of this project was to measure and increase health literacy among adolescents. To achieve this purpose, a sample of 23 adolescents, age 15-16, participated in a pre-test survey to measure health literacy using the Newest Vital Sign and eHEALS, attended an educational intervention, and completed a post-test survey to re-measure health literacy. The educational intervention contained information on where to find health information online and how to evaluate those sources. The pre-test survey scores on the Newest Vital Sign indicate that most of the 23 participants (65%) had adequate health literacy prior to the educational intervention. Following the educational intervention, there was no significant change in the participants' Newest Vital Sign scores while there was a significant improvement in the eHEALS scores. The results indicate that the educational intervention improved participants' perceived skills at using electronic health information. Further research and programs are needed to continue to identify successful methods of improving health literacy in adolescents. Measuring the health literacy of patients allows providers to tailor communication and education to each patient and improve the patients' experience.

# CHAPTER ONE

# INTRODUCTION

## Background

Health literacy is the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions (Patient Protection and Affordable Care Act, 2010). Individuals need adequate health literacy to find information and services; communicate their needs and preferences; respond to information and services; process the meaning and usefulness of information and services; understand the choices, consequences, and context of the information and services; and to decide which information and services match their needs and preferences (Centers for Disease Control and Prevention [CDC], 2016a). Health literacy emerges when the expectations, preferences, and skills of individuals seeking health information and services meet the expectations, preferences, and skills of those providing information and services (Nielsen-Bohlman, Panzer, & Kindig, 2004). In simpler terms, health literacy allows people to find, process, understand, and decide on health information and services.

Health literacy is important because all people need to be able to find, understand, and use health information and services. Nearly half of American adults have difficulty understanding and using health information (Nielsen-Bohlman et al, 2004). Adequate health literacy predicts the use of health promotion and preventative services which can help prevent health problems and protect health (Schumacher et al., 2013). Individuals

with greater health literacy tend to better manage health problems and unexpected health situations that occur (CDC, 2016a). Health literacy extends beyond individuals; it is dependent on the skills, preferences, and expectations of health care providers. Most care providers attempt to educate patients without assessing the patient's health literacy. Many visits to care providers end with distribution of printed health education or brochures, most of which are written at the 10th grade level or higher (Sanders, Federico, Klass, Abrams, & Dreyer. 2009). Health literacy affects communication which in turn affects the ability of the health care system to provide effective, high quality healthcare (Nielsen-Bohlman et al., 2004).

In May 2010, the U.S. Department of Health and Human Services (USDHHS) developed a national action plan to engage organizations, professionals, policymakers, communities, individuals, and families together in an effort to improve health literacy (Baur, 2011; CDC, 2011; USDHHS, 2010). This national action plan contains seven goals to improve health literacy with strategies for achieving them. The seven goals are:

1. Develop and disseminate health and safety information that is accurate, accessible, and actionable
2. Promote changes in the health care system that improve health information, communication, informed decision-making, and access to health services
3. Incorporate accurate, standards-based, and developmentally appropriate health and science information and curricula in child care and education through the university level

4. Support and expand local efforts to provide adult education, English language instruction, and culturally and linguistically appropriate health information services in the community
5. Build partnerships, develop guidance, and change policies
6. Increase basic research and the development, implementation, and evaluation of practices and interventions to improve health literacy
7. Increase the dissemination and use of evidence-based health literacy practices and interventions (USDHHS, 2010, p. 16-17).

To date, measureable improvements in health literacy are very limited despite this national action plan (Berkman et al., 2011; D'Eath, Barry, & Sixsmith, 2012; Winkelman, Caldwell, Bertram, & Davis, 2016). Low health literacy levels are one of the most powerful predictors of poor health outcomes, yet there is very little research focused on assessing and improving health literacy skills in the general population, and even less research specific to adolescents (Subramaniam et al., 2015).

Adolescents are beginning to develop their independence and self-care as they look forward to graduating high school and/or moving out on their own. Individuals in this age group are often just starting to be responsible for their own health care decisions. Adolescence is a formative time when young people are in the process of developing influential health behaviors and habits (Subramaniam et al., 2015). Increased health literacy and an understanding of self-care learned at this age can be used throughout the lifetime and can improve knowledge of how to find, process, understand, and make decisions on health information and services (CDC, 2016a; Perry, 2014; Sansom-Daly et

al., 2016). Subramaniam and colleagues (2015) state that adolescents are at an age where independent searches become more enticing, particularly when their questions pertain to issues that are difficult or awkward to discuss. Adolescence is an excellent time to channel energy and resources toward the development of health literacy, health information seeking, and self-care skills (Subramaniam et al., 2015).

## Purpose of the Project

The purpose of the project was to measure and increase health literacy among adolescents. To achieve this purpose a sample of adolescents participated in a pre-test survey that measured health literacy using the Newest Vital Sign (NVS) (Pfizer, 2017) and E-Health Literacy Scale (eHEALS) (Norman & Skinner, 2006). After the pre-test survey an educational intervention was presented to participants followed by a post-test survey to re-measure health literacy. Improved health literacy can increase this population's knowledge of available health information, ability to find and evaluate health information, cognizance of the type and quality of the care they receive, and skills to support a life of learning and good health (CDC, 2016a).

## Significance of the Project

The need to increase health literacy across the lifespan is clear (Briones, 2015; Kilgour, Matthews, Christian, Shire, 2013; Perry, 2014; Sanders et al., 2009; Sansom-Daly et al., 2016) although the best way to do so has not yet been identified and there are no established practice guidelines to follow. As providers, efforts can be made to assess

the health literacy level of people and adjust communication and education to fit the individual's unique needs. The literature on interventions and methods to improve health literacy among adolescents is very limited. Based on the results of several studies, it is known that adolescents utilize online sources, but are not doing so effectively due to limited capacity to find, understand, and process the information available (Briones, 2015; Ghaddar, Valario, Garcia, & Hansen, 2012; Gray, Klein, Noyce, Sesselber, & Cantrill, 2005). There is much work to be done in the field of health literacy and great potential to dramatically improve the health literacy of adolescents, thus changing the course of health throughout their lifetime.

## Nursing Theory

Orem's Self-Care Deficit Theory was used to guide this scholarly project concerning health literacy and how limited health literacy can contribute to self-care deficits. The term health literacy can almost be used interchangeably with self-care. Orem (2001) defined self-care as "the practice of activities that maturing and mature persons initiate and perform, within time frames, on their own behalf in the interests of maintaining life, healthful functioning, continuing personal development, and well-being" (p. 365). Orem's Self-Care Deficit Theory is a general theory composed of three related theories: Theory of Self-Care, Theory of Self-Care Deficit, and Theory of Nursing Systems (Masters, 2012). Orem's theory of self-care describes why and how people care for themselves and suggests that nursing is required in case of inability to perform self-care as a result of limitations (Masters, 2012, p. 155; Orem, 2001, p. 69-70). Orem's

theory of self-care deficit explains that persons deliberately learn and perform actions to direct their survival, quality of life, and well-being and explains why people can be helped through nursing (Masters, 2012, p. 156; Orem, 2001, p. 70-71). Orem's theory of nursing systems describes relationships that must exist and be maintained for nursing to occur (Masters, 2012, p.156; Orem, 2001, p. 72-73). Orem's theory assumes that people are self-reliant and responsible for their care and the care of others in their family who need care (Petiprin, 2015). To be self-reliant and responsible for one's own care, an individual must also have a certain level of health literacy. It is not enough to want to take care of oneself, an individual must also have the skills and knowledge of how to do so.

Masters (2012) outlined six health-deviation self-care requisites of Orem's theory:

- Seeking and securing appropriate medical assistance
- Being aware of and attending to the effects and results of illness states
- Effectively carrying out medically prescribed treatments
- Being aware of and attending to side effects of treatment
- Modifying self-concept in accepting oneself in a particular state of health
- Learning to live with the effects of illness and medical treatment (p.156; Orem, 2001, p. 134)

In the requisites, Orem (2011) described what an individual needs to be able to do and understand in order to provide one's own self-care. An individual's level of health literacy directly influences these factors. By empowering adolescents to increase their capacity to critically think about their health and allow them to make autonomous informed

decisions, health literacy and ability to perform self-care can be increased (Rathnayake, 2014).

Orem's Self-Care Deficit Theory of Nursing (Orem, 2001) provided a framework for enhancing the health literacy of adolescents. In her theory, Orem described the development of self-care, detailed the aspects of self-care deviation, and identified methods that can be utilized by nurses to help meet the self-care needs of a patient or population. In this way, Orem's theory provided a framework to guide this project.

# CHAPTER TWO

# REVIEW OF THE LITERATURE

This chapter contains a summary of the literature on health literacy, measures of health literacy and interventions, health literacy in schools, adolescent health literacy and the internet, evaluating online health information, and health literacy instruments. Databases used to locate relevant literature included CINAHL, Cochrane Library, ERIC, Dissertations and Thesis Global, Google Scholar, Joanna Briggs Institute EBP Database, PubMed, Psych Info, Sport Diskus, and Web of Science Core Collection. Articles published from 2006-2017 were found using search terms: health literacy, public health, health promotion, health education, adolescen*, young adult, and teen*. A limited number of publications were found on health literacy in adolescents and nothing specific on effective methods to improve health literacy in this population.

## Health Literacy

Health literacy is defined as the degree to which individuals can obtain, process and understand basic health information and services needed to make important health decisions (Sansom-Daly et al, 2016; Patient Protection and Affordable Care Act, 2010). Nutbeam (2000) expanded this definition with his conceptual model of health literacy. Nutbeam (2000) described three core skill components of health literacy: functional literacy, interactive literacy, and critical literacy. He defined functional literacy as basic health literacy skills that are sufficient for individuals to obtain relevant health

information and apply that knowledge to a limited range of prescribed activities. Interactive health literacy is more advanced literacy skills that enable individuals to extract information and derive meaning from different forms of communication; to apply new information to changing circumstances; and to interact with greater confidence with health care professionals (Nutbeam, 2000). He defined critical health literacy as most advanced cognitive skills which, together with social skills, can be applied to critically analyze information, and to use this information to exert greater control over life events and situations. Health literacy can be conceptualized as a risk that can be assessed and managed through adapted communion or as an asset that can be developed through health education and communication (Nutbeam, 2015).

Sanders and colleagues (2009) conducted a systematic review to assess the prevalence of low health literacy among adolescents, young adults, and child caregivers in the United States. A total of 1,267 articles were reviewed by the authors and 215 met their inclusion criteria. They found that at least 1 in 3 young adults had limited health literacy and that most child health information and online health information was written above the tenth-grade level. Adults with low literacy were 1.2-4 times more likely to exhibit negative health behaviors that affected child health, adolescents were at least twice as likely to exhibit aggressive or antisocial behavior, and chronically ill children with caregivers with low literacy were twice as likely to use more health services (Sanders et al., 2009). Adolescents and young adults need adequate health literacy to meet the expectation of understanding increasingly complex health information,

including; making their own health decisions, choosing appropriate over-the counter medications, and enrolling in health care plans (Sanders et al., 2009).

Sansom-Daly and colleagues (2016) conducted a systematic review of health literacy in adolescents and young adults. Their review considered what sources of health information were used; how well adolescents and young adults understood (functional literacy), communicated (interactive literacy), and critically evaluated (critical literacy) health-related information; and if health literacy was associated with health behaviors and outcomes. The authors reviewed 603 articles, 14 met their inclusion criteria, six of which examined chronic illness populations. The authors found adequate health literacy was reported in at least 60% of the participants although few studies explored communicative or critical health literacy. They also found poorer health literacy was associated with some adverse health outcomes such as obesity and smoking (Sansom-Daly et al., 2016).

In 2013, Schumacher and colleagues examined the relationship between health literacy, access to primary care, and reasons for use of the emergency department (ED) among adults presenting for emergency care. The authors conducted structured interviews that included the Rapid Estimate of Adult Literacy in Medicine (REALM) health literacy assessment. They interviewed 492 ED patients at a southern academic medical center. They found after adjusting for sociodemographic and health status, those individuals with limited health literacy reported fewer doctor office visits, greater ED use, and more potentially preventable hospital admissions than individuals with adequate health literacy. Based on the results of this study, the authors suggested that individuals with limited health literacy require clear communication on why primary care is

beneficial and support in navigating health care systems to access timely primary care services (Schumacher et al., 2013).

In 2015, Dharmapuri and colleagues conducted a study to assess the relationship between health literacy levels and medication adherence in adolescents. The authors measured health literacy and medication adherence via the Rapid Estimate of Adult Literacy in Medicine-TEEN (REALM-TEEN) and Adherence to Refills and Medications Scale (ARMS) with a convenience sample of 112 adolescents, age 12-21. While the authors did not find a statistically significant relationship between health literacy and medication adherence, they speculated that poor ARMS scores may have been the result of a lack of understanding of the survey questions rather than having poor medication adherence (Dharmapuri et al., 2015).

Brown, Teufel, and Birch (2006) conducted a study to investigate the effects of aspects of health literacy on the motivation to practice health-enhancing behaviors among early adolescents. Their sample included 1,178 students, age 9-13, visiting 11 health education centers in 7 states. In this study, participants reported that school (49%) and medical personnel (29%) were the sources from which they learned most about health, but when asked where they would go first if they had a health question, 31% reported their parent. Older participants were more likely than younger participants to report they would go to the internet with a health question first. Those participants who reported most of what they heard about health was hard to understand were less likely to be interested in learning about or following what they were taught about health (Brown et al., 2006).

## Measuring Health Literacy and Interventions

Perry (2014) conducted an integrative review of health literacy in adolescents. Her review included studies that involved either the development or validation of health literacy instruments for adolescents or the evaluation of health literacy interventions for adolescents. Ten studies met her inclusion criteria and were further analyzed. Of the health literacy instruments, only the REALM-TEEN showed high validity and reliability in English. Perry found that several articles described health literacy curriculum interventions but none included any evaluation of the programs. Perry (2014) concluded that there was a scarcity of literature regarding health literacy instruments and interventions for adolescents.

Berkman and colleagues (2011) conducted a systematic review of health care service use and health outcomes related to differences in health literacy level and interventions designed to improve outcomes for individuals with low health literacy. Eighty one studies addressing health outcomes and 43 addressing interventions were included in the review. The authors found differences in health literacy were consistently associated with increased hospitalizations, greater emergency care use, poorer ability to demonstrate taking medications appropriately and poorer ability to interpret labels and health messages. Among the included intervention studies, the authors found the strength of evidence low or insufficient because of mixed intervention outcomes or lack of evaluation of outcomes. Priorities in advancing the design of interventions include testing novel approaches to increase motivation, techniques for delivering information orally, interventions such as patient advocates, determining effective components of already-

tested interventions, and determining the effect of policy and practice interventions (Berkman et al., 2011).

D'Eath and colleagues (2012) conducted a rapid evidence review, a less in depth version of a systematic review, of interventions for improving health literacy. The authors sought to identify and synthesize evidence on effective strategies for improving health literacy, highlight gaps in the evidence, and provide recommendations. The authors included five studies, most identifying interventions focused on the functional level of health literacy and work at the level of traditional health education in schools. The authors found little evidence of interventions targeted at the communicative or critical levels of health literacy. The authors concluded that there were considerable gaps in the evidence concerning which interventions were most effective in improving health literacy. Further research was needed to determine strategies for meeting the needs of population groups with low literacy levels, those who were vulnerable, disadvantaged, or hard to reach (D'Eath et al., 2012).

Jacobs, Lou, Ownby and Caballero (2016) conducted a systematic review of electronic health (eHealth) interventions to improve health literacy. Twelve studies met the inclusion criteria of the authors. The studies included interventions that targeted a variety of health risks, lifestyles, and disease management and were all associated with significant positive changes in health outcome and/or health literacy scores. The authors noted interactive media delivered via eHealth interventions and applications provided opportunities for patients to act as engaged users instead of passive receivers of information. It was difficult to ascertain whether accessing eHealth interventions alone

was successful or whether some of the improvements may have been, at least partly, due to the wider variability of sources of information available on the internet (Jacobs et al., 2016).

Subramaniam and colleagues (2015) explored the literature to identify skills thought to comprise health literacy and used this set of skills to design, implement, and revise their HackHealth afterschool program for adolescents. The authors used a variety of data collection methods to assess health literacy including: conducted a pre-/post-program survey, monitored Google search results activity, direct observation, and interviews with 30 adolescent students. The authors found participants often had difficulty identifying relevant sources, determining credibility of sources, and understanding the information found. The authors also found a need to improve self-efficacy, information access, and a wide array of health literacy skills in their study population. Assessing and improving health literacy skills of this population, during the critical adolescent stage of development, can increase motivation and adolescents' belief in their ability to exert control over their own health (Subramaniam et al., 2015).

## Health Literacy in Schools

The National Health Education Standards (NHES) were developed to establish, promote and support health-enhancing behaviors for students in all grade levels (CDC, 2016b). The NHES provide a framework for teachers, administrators, and policy makers in designing or selecting curricula, allocating instructional resources, and assessing student achievement and progress. The NHES aims to improve students' comprehension

of health promotion and disease prevention, enhance their ability to access health services and information, and advocate for community health. The NHES are comprised of eight standards that are assessed at grades 2, 5, 8, and 12.

1. Students will comprehend concepts related to health promotion and disease prevention to enhance health.
2. Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.
3. Students will demonstrate the ability to access valid information, products, and services to enhance health.
4. Students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks.
5. Students will demonstrate the ability to use decision-making skills to enhance health.
6. Students will demonstrate the ability to use goal-setting skills to enhance health.
7. Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.
8. Students will demonstrate the ability to advocate for personal, family, and community health (CDC, 2016b).

The Wyoming Content and Performance Standards in Health Education are based on the premise that health literacy is the key outcome of school health education (Wyoming Department of Education [WDE], 2018). Health literacy is an asset to be

achieved and students must be empowered to apply their knowledge and skills in ways that enable them to exert greater control over their health and health-related decisions. In 2011, Wyoming Content and Performance Standards in Health Education were revised and reduced to four:

1. Students critically examine health-related problems and use systematic processes to make decisions that enhance health and reduce or avoid risk.
2. Students access, analyze and evaluate health information, products and resources.
3. Students demonstrate the ability to use interpersonal communication skills essential for enhancing health and reducing or avoiding health risks.
4. Students use personal and social skills that are associated with taking responsible action for enhancing health and reducing or avoiding health risks (WDE, 2018).

The degree to which these standards are met depends on the student's grade level at the time of assessment. There are benchmarks for meeting these standards and performance level descriptors for grade spans: K-2, 3-4, 5-6, 7-8, and 9-12 (WDE, 2018). Each school district within the state design curricula to meet these benchmarks and must document how the standards are met.

Kilgour and colleagues (2013) conducted a qualitative study to examine the current dissemination of health-related messages in three schools and if it was sufficient to develop health literacy in students. The authors interviewed 34 students, split into 6 focus groups, 3 in each school. They also interviewed 8 school staff members. Based on

information gathered in the interviews, the authors called for students to have access to consistent and accurate public health messages pertinent to their health and well-being as adolescents. The authors describe health literacy being actualized through empowerment and the confidence to make informed decisions in regard to health. The authors found evidence to suggest the need for a comprehensive health literacy education in schools with a curriculum that is accurate and consistent (Kilgour et al., 2013).

## Adolescent Health Literacy and the Internet

In today's technology driven world, online sources of health information are frequently accessed and may be an important tool to increase adolescent health literacy. There is a great opportunity to improve health behaviors in adolescents by empowering them to make good health choices, ask needed health questions, search for reliable health information, and seek appropriate healthcare when needed (Levin-Zamir, Lemish & Gofin, 2011).

Gray and colleagues (2005) conducted a study to describe functional, interactive, and critical health literacy, as defined by Nutbeam (2000), experienced by adolescent students when using the internet for online health information. They conducted twenty-six focus groups with 157 adolescent students, age 11-19. The authors analyzed the recorded discussions and thematically grouped and coded the data and examples reported by adolescents into three categories. The authors concluded that adolescents had difficulties with all three categories of health literacy; functional, interactive, and critical skills. Students cited difficulties including: spelling medical terms correctly, discerning

relevance of information, knowing which websites to trust, and applying health information to address personal health concerns (Gray et al., 2005).

Briones (2015) completed 50 in-depth interviews to examine how and why young adults use the internet for health information, and what strategies they employed to ensure the information obtained was credible. Briones conducted the interviews in person, via Skype, or over the telephone. Participants claimed online health information made for more productive visits with doctors, which Briones concluded may increase the potential for shared decision making between doctors and patients. Briones found her participants embraced the immediacy of online information and the accessibility of information while expressing concern about credibility. While social media use was almost universal, the findings showed hesitance among young adults using this resource for health information and instead, it was more of a channel for networking and entertainment (Briones, 2015).

Ghaddar et al., (2012) conducted a study to investigate whether exposure to a credible source of online health information, MedlinePlus, was associated with higher levels of health literacy. The authors administered an online survey to a cross-sectional random sample of 261 high school students. The online survey included 52 questions assessing: sociodemographic and academic information, patterns of internet use, health information, MedlinePlus use, general self-efficacy, eHEALS, and the Newest Vital Sign. The authors found health literacy was positively associated with self-efficacy and seeking health information online. They also found exposure to MedlinePlus was associated with higher eHEALS scores. Ghaddar and colleagues (2012) concluded that the introduction

of reliable, age appropriate, sources of health information may improve adolescent health literacy.

## Evaluating Online Health Information

Today's technology filled world offers instant access to health information through the internet and mobile apps. The internet can be a great resource to learn about specific diseases, health conditions, and tips to stay healthy (American Academy of Family Physicians [AAFP], 2018). While some online sources of health information are useful, others are inaccurate or misleading (AAFP, 2018; United States Department of Health and Human Services, National Institutes of Health [NIH], 2018). The NIH (2018) recommend starting an online search for health information with organized collections of high-quality resources such as MedlinePlus, sponsored by the National Library of Medicine (NLM), or healthfinder.gov, sponsored by the U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion.

The United States Department of Health and Human Services, National Library of Medicine (NLM) (2015) produced an online tutorial to teach evaluation of health information found on the internet. Nine questions for evaluation of a website were listed in the tutorial:

1. Who runs the site?
2. Why have they created the site?
3. What do they want from you?
4. Who is paying for the site? Does the site's information favor the sponsor?

5. Is the information reviewed by experts?
6. Where did the information come from?
7. Does the site make unbelievable claims?
8. Is it up-to-date?
9. Does the site want your personal information? Why? (NLM, 2015)

A discussion of the evaluation of two example websites using these questions followed the website evaluation guide. Lastly, the content of the tutorial was summarized. While there is no guarantee that information is completely accurate, even after evaluation of the website, the NLM (2015) recommends individuals follow up with healthcare providers to discuss the information found and any further questions.

## Health Literacy Instruments

In 2003, the National Assessment of Adult Literacy (NAAL) measured the literacy and health literacy skills of a representative sample of more than 19,000 adults older than 16 years and found that 36% had basic or below basic health literacy skills (Kutner, Greenberg, Jin, & Paulsen, 2006). The results were extrapolated to the U.S. adult population and indicated that 78 million U.S. adults are unable to perform basic health tasks such as using an immunization schedule, interpreting a growth chart, or following written instructions on how to take medication. Lower health literacy was found to be more prominent among immigrants, minorities, older adults, and lower-income populations (Kutner et al., 2006).

Health literacy can be measured using a variety of tools although most have only been used with adult samples. Researchers have used different tools to validate and find an optimal method to accurately assess health literacy in adolescents (Ormshaw, Paakkari & Kanna, 2013). The Test of Functional Health Literacy in Adults (TOFHLA) is the most frequently used measure of health literacy for adolescents (Sansom-Daly et al., 2016). The Rapid Estimate of Adult Literacy in Medicine-Teen (REALM-Teen) was developed for adolescents (Davis et al., 2006; Perry, 2014). The Newest Vital Sign has also been used to measure health literacy in children and adolescents (Warsh, Chari, Badaczewski, Hossain, & Sharif, 2014; Weiss et al., 2005). See Appendix A, page 49, for a list of some of the tools used to date.

The TOFHLA is used to measure an individual's ability to perform health-related tasks that require reading and numerical skill. The TOFHLA consists of a timed, 12 minute, 50-item reading comprehension and 10 minute, 17-item numerical ability test. (Mancuso, 2009; Parker, Baker, Williams, & Nurss, 1995). The reading comprehension section uses instructions to prepare for an upper GI series, the patient rights and responsibilities section of a Medicaid form, and the standard hospital informed consent form (Mancuso, 2009). The numerical section assesses the individual's ability to use numerical skills necessary to comprehend directions on a prescription bottle, monitor blood glucose, keep clinic appointments, and obtain financial assistance (Mancuso, 2009). The TOFHLA is scored 0-100: 0-59 indicating inadequate health literacy, 60-74 marginal health literacy, and 75-100 adequate health literacy (Parker et al., 1995).

The Rapid Estimate of Adult Literacy in Medicine-Teen (REALM-Teen) has been shown to be valid and a reliable measure of health literacy in adolescents (Dharmapuri et al, 2015; Perry, 2014). The REALM-Teen is a reading recognition instrument, modeled after the REALM, which measures an individual's ability to pronounce words in ascending order of difficulty (Davis et al., 2006). The REALM-Teen consists of 66 medical terms arranged in 3 columns with 22 words in each column. Words are organized in order of difficulty with the words most difficult to pronounce at the bottom. Participants are asked to read the words out loud in order. If they are unable to read the word, pronounce it incorrectly, or skip a word, they do not receive credit for that word. Correct words are added for a score of 0-60. The score is then converted to a grade range: 0-37 3$^{rd}$ grade and below, 38-44 4$^{th}$ to 5$^{th}$ grade, 45-58 6$^{th}$ to 7$^{th}$ grade, and 59-62 8$^{th}$ to 9$^{th}$ grade (Davis et al, 2006; Dharmapuri et al., 2015).

The Newest Vital Sign (NVS) is a quick measure of health literacy in English or Spanish designed to identify patients at risk for low health literacy (Weiss et al., 2005). A nutrition label from an ice cream container is provided and individuals are asked questions about how they would interpret and act on information contained on the label (Mancuso, 2009; Weiss et al., 2005). The NVS is scored 0-6: 0-1 suggests a high likelihood of limited literacy, 2-3 indicates the possibility of limited literacy, and 4-6 indicates adequate literacy. The major advantage of the NVS is its ease of administration and scoring in a short amount of time (Mancuso, 2009).

The NVS was tested in children and adolescents in a small study by Warsh and colleagues (2014). The authors conducted an anonymous cross-sectional survey using a

convenience sample of school-aged children in outpatient waiting rooms of pediatric care at an academic children's hospital. They administered the NVS to 97 children ages 7-17 years. Good criterion validity for the performance of the NVS was found in children when compared with a validated test of reading comprehension (Warsh et al., 2014).

Norman and Skinner (2008) developed the eHealth Literacy Scale (eHEALS) to assess consumers' perceived skill at using information technology for health and to aid in determining the fit between eHealth programs and consumers. The eHEALS is an 8-item measure of eHealth literacy to evaluate consumers' combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems. A 5-point Likert scale is used with scores ranging from 8-40, higher scores reflecting higher levels of eHealth literacy. A youth population was the focus for initial development of eHEALS, primarily because youth have high levels of eHealth use and familiarity with information technology tools (Norman & Skinner, 2008).

# CHAPTER THREE

# METHODS

The purpose of the project was to measure and increase health literacy among adolescents. An educational intervention with pre- and post-testing was conducted to obtain a measure of health literacy and evaluate the effectiveness of the educational intervention aimed at improving health literacy.

## IRB Approval

Approval from the Montana State University Institutional Review Board (IRB) was obtained on September 28, 2017. Written permission from the school district was obtained on September 7, 2017. An informational letter for parent/guardians was sent home with participants two weeks prior to the project pre-test survey. The letter asked parents to sign and return the form only if they objected to their child's participation in the project. This type of opt-out consent increases participation rates and minimizes non-response bias (Ghaddar et al., 2012). Participant informed consent was obtained at the beginning of both the pre-test and post-test surveys. See Appendix D-G, pages 55-63, for written approval letters, parent/guardian informational letter, and participant informed consent.

## Population

Adolescents in sophomore health class at a rural Wyoming high school were the sample population. The high school is located in a small Wyoming community, population 855, surrounded by cattle ranches and beautiful mountains (Town of Ranchester, 2017). The high school has approximately 120-130 students each year (Sheridan County School District #1 [SCSD1], 2016). Eligible participants were determined by the health class instructor. All students in the class whose parent/guardians did not chose to opt-out and agreed to participate were included in the project. Permission to allow access to the target population for the project and educational intervention was requested and obtained from the school district.

## Project Design

The purpose of the project was to measure and increase health literacy among adolescents. An educational intervention with pre- and post-testing was used to measure health literacy before and after an in-person presentation of an educational intervention. The educational intervention attempted to improve the health literacy of adolescents by teaching them what sources of health information are available and how to evaluate online sources of reliable health information, especially sources with information written at the appropriate level. Participants completed an online demographics and pre-test survey, an educational intervention, and post-test survey.

The pre-test consisted of demographic data for the sample population, the Newest Vital Sign as a measure of health literacy (Pfizer, 2017; Weiss, et al., 2005), and the E-

Health Literacy Scale (eHEALS) (Norman and Skinner, 2006). Demographic data included age, gender, and number of adults in the participants' household. The Newest Vital Sign is a quick and accurate screening tool for health literacy that has established validity and reliability (Weiss et al., 2005). This measure of health literacy was used in an online survey format using SurveyMonkey (SurveyMonkey, 2018) and one-on-one or face-to-face administration was not used. The Newest Vital Sign consists of a nutritional label for ice cream followed by six questions and requires approximately three minutes for administration (Weiss et al., 2005). The eHEALS is an eight question measure of eHealth literacy developed to measure knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems (Norman & Skinner, 2006).

Two weeks following the pre-test survey, participants were provided an in-person presentation by the DNP student. The post-test survey immediately followed the educational intervention. The post-test included the Newest Vital Sign, eHEALS, and open ended questions for evaluation of the educational intervention. See Appendix H and K, pages 64 and 79, for the pre- and post-test surveys.

## Educational Intervention

Participants were provided an in-person presentation by the DNP student utilizing Microsoft PowerPoint (Microsoft, 2013) two weeks following the pre-test survey. The presentation was given in a classroom, and participants were encourage to participate in

discussion and ask questions throughout. The presentation took approximately 25 minutes with time for questions before participants completed the post-test survey.

The topic of the presentation was health literacy and included information on what resources are available for health information with more detailed education on how to evaluate the reliability of health information found online. The National Action Plan on health literacy's goals and strategies (USDHHS, 2010) and National Libraries of Medicine's guide and tutorial for evaluating online sources of health information (NLM, 2015) were used in the development of the educational intervention. The nine questions listed by the National Library of Medicine
(2015) tutorial to evaluate a website were discussed and provided to participants on a participant handout. The nine evaluation questions were:

1. Who runs the site?
2. Why have they created the site?
3. What do they want from you?
4. Who is paying for the site? Does the site's information favor the sponsor?
5. Is the information reviewed by experts?
6. Where did the information come from?
7. Does the site make unbelievable claims?
8. Is it up-to-date?
9. Does the site want your personal information? Why? (NLM, 2015)

Using these questions, the DNP student reviewed with participants a selection of online sources of health information with well-established reliability and an example of a non-

reliable online source. Examples of reliable websites included: Kidshealth.org and healthychildren.org (both written at an appropriate reading level for the population), Medline.com (written at an advanced level), Mayoclinic.org, and the World Health Organization (http://www.who.int/en/). The example of a possibly non-reliable site was AskDrSears.com. Several apps were also reviewed using the same nine evaluation questions. Examples of apps included: Healthy Children, John's Hopkins Pocket Doc, and ChildrensMD by Children's Hospital of Colorado. A handout of the nine evaluation questions, the reliable websites and apps reviewed in the presentation were given to participants on a two-sided 4x5 inch card. See Appendix I, pages 68-76, for the educational intervention PowerPoint and Appendix J, page 77, for the participant handout.

In order for the school district to approve the educational intervention in this project, the content needed to address school district outcomes for students. The health education outcomes for the school district were reviewed. The content of the educational intervention addressed high school health and wellness outcomes: 2.1 identify skills for communicating effectively with family, peers, and others to enhance health; 2.2 describe how family influences the health of individuals, and 3.2 analyze the information contained on food labels to determine healthy food choices (SCSD1, 2017). The content of the educational intervention also addressed Wyoming Content and Performance Standards: 2 students access, analyze and evaluate health information, products and resources, and 4 students use personal and social skills that are associated with taking

responsible action for enhancing health and reducing or avoiding health risks (WDE, 2018).

## Data Collection

Permission to access the adolescents was requested from the school district. Access was granted by the district and a letter of permission from the school district was included in the IRB application. An informational letter with an opt-out provision was emailed to the class instructor who printed the letters and sent them home with potential participants for their parent/guardians to sign and submit if they did not wish their child to participate. The letter informed parent/guardians of the intent of the project and requested participation of their child. Two weeks after parent/guardians had the opportunity to request their child be excluded from the project, the pre-test survey was delivered to participants by the class instructor. Participants accessed the online pre-test survey through a SurveyMonkey internet link provided to the instructor by the DNP student. The pre-test survey began with information about the project and consent of the participant before the participants were allowed to continue with the survey. Access to the pre-test internet link was limited by the DNP student. The DNP student provided the link to the class instructor who wrote it on the classroom whiteboard for eligible participants to ensure only the target population completed the survey. The link to the survey was closed by the DNP student by the end of the day it was administered. The same process was used for the post-test survey, completed immediately after the in-person educational intervention.

The pre-test and post-test surveys were delivered to participants using the online survey platform, SurveyMonkey. Using an online survey platform allowed data to be collected and summarized electronically without the need for manual data entry. The online survey format also allowed the study participants to remain anonymous. SurveyMonkey reported real-time results as surveys were completed, stored and summarized the data, provided a custom report, and allowed for easy exportation of the data to Microsoft Excel (Microsoft, 2013) for further statistical analysis (SurveyMonkey, 2017).

## Data Analysis

All pre- and post-test survey data was collected using SurveyMonkey. The data were exported to Excel from SurveyMonkey. Newest Vital Sign scores and eHEALS scores were manually calculated by the DNP student. The Newest Vital Sign scores consist of the total number of items answered correctly with a range of 1 through 6. The eHEALS scores consist of the summed total of the values of the scale items 3-10 on a 5-point Likert scale with a range of 8 through 40. The value of the Likert scale response options range from Strongly Disagree=1 to Strongly Agree=5. Correlational analysis was completed using the correlational analysis tool in Excel to examine potential associations between pre-test Newest Vital Sign and eHEALS scores and demographic data (Gravetter & Wallnau, 2014). Correlational analysis of pre-test and post-test Newest Vital Sign and eHEALS scores was completed to look for associations between participants' measured health literacy and perceived e-Health literacy. The effectiveness of the educational

intervention was assessed using paired t-test to compare the pre-test and post-test Newest Vital Sign and eHEALS scores. Qualitative data from the evaluation questions about the educational intervention on the post-test survey were reviewed and summarized.

One student completed the pre-test but did not complete the educational intervention or the post-test survey. This student's pre-test data was removed from the data set and not used in any of the t-test analyses. The student's pre-test data was used in the correlational analysis health literacy scores and demographic data.

# CHAPTER FOUR

# RESULTS

The purpose of the project was to measure and increase health literacy among adolescents. Demographic data were collected on the pre-test survey. Health literacy was measured on the pre-test and post-test surveys using the Newest Vital Sign and e-HEALS. Three open-ended questions were asked on the post-test survey to evaluate the educational intervention.

## Descriptive Results

Demographic data collected on the pre-test survey included age, gender, and the number of adults in the household of the participant (Table 1). There were 24 participants in the pre-test survey. There were 19 participants age 15 and 5 participants age 16. There were 15 female and 9 male participants. The number of adults in the household ranged from 1-5 with 19 participants reporting 2 adults in the home.

Table 1. Demographic Data

| Demographic Data | *N* | % |
|---|---|---|
| Gender | | |
| Male | 9 | 37.5 |
| Female | 15 | 62.5 |
| Age | | |
| 15 | 19 | 79 |
| 16 | 5 | 21 |
| Number of Adults in Household | | |
| 1 | 3 | 12.5 |
| 2 | 19 | 79.17 |
| 3 | 1 | 4.17 |
| 4 | 0 | 0 |
| 5 | 1 | 4.14 |

Scores on the Newest Vital Sign were calculated for both the pre- and post-test surveys. Scores range from 0-6. Scores were then interpreted based on the following categories: 0-1 high likelihood of limited literacy, 2-3 possibility of limited literacy, 4-6 adequate literacy (Table 2 and 3). The mean pre-test score was 4.04 and mean post-test score was 4.21 (Table 4).

Table 2. Newest Vital Sign Scores and Interpretations

| Pre-test score | Interpretation of pre-test score | Post-test score | Interpretation of post-test score |
|---|---|---|---|
| 0 | High likelihood of limited literacy | 2 | Possibility of limited literacy |
| 2 | Possibility of limited literacy | 4 | Adequate Literacy |
| 4 | Adequate Literacy | 3 | Possibility of limited literacy |
| 4 | Adequate Literacy | 2 | Possibility of limited literacy |
| 5 | Adequate Literacy | 4 | Adequate Literacy |
| 6 | Adequate Literacy | 6 | Adequate Literacy |
| 6 | Adequate Literacy | 6 | Adequate Literacy |
| 6 | Adequate Literacy | 6 | Adequate Literacy |
| 3 | Possibility of limited literacy | 5 | Adequate Literacy |
| 6 | Adequate Literacy | 6 | Adequate Literacy |
| 6 | Adequate Literacy | 4 | Adequate Literacy |
| 6 | Adequate Literacy | 6 | Adequate Literacy |
| 4 | Adequate Literacy | 4 | Adequate Literacy |
| 6 | Adequate Literacy | 4 | Adequate Literacy |
| 3 | Possibility of limited literacy | 4 | Adequate Literacy |
| 5 | Adequate Literacy | 5 | Adequate Literacy |
| 1 | High likelihood of limited literacy | 3 | Possibility of limited literacy |
| 2 | Possibility of limited literacy | 2 | Possibility of limited literacy |
| 1 | High likelihood of limited literacy | 3 | Possibility of limited literacy |
| 2 | Possibility of limited literacy | 2 | Possibility of limited literacy |
| 5 | Adequate Literacy | 5 | Adequate Literacy |
| 6 | Adequate Literacy | 5 | Adequate Literacy |
| 4 | Adequate Literacy | 6 | Adequate Literacy |

Table 3. Summary of Newest Vital Sign Scores and Interpretation

| | Pre-test % (n) | Post-test % (n) |
|---|---|---|
| Students with high likelihood of limited health literacy | 13% (3) | 0% (0) |
| Students with possibility of limited health literacy | 22% (5) | 30% (7) |
| Students with adequate health literacy | 65% (15) | 70% (16) |

Table 4. Newest Vital Sign Summary Statistics

| | *N* | Mean | Score Range |
|---|---|---|---|
| Pre-test | 23 | 4.04 | 0-6 |
| Post-test | 23 | 4.21 | 2-6 |

Scores for eHEALS were calculated for both the pre-and post-test surveys. The first two items of the eHEALS ask about participants' perception of the internet as a decision support tool and its usefulness to gather health information but are not scored (Norman & Skinner, 2006). Possible scores ranged from 8-40 with higher scores indicating higher perceived e-health literacy. Participant scores range from 22-31 on the pre-test and 24-40 on the post-test survey (Table 5 and 6). The mean pre-test score for the project sample was 27.17 and mean post-test score was 31.61 (Table 7).

Table 5. eHEALS Scores

| Pre-test eHEALS scores | Post-test eHEALS scores | Difference in eHEALS scores |
|---|---|---|
| 31 | 32 | 1 |
| 30 | 29 | -1 |
| 24 | 32 | 8 |
| 22 | 31 | 9 |
| 30 | 32 | 2 |
| 31 | 29 | -2 |
| 23 | 32 | 9 |
| 23 | 24 | 1 |
| 29 | 40 | 11 |
| 30 | 40 | 10 |
| 32 | 30 | -2 |
| 28 | 28 | 0 |
| 26 | 37 | 11 |
| 30 | 33 | 3 |
| 23 | 32 | 9 |
| 24 | 32 | 8 |
| 27 | 31 | 4 |
| 31 | 30 | -1 |
| 29 | 26 | -3 |
| 22 | 30 | 8 |
| 30 | 28 | -2 |
| 23 | 35 | 12 |
| 27 | 34 | 7 |

Table 6. Summary of eHEALS scores

| | Pre-test % (n) | Post-test % (n) |
|---|---|---|
| Students with score 8-18 | 0% (0) | 0% (0) |
| Students with score 19-29 | 61% (14) | 26% (6) |
| Students with score 30-40 | 39% (9) | 74% (17) |

Table 7. eHEALS Summary Statistics

| | *N* | Mean | Score Range |
|---|---|---|---|
| Pre-test | 23 | 27.17 | 22-32 |
| Post-test | 23 | 31.61 | 24-40 |

Comparisons: Demographics and Health Literacy

For the sample, there was minimal correlation between the pre-test Newest Vital Sign scores and the demographic data; age, r=0.18, number of adults in the household,

r=0.09, and gender, r=-0.13. There was minimal correlation between the pre-test eHEALS scores and the demographic data; age, r=0.04. The sample suggests a moderate correlation between the pre-test eHEALS scores and the demographic data; number of adults in the household, r=-0.34, and gender, r=0.35. The mean eHEALS score for males was 25.33 and for females 28.12.

Comparisons: Pre- and Post-test Health Literacy

For the sample, there was minimal correlation between the pre-test Newest Vital Sign scores and the pre-test eHEALS scores, r=-0.09. There was also minimal correlation between the post-test Newest Vital Sign scores and the post-test eHEALS scores, r=0.13.

A paired-samples t-test was conducted to compare the Newest Vital Sign score before and after the educational intervention. There was no significant difference between the scores for the pre-test Newest Vital Sign (M=4.04, SD=1.94) and post-test (M=4.21, SD=1.44), t(22)=-0.624, p=.54, d=-0.13. A paired-samples t-test was conducted to compare eHEALS scores before and after the educational intervention. There was a significant difference between eHEALS scores on the pre-test (M=27.1, SD=3.4) and the post-test (M=31.61, SD=3.85), t(22)=4.17, p<.001, d=0.86.

Evaluation

Three questions were asked on the post-test to evaluate the educational intervention. Twenty-two participants responded to the first question: How might this presentation change where or how you look for your health information? Twenty-one participants responded to the second question: What was most helpful about this

presentation? Eight participants responded to the third question: Please share any additional comments you have about the presentation or this project.

Responses to the evaluation questions were positive and reflected participants' beliefs that they had learned new and/or useful information in the educational intervention. Responses to question 1 described changes in how participants might evaluate websites, use the example websites when looking for health information, or use apps instead of websites. In response to question 2, participants found the information on how to evaluate a website, the example websites, or the handout useful. Respondents to question 3 expressed that they found the presentation helpful, thanks to the DNP student for presenting to them, or both (Table 8).

Table 8. Evaluation Responses

| | n | % |
|---|---|---|
| Question 1 Potential changes to where or how health information is sought | | |
| May use example websites | 3 | 13.6 |
| May evaluate websites differently | 15 | 68.2 |
| May use apps | 1 | 4.5 |
| Other | 3 | 13.6 |
| Question 2 Most helpful information presented | | |
| How to evaluate websites | 10 | 47.6 |
| Example websites | 7 | 33.3 |
| Handout | 1 | 4.8 |
| Other | 3 | 14.3 |
| Question 3 Additional comments | | |
| Presentation helpful | 5 | 62.5 |
| Thanks | 2 | 25 |
| Both | 1 | 12.5 |

# CHAPTER FIVE

# DISCUSSION AND CONCLUSION

The purpose of the project was to measure and increase health literacy among adolescents. The purpose was addressed by obtaining two measures of health literacy in a group of adolescents before and after an educational intervention. The goal of increasing health literacy in adolescents as measured by the Newest Vital Sign was not achieved. Participants perceived health literacy as measured by eHEALS did significantly increase following the educational intervention. Addressing strengths and weakness of the project and its design may improve future projects intended to increase health literacy in adolescents.

## Discussion of the Results

Participants of the project were asked to complete the pre-test survey which consisted of an informed consent, demographic data, the Newest Vital Sign, and eHEALS. Scores for the Newest Vital Sign and e-HEALS were calculated. Participants averaged a score of 4.4 on the pretest for the Newest Vital Sign. The mean pretest score for e-HEALS was 27.17. Correlational analysis between these two scores showed minimal correlation. As these are both validated measures of health literacy for this population, a lack of correlation between the two pre-test scores was unexpected. A larger sample size may have resulted in a correlation between health literacy scores for the two

measures. It is also possible that the minimal correlation between the Newest Vital Sign and eHEALS is due to measurement of different components of health literacy.

Based on the pre-test mean score of 4.4 on the Newest Vital Sign, most of the participants had adequate literacy before the educational intervention. On the pre-test, 3 students scored 0-1 indicating a high likelihood of limited literacy and 5 students scored 2-3 indicating the possibility of limited literacy. On the post test, 7 students scored 2-3 indicating the possibility of limited literacy, but 0 students scored 0-1. While the comparison between mean scores on the pre- and post-test survey Newest Vital Sign did not show a significant difference, examination of the individual scores of those students with limited health literacy suggests they may have benefited from the educational intervention. The individual scores (Table 2, page 30) show that all three of those participants with a high likelihood of limited literacy prior to the educational intervention improved their post-test Newest Vital Sign scores 2 points, moving them to the possibility of limited literacy category.

Although not part of the purpose of this project, demographic data were compared with the Newest Vital Sign and eHEALS mean scores using correlational analysis. There was minimal correlation between the pre-test Newest Vital Sign scores and the demographic data which was expected due to the small sample size. The results did suggest a moderate correlation between the pre-test eHEALS scores and gender, with females perceiving their electronic health literacy to be higher than males. The results also suggest a moderate negative correlation between the pre-test eHEALS scores and the number of adults in household. The majority of participants ($n$=19) had two adults living

in the household with a mean eHEALS score of 27.4, while the two students with more adults in the household both scored 22.

A paired-samples t-test of the Newest Vital Sign score before and after the educational intervention showed no significant difference between the scores. The goal of increasing health literacy in adolescents as measured by the Newest Vital Sign was not met. This result was not unexpected based on the content of the educational intervention. The educational intervention did not contain content specific to the Newest Vital Sign nor education on reading and interpreting nutritional labels.

A paired-samples t-test of pre- and post-test eHEALS scores showed a significant difference. The education intervention content was more congruent with the content of eHEALS than the Newest Vital Sign. The intent of the educational intervention was to help participants find and evaluate online health information. The significant increase in eHEALS scores indicates that the educational intervention was successful in improving participants' perception of their e-health literacy.

Project participants perceived themselves to have increased health literacy following the educational intervention while their health literacy scores, as measured by the Newest Vital Sign, did not improve. Similar baseline scores for the Newest Vital Sign and eHEALS were obtained by Ghaddar and colleagues (2012) who also noted an increase in eHEALS scores with exposure to online content. The evaluation questions on the post-test survey further reflect the participants' beliefs that they learned new and useful information.

## Limitations of the Project

There were several limitations in this project, small sample size, limited time frame, and lack of published literature regarding health literacy in adolescents and methods to improve it. The sample size was small making it difficult to yield results that were statistically significant. Participation in the project in the school's health class was excellent, 96%, but the number of participants was limited by the DNP student's choice to target a local rural school and the school districts limitations to a single health education class. Additionally, the population was very specific, a single sophomore class at a rural high school. The results cannot be generalized across the adolescent age span or to adolescents in other rural schools or in more urban areas.

There was a significant time limit to this project. At the request of the school district, the educational intervention was coordinated with the current curriculum to meet several course outcomes. This limited the educational intervention to a very specific point in time. With the educational intervention scheduled, there was limited time for participants to complete the pre-test survey in order to allow adequate time for the parent/guardian consent prior to administration of the pre-test. Due to the short 2 week time frame between pre- and post-test surveys, there may have been test recognition error, in which participants may have recalled the questions and their answers from the pre-test survey while completing the post-test survey.

There currently is very little published research about effective methods for increasing health literacy in adolescents. Most of the literature that has been published focuses on the use of different measures of health literacy in adolescents and the results

indicate that several measures are valid and reliable (Davis et al., 2006; Ormshaw et al., 2013; Sansom-Daly et al., 2016; Warsh et al., 2014; Weiss et al., 2005). There are no published guidelines on increasing health literacy in adolescents, thus there was no prior work on which to build. The educational intervention was developed by the graduate student so its effectiveness is unknown. The content of the educational intervention may not have matched the chosen measures of health literacy used to evaluate it. This project attempted to measure and increase health literacy in the adolescent population so as to start filling this gap in the literature.

## Implications for Clinical Practice

The May 2010 National Action Plan to improve health literacy contained seven goals (USDHHS, 2010, p. 16-17). The DNP student took a small step towards achieving goals 2, 3, and 6. Goal 2: Promote changes in the health care system that improve health information, communication, informed decision-making, and access to health services (USDHHS, 2010). Goal 3: Incorporate accurate, standards-based, and developmentally appropriate health and science information and curricula in child care and education through the university level (USDHHS, 2010). The graduate student created a health literacy educational intervention and presented it to adolescent participants to increase their understanding of health information and help them make better informed choices. During the educational intervention the DNP student taught participants how to evaluate health information on the internet and find information written at an appropriate level for an adolescent. Goal 6: Increase basic research and the development, implementation, and

evaluation of practices and interventions to improve health literacy. The DNP student used established tools to measure health literacy and applied them to an understudied adolescent population. An educational intervention was then completed to improve health literacy. Although health literacy scores of the participants as measured by the Newest Vital Sign were not significantly increased, the results can be used to help develop further projects and interventions to improve health literacy.

When nearly half of American adults have difficulty understanding and using health information (Nielsen-Bohlman et al., 2004), providers need to make a greater effort to measure health literacy and present information to patients in an understandable manner. Previous research and this project show that the Newest Vital Sign can be used to assess health literacy in adolescents and adults (Weiss et al, 2005). The Newest Vital Sign can be used to quickly assess health literacy in a clinical setting (Duell, Wright, Renzaho, & Bhattacharya, 2015). Providers could use the Newest Vital Sign as a quick measure of health literacy prior to attempting to verbally educate patients and before giving handouts that are not written at an appropriate level. Measuring the health literacy of patients does not need to be completed with every primary care visit, but should be a part of establishing care. Individuals, including those participants of this project who's Newest Vital Sign score indicated low or limited health literacy require approaches tailored to or appropriate for those with limited health literacy. Once the health literacy level has been determined, health education can be tailored to the individual. The opportunity to improve education and communication from providers to patients should be seized.

## Relation of Project to Nursing Theory

Orem's Self-Care Deficit Theory was used to guide this scholarly project. This project was focused on adolescents who are developing their self-care skills. The goal of this project was to improve health literacy through an educational intervention that focused on evaluation of electronic health care information. The educational intervention dealt directly with one of Orem's self-care requisites, seeking and securing appropriate medical assistance. The educational intervention attempted to teach participants to evaluate the online information they are seeking. The educational intervention sought to empower the participants to critically think about their health and make informed decisions with the assistance of accurate online information.

## Recommendations for Future Research and Scholarly Projects

Although this was a small project, it can serve to illustrate the need for further research in health literacy, particularly with adolescents. Health literacy is an important enough issue that a national action plan to improve it was developed and published (USDHHS, 2010). Individuals with greater health literacy manage their health problems and unexpected health situations better (CDC, 2016a). Valid and reliable measures of health literacy have been created and studied (See Appendix A, page 49). The strength of evidence in current research on methods to improve health literacy is insufficient to low for adults (Berkman et al., 2011). Research on methods to improve health literacy in adolescents is almost non-existent (Berkman et al., 2011; D'Eath et al., 2012; Perry, 2014). National efforts to combat low health literacy rates fail to adequately prepare

children and adolescents to be health-literate adults (Winkelman et al., 2016). Research on effective methods for improving adolescent health literacy should be pursued in order to know how to better prepare them to be health conscious and literate adults.

This project could be replicated in future projects that include a larger number of participants, a more diverse population, and entire or multistate samples. With a larger sample size, significant changes in pre- and post-test health literacy scores and significant correlations between the Newest Vital Sign and e-HEALs scores may be seen. Significant correlations may also be seen among the scores and demographic data. A continuation of this project may also be possible, re-measuring Newest Vital Sign and e-HEALs scores as the participants age.

## Conclusion

It is essential for the improvement of overall health to improve the health literacy of individuals, especially adolescents. While the educational intervention in this project did not significantly improve health literacy as measured by the Newest Vital Sign, participants perceived themselves to have a better understanding of online health information as evidenced by improved e-HEALS scores and qualitative evaluation data. Participants reported that they had not previously been taught how to evaluate health information online and felt more equipped to look at health information online following the presentation. Considerable research is needed to continue to identify methods to improve health literacy in adolescents. Until results of such research are available,

providers can utilize the Newest Vital Sign to measure health literacy in adolescents and adults in order to provide customized health education.

# REFERENCES CITED

American Academy of Family Physicians. (2018). *Health information on the web: Finding reliable information*. Retrieved from https://familydoctor.org/health-information-on-the-web-finding-reliable-information/?adfree=true

Briones, R. (2015). Harnessing the web: How e-health and e-health literacy impact young adults' perceptions of online health information. *Medicine 2.0, 4*(2), e5.

Baur, C. (2011). Calling the nation to act: Implementing the national action plan to improve health literacy. *Nursing Outlook, 59*(2), 63-69.

Berkman, N., Sheridan, S., Donahue, K., Halpern, D., Viera, A., Crotty, K., … Viswanathan, M. (2011). Health literacy interventions and outcomes: An updated systematic review. *Evidence report/technology assessment,* (199), 7-15.

Brown, S., Teufel, J., & Birch, D. (2007). Early adolescent's perceptions of health and health literacy. *Journal of School Health, 77*(1), 7-15.

Centers for Disease Control and Prevention [CDC]. (January 13, 2016a). *Health literacy*. Retrieved from http://www.cdc.gov/healthliteracy/index.html

Centers for Disease Control and Prevention. (August 18, 2016b). *Healthy schools: National health education standards.* Retrieved from https://www.cdc.gov/healthyschools/sher/standards/index.htm

Centers for Disease Control and Prevention. (October 14, 2011). *Healthy people 2020*. Retrieved from http://www.cdc.gov/nchs/healthy_people/hp2020.htm

D'Eath, M., Barry, M., & Sixsmith, J. (2012). Rapid evidence review of interventions for improving health literacy. *European Center for Disease Prevention and Control (ECDC).* Stockholm, doi 10.2900/20189.

Davis, T., Wolf, M., Arnold, C., Byrd, R., Long, S., Springer, T., Kennen, E., & Bocchini, J. (2006). Development and validation of the rapid estimate of adolescent literacy in medicine (REALM-Teen): A tool to screen adolescents for below-grade reading in health care settings. *Pediatrics, 118*(6).

Dharmapuri, S., Best, D., Kind, T., Silber, T., Simpson, P., & D'Angelo, L. (2015). Health literacy and medication adherence in adolescents. *The Journal of Pediatrics, 166*(2), 378-382.

Duell, P., Wright, D., Renzaho, A., & Bhattacharya, D. (2015). Optimal health literacy measurement for the clinical setting: A systematic review. *Patient Education and Counseling, 98*(11), 1295-1307.

Ghaddar, S., Valerio, M., Garcia, C., & Hansen, L. (2012). Adolescent health literacy: The importance of credible sources for online health information. *Journal of School Health, 82*(1), 28-36.

Gravetter, F., & Wallnau, L. (2014). *Essentials of statistics for the behavioral sciences.* Belmont, CA: Wadsworth Cengage Learning.

Gray, N., Klein, J., Noyce, P., Sesselber, T., & Cantrill, J. (2005). The internet: A window on adolescent health literacy. *Journal of Adolescent Health, 37*(3) 243.e1-243.e7.

Jacobs, R., Lou, J., Ownby, R., & Caballero, J. (2016). A systematic review of eHealth interventions to improve health literacy. *Health Informatics Journal, 22*(2), 81-98.

Kilgour, L., Matthews, N., Christian, P., & Shire, J. (2013). Health literacy in schools: Prioritizing health and well-being issues through the curriculum. *Sport, Education and Society 20*(4) 485-500.

Kutner, M., Greenberg, E., Jin, Y., & Paulsen, C. (2006). *The health literacy of America's adults: Results from the 2003 national assessment of adult literacy.* U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Levin-Zamir, D., Lemish, D., & Gofin, R. (2011). Media health literacy (MHL): Development and measurement of the concept among adolescents. *Health Education Research, 26*(2) 323-335.

Mancuso, J. (2009). Assessment and measurement of health literacy: An integrative review of the literature. *Nursing and Health Sciences, 11*(1) 77-89.

Massey, P., Prelip, M., Calimlim, B., Afifi, A., Quiter, E., Nessim, S., & ... Glik, D. (2013). Findings toward a multidimensional measure of adolescent health literacy. *American Journal of Health Behavior, 37*(3), 342-350.

Masters, K. (2012). *Nursing theories: A framework for professional practice* (pp. 153-164). Sudbury, MA: Jones & Bartlett Learning.

Nielsen-Bohlman, L., Panzer, A., & Kindig, D. (Eds). (2004). *Health literacy: A prescription to end confusion.* Washington, D.C: National Academies Press.

Norman, C. and Skinner, H. (2006). eHEALS: The ehealth literacy scale. *Journal of Medical Internet Research, 8*(4).

Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International, 15*(3), 259-267.'

Nutbeam, D. (2015). Defining, measuring and improving health literacy. *World Health Organization, 42*(4), 450-456.

Orem, D. (2001). *Nursing: Concepts of practice* (6th ed.). St. Louis, MO: Mosby.

Ormshaw, M., Paakkari, L., & Kannas, L. (2013). Measuring child and adolescent health literacy: A systematic review of literature. *Health Education, 113*(5), 433-455.

Patient Protection and Affordable Care Act, 42 U.S.C. § 18001 (2010).

Parker, R. Baker, D., Williams, M., & Nurss, J. (1995). The test of functional health literacy in adults: A new instrument for measuring patients' literacy skills. *Journal of General Internal Medicine, 10*(10), 537-541.

Perry, E. (2014). Health literacy in adolescents: An integrative review. *Journal For Specialists In Pediatric Nursing, 19*(3), 210-218.

Petiprin, A. (2015). *Self-care deficit theory*. Retrieved from http://www.nursing-theory.org/theories-and-models/orem-self-care-deficit-theory.php

Pfizer. (2017). *The newest vital sign*. Retrieved from https://www.pfizer.com/files/health/2016_nvs_flipbook_spanish_final.pdf

Rathnayake, T. (2014). The experience of self-care [Evidence summary]. Retrieved from Joanna Briggs Institute EBP Resources website: http://joannabriggslibrary.org/

Sanders, L., Federico, S., Klass, P., Abrams, M., & Dreyer, B. (2009). Literacy and child health: A systematic review. *Archives of Pediatrics & Adolescent Medicine, 163*(2) 131-140.

Sansom-Daly, U., Lin, M., Robertson, E., Wakefield, C., McGill, B., Girgis, A., & Cohn, R. (2016). Health literacy in adolescents and young adults: An updated review. *Journal of Adolescent Young Adult Oncology*, Epub ahead of print.

Schumacher, J., Hall, A., Davis, T., Arnold, C., Bennett, R., Wolf, M., & Carden, D. (2013). Potentially preventable use of emergency services: The role of low health literacy. *Medical Care, 51*(8), 654-658.

Sheridan County School District #1[SCSD1]. (2016). *2015-2016 annual report*. Retrieved from http://www.sheridan.k12.wy.us/Content/102

Sheridan County School District #1. (2017). *High school outcomes and components.* Retrieved from http://www.sheridan.k12.wy.us/Content2/136

Subramaniam, M., St Jean, B., Taylor, N., Kodama, C., Follman, R., & Casciotti, D. (2015). Bit by bit: Using design-based research to improve the health literacy of adolescents. *JMIR Research Protocols, 4*(2).

SurveyMonkey. (2017). *SurveyMonkey: Ask more, know more, do more*. Retrieved from https://www.surveymonkey.com/mp/take-a-tour/?ut_source=header

Town of Ranchester. (2017). *Ranchester Wyoming*. Retrieved from http://www.ranchesterwyoming.com/

United States Department of Health and Human Services, National Institutes of Health [NIH]. (2018). *Finding and evaluating online resources*. Bethesda, MD. Retrieved from https://nccih.nih.gov/health/webresources

United States Department of Health and Human Services, National Library of Medicine [NLM]. (2016). *K-12 science and health education*. U.S. Department of Health and Human Services. Washington, DC.

United States Department of Health and Human Services, National Library of Medicine. (2015). *Evaluating internet health information: A tutorial*. Bethesda, MD. Retrieved from https://medlineplus.gov/webeval/webeval_start.html

United States Department of Health and Human Services, Office of Disease Prevention and Health Promotion [USDHHS]. (2010). *National Action Plan to Improve Health Literacy*. Washington, DC.

Warsh, J., Chari, R., Badaczewski, A., Hossain, J., & Sharif, I. (2014). Can the Newest Vital Sign be used to assess health literacy in children and adolescents? *Clinical Pediatrics, 53*(2), 141-144.

Winkelman, T., Caldwell, M., Bertram, B., & Davis, M. (2016). Promoting health literacy for children and adolescents. *Pediatrics, 138*(6).

Weiss, B. D., Mays, M. Z., Martz, W., Castro, K. M., DeWalt, D. A., Pignone, M. P., . . . Hale, F. A. (2005). Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine, 3*(6), 514-522. doi:10.1370/afm.405

Wyoming Department of Education [WDE]. (2018). *Health education content & performance standards*. Retrieved from https://edu.wyoming.gov/educators/standards/health-education/

# APPENDICIES

# APPENDIX A

## HEALTH LITERACY INSTRUMENTS

Health Literacy Instruments:

- Adherence to Refills and Medications Scale (ARMs score) (Dharmapuri, et al., 2015)
- Consumer Assessment of Healthcare Providers and Systems on health literacy (CAHPS) (Schumacher, et al., 2013)
- E-Health Literacy Scale (eHEALS) (Norman & Skinner, 2006)
- Emergency Medicine Patients' Access to Healthcare (EMPATH) (Schumacher, et al., 2013)
- Health Literacy Domains Questionnaire (Massey, et al., 2013)
- Media Health Literacy (MHL) (Levin-Zamir, et al., 2011)
- Modified Short Test of Functional Health Literacy in Adults (modifiedSTOFHLA) (Ormshaw, et al., 2012)
- Newest Vital Sign (Warsh, et al., 2014; Weiss, et al., 2005)
- Rapid Estimate of Adult Literacy in Medicine (REALM) (Ormshaw, et al., 2012; Sanders, et al., 2009; Schumacher, et al., 2013)
- Rapid Estimate of Adult Literacy in Medicine-teen (REALM-teen) (Dharmapuri, et al., 2015; Perry, 2014)
- Short Test of Functional Health Literacy in Adults (STOFHLA) (Ormshaw, et al., 2012; Sanders, et al., 2009)
- Test of Functional Health Literacy in Adults (TOFHLA) (Mancuso, 2009; Parker et al, 1995).

# APPENDIX B

## THE NEWEST VITAL SIGN

| **Nutrition Facts** | |
|---|---|
| Serving Size | 1/2 cup |
| Servings per container | 4 |
| Amount per serving | |
| Calories 250 | Fat Cal 120 |
| | %DV |
| **Total Fat** 13g | 20% |
| Sat Fat 9g | 40% |
| **Cholesterol** 28mg | 12% |
| **Sodium** 55mg | 2% |
| **Total Carbohydrate** 30g | 12% |
| Dietary Fiber 2g | |
| Sugars 23g | |
| **Protein** 4g | 8% |

* Percent Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

**Ingredients:** Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

| | ANSWER CORRECT? YES | NO |
|---|---|---|

**READ TO SUBJECT:** This information is on the back of a container of a pint of ice cream.

**QUESTIONS**

1. If you eat the entire container, how many calories will you eat?
   **Answer** ❑ 1,000 is the only correct answer _____ _____

2. If you are allowed to eat 60 g of carbohydrates as a snack, how much ice cream could you have?
   **Answer** Any of the following is correct: _____ _____
   - ❑ 1 cup (or any amount up to 1 cup)
   - ❑ Half the container

   Note: If patient answers "2 servings," ask "How much ice cream would that be if you were to measure it into a bowl?"

3. Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes 1 serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?
   **Answer** 33 is the only correct answer _____ _____

4. If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?
   **Answer** 10% is the only correct answer _____ _____

Pretend that you are allergic to the following substances: Penicillin, peanuts, latex gloves, and bee stings.

5. Is it safe for you to eat this ice cream?
   **Answer** ❑ No _____ _____

6. (Ask only if the patient responds "no" to question 5): Why not?
   **Answer** Because it has peanut oil. _____ _____

**Total Correct** _____

# APPENDIX C

## E-HEALTH LITERACY SCALE (eHEALS)

**I would like to ask you for your opinion and about your experience using the Internet for health information. For each statement, tell me which response best reflects your opinion and experience *right now*.**

How **useful** do you feel the Internet is in helping you in making decisions about your health?

o Not useful at all o Not useful o Unsure o Useful o Very Useful

2. How **important** is it for you to be able to access health resources on the Internet?

o Not important at all o Not important o Unsure o Important o Very Important

3. I know **what** health resources are available on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4. I know **where** to find helpful health resources on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

5. I know **how** to find helpful health resources on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

6. I know **how to use** the Internet to answer my questions about health

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

7. I know how to use **the health information** I find on the Internet to help me

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

8. I have the skills I need to **evaluate** the health resources I find on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

9. I can tell **high quality** health resources from **low quality** health resources on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

10. I feel **confident** in using information from the Internet to make health decisions

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

# APPENDIX D

## SCHOOL DISTICT LETTER OF PERMISSION



**SHERIDAN COUNTY SCHOOL DISTRICT #1**
Individual Success Through Education

September 7, 2017

To the IRB Committee:

I have been in contact with Claire Buckingham to set up a project to measure health literacy at Tongue River High School in one of our health classes. Claire will set up the project with the health teacher that includes a pretest, instruction focused on state and district outcomes: HS.WELL. 2.1, 2.2, and 3.2, and concludes with a post-test. Claire will use a tool called Newest Vital Sign, which asks questions based on a nutrition label.

Tongue River High School Principal, Mark Fritz, and health teacher, John Scott, look forward to working with Claire on this project.

Feel free to contact us should you have further questions.

Sara McGinnis, Curriculum Director
sara@sheridan.k12.wy.us
307-751-6060

Marty Kobza
mkobza@sheridan.k12.wy.us
307-655-9541

THE STATE OF WYOMING PROVIDES HATHAWAY MERIT AND NEED SCHOLARSHIPS TO WYOMING STUDENTS ATTENDING THE UNIVERSITY OF WYOMING AND WYOMING COMMUNITY COLLEGES. EVERY WYOMING STUDENT WHO MEETS THE MERIT REQUIREMENTS CAN EARN A HATHAWAY MERIT SCHOLARSHIP. CONTACT YOUR SCHOOL COUNSELOR FOR MORE INFORMATION.

WYOMING HATHAWAY

P.O. BOX 819 RANCHESTER, WY 82839 (P) 307-655-9541 (F) 307-655-9477

# APPENDIX E

## IRB APPROVAL LETTER

MONTANA
STATE UNIVERSITY

INSTITUTIONAL REVIEW BOARD
**For the Protection of Human Subjects**
**FWA 00000165**

960 Technology Blvd. Room 127
c/o Microbiology & Immunology
Montana State University
Bozeman, MT 59718
Telephone: 406-994-6783
FAX: 406-994-4303
E-mail: cherylj@montana.edu

*Chair:* Mark Quinn
406-994-4707
mquinn@montana.edu
*Administrator:*
Cheryl Johnson
406-994-4706
cherylj@montana.edu

**MEMORANDUM**

**TO:** Claire Buckingham and Jean Shreffler-Grant

**FROM:** Mark Quinn Mark Quinn cmj
Chair, Institutional Review Board for the Protection of Human Subjects

**DATE:** September 28, 2017

**SUBJECT:** *"Increased Health Literacy in Adolescents"* [CB092817]

The above proposal was reviewed by expedited review by the Institutional Review Board. This proposal is now approved for a period of one-year.

Please keep track of the number of subjects who participate in the study and of any unexpected or adverse consequences of the research. If there are any adverse consequences, please report them to the committee as soon as possible. If there are serious adverse consequences, please suspend the research until the situation has been reviewed by the Institutional Review Board.

Any changes in the human subjects' aspects of the research should be approved by the committee before they are implemented.

It is the investigator's responsibility to inform subjects about the risks and benefits of the research. Although the subject's signing of the consent form, documents this process, you, as the investigator should be sure that the subject understands it. Please remember that subjects should receive a copy of the consent form and that you should keep a signed copy for your records.

In one year, you will be sent a questionnaire asking for information about the progress of the research. The information that you provide will be used to determine whether the committee will give continuing approval for another year. If the research is still in progress in 5 years, a complete new application will be required.

# APPENDIX F

## LETTER OFCONSENT FOR PARENTS/GUARDIANS

PARENTS' INFORMATION AND OPT OUT FORM
**Increased Health Literacy in Adolescents**

Dear Parent(s) or Guardian(s),

I am writing to inform you about a project I am conducting at Sheridan County School District #1 Tongue River High School in which your child will be asked to participate. The purpose of the project is to improve health literacy among adolescents and enhance their understanding of health related information. My name is Claire Buckingham and I am a doctoral student at Montana State University College of Nursing. This project is part of the requirements for my Doctor of Nurse Practitioner degree. I am a native of Wyoming and have been a practicing nursing in Sheridan County for many years.

Students enrolled in freshman health and physical fitness at Tongue River High School will be asked to participate in this project. Sheridan County School District #1 has approved this project which meets the district's Wellness Outcomes 2.1, 2.2, and 3.2. If the project results in improvement of student's health literacy, the project may be expanded to other school districts across the state.

If your son or daughter agrees to take part in the project, he or she will be asked to complete a short online survey to assess health literacy. The class instructor, Mr. Scott, will send the survey electronically to students. All students enrolled in freshman health and physical fitness will then attend a presentation on health literacy. The health literacy presentation will cover what health literacy is, why it is important, where health information can be obtained, and how to evaluate the reliability of health information. The presentation will be given during the regularly scheduled health and physical education class. Following the presentation, students who agreed to participate in the project will be asked to complete another short online survey to re-assess health literacy.

No information identifying your child will be collected in the online surveys. Your child's participation in the surveys is completely voluntary and he/she may choose to not answer any questions he/she does not want to answer and/or may stop at any time. Participation or non-participation will not affect the students' grade or class standing in any way.

If you have any questions or concerns about this project, please call or email:

Claire Buckingham, RN
Phone: 307-761-0132
Email: claire.buckingham@msu.montana.edu

Mr. John Scott
Tongue River High School Health/PE teacher
Email: jscott@sheridan.k12.wy.us

Jean Shreffler-Grant, PhD, RN, Advisor
Montana State University College of Nursing
Phone: 406-243-2540
Email: jeansh@montana.edu

Mark Quinn, PhD
Montana State University
Institutional Review Board Chair
Phone: 406-994-4707
Email: mquinn@montana.edu

APPROVED
MSU IRB
09/28/2017
Date approved

If you DO NOT wish your child to participate in this project, please fill in the information on the back and return this form with your child to his/her health education instructor.

I DO NOT want _____ to participate in the Increased
(please print student's name)

Health Literacy in Adolescents project. I understand that my son or daughter will attend the health literacy presentation as a part of the regularly scheduled health and physical education class but will not receive the online surveys to complete before and after the presentation.

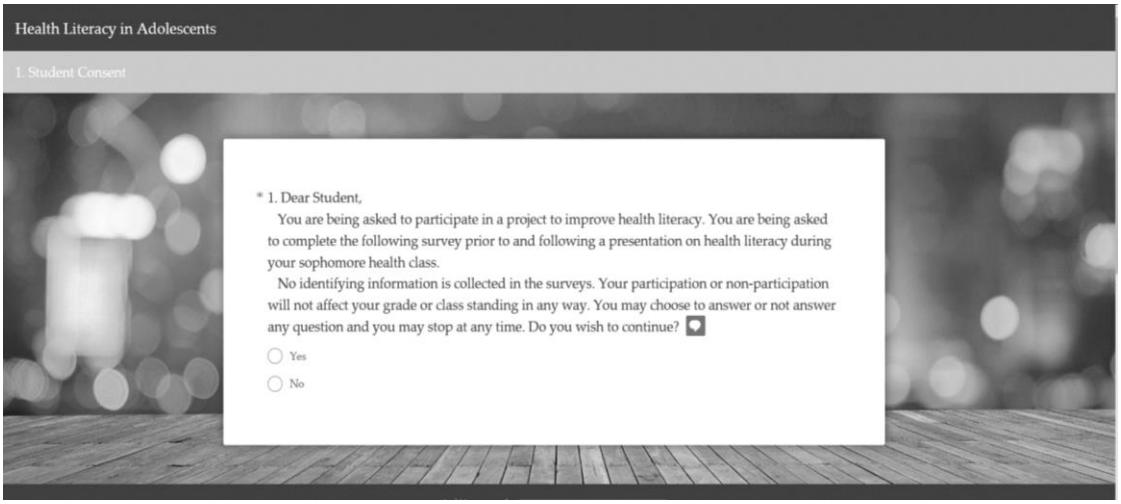
Parent or Guardian Name (please print): _____

Parent or Guardian Signature: _____

APPROVED
MSU IRB
09/28/2017
Date approved

# APPENDIX G

## PARTICIPANT INFORMED CONSENT




Dear Student,

You are being asked to participate in a project to improve health literacy. You are being asked to complete the following survey prior to and following a presentation on health literacy during your sophomore health class.

No identifying information is collected in the surveys. Your participation or non-participation will not affect your grade or class standing in any way. You may choose to answer or not answer any question and you may stop at any time. Do you wish to continue?

Yes

No

# APPENDIX H

## PRE-TEST SURVEY

1.1 Dear Student,

You are being asked to participate in a project to improve health literacy. You are being asked to complete the following survey prior to and following a presentation on health literacy during your sophomore health class.

No identifying information is collected in the surveys. Your participation or non-participation will not affect your grade or class standing in any way. You may choose to answer or not answer any question and you may stop at any time. Do you wish to continue?

- o Yes
- o No

2.1 What number did Mr. Scott give you?

2.2 What is your age?

- o 14
- o 15
- o 15
- o Other (please specify)

2.3 What is your gender?

- o Female
- o Male
- o Other (please specify)

2.4 How many adults live in your household?

- o 1
- o 2
- o 3
- o 4
- o Other (please specify)

Please use the below ice cream nutrition label to answer the following 6 questions.

| **Nutrition Facts** | |
|---|---|
| Serving Size | 1/2 cup |
| Servings per container | 4 |
| Amount per serving | |
| Calories 250 | Fat Cal 120 |
| | %DV |
| **Total Fat** 13g | 20% |
| Sat Fat 9g | 40% |
| **Cholesterol** 28mg | 12% |
| **Sodium** 55mg | 2% |
| **Total Carbohydrate** 30g | 12% |
| Dietary Fiber 2g | |
| Sugars 23g | |
| **Protein** 4g | 8% |

* Percent Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

**Ingredients:** Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

3.1 If you eat the entire container, how many calories will you eat?

3.2 If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?

3.3 Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?

3.4 If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?

3.5 Pretend that you are allergic to the following substances: penicillin, peanuts, latex gloves, and bee stings.
Is it safe for you to eat this ice cream?

o Yes (please skip question 6)

o No (please answer question 6)

3.6 Why not?

4.1 How useful do you feel the Internet is in helping you in making decisions about your health?

o Not useful at all  o Not useful  o Unsure  o Useful  o Very Useful

4.2 How important is it for you to be able to access health resources on the Internet?
o Not important at all o Not important o Unsure o Important o Very Important

4.3 I know what health resources are available on the Internet
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.4 I know where to find helpful health resources on the Internet
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.5 I know how to find helpful health resources on the Internet
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.6 I know how to use the Internet to answer my questions about health
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.7 I know how to use the health information I find on the Internet to help me
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.8 I have the skills I need to evaluate the health resources I find on the Internet
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.9 I can tell high quality health resources from low quality health resources on the Internet
o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.10 I feel confident in using information from the Internet to make health decisions
o Extremely Relevant o Very Relevant o Moderately relevant
o Slightly Relevant o Not at all relevant

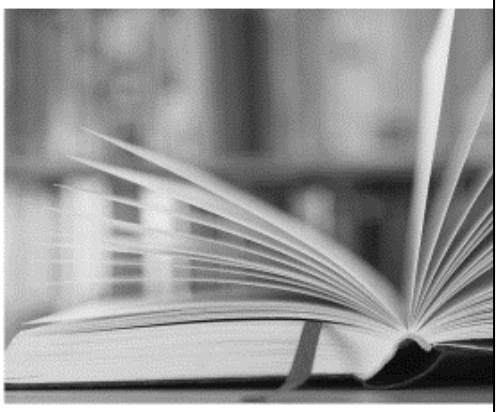
If you have any questions, please ask Mr. Scott or contact me. Mr. Scott has my contact information. I look forward to meeting you all and speaking to you about health literacy in a few weeks.

# APPENDIX I

## ADOLESCENT HEALTH LITERACY POWERPOINT

# ADOLESCENT HEALTH LITERACY

Claire Buckingham, RN
MSU DNP student



## Health Literacy

- What is it?
- Why is it important?

## Health literacy

- Where do you get your health information currently?
  - Parent/guardian
  - Family
  - Friends
  - Doctor or pediatrician
  - Media
    - Television
    - Radio
    - Newspaper
    - Internet

## Health information on the internet

- Internet
  - News pages
  - Search engines
  - Social media

## Online Source reliability

- How do you know the information you are getting is reliable?

## How to evaluate a health website

- Tutorial from the National Libraries of Medicine
  - https://medlineplus.gov/webeval/webeval.html

## How to evaluate a website

1. Who runs the site?
2. Why have they created the site?
3. What do they want from you?
4. Who is paying for the site? Does the site's information favor the sponsor?
5. Is the information reviewed by experts?
6. Where did the information come from?
7. Does the site make unbelievable claims?
8. Is it up-to-date?
9. Does the site want your personal information? Why?

## Examples

- https://www.healthychildren.org/English/ages-stages/teen/nutrition/Pages/A-Teenagers-Nutritional-Needs.aspx
- https://www.askdrsears.com/topics/feeding-eating/family-nutrition/teen-nutrition

## Where can you go for health information?

- Parent/guardian
- Family
- Friends
- Teachers
- Doctor or pediatrician
- ASK-A-NURSE
- Media
  - Internet

## Internet sources of health information

- Kidshealth.org
- Healthychildren.org
- Medline
- Mayoclinic
- WHO (World Health Organization)

# Apps

- HealthyChildren

healthychildren.org




# APPS

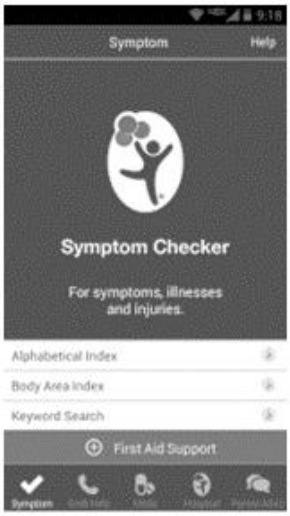
POCKET DOC

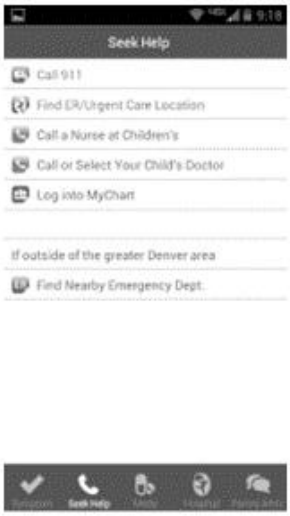





# APPS

ChildrensMD
Children's Hospital Colorado




# Questions?

# Resources


- Centers for Disease Control and Prevention. (2016). Health literacy. Retrieved from http://www.cdc.gov/healthliteracy/index.html
- Sears, W. & Sears, M. (2017). Teens need better nutrition. AskDrSears. Retrieved from https://www.askdrsears.com/topics/feeding-eating/family-nutrition/teen-nutrition
- HealthyChildren. (2017). A teenager's nutritional needs. *American Academy of Pediatrics.* Retrieved from https://www.healthychildren.org/English/ages-stages/teen/nutrition/Pages/A-Teenagers-Nutritional-Needs.aspx
- Healthy Children . (2017). Healthychildren.org. *American Academy of Pediatrics.* Retrieved from https://www.healthychildren.org/English/Pages/default.aspx
- Mayo Clinic. (2017). Mayo Clinic. Retrieved from https://www.mayoclinic.org/
- Nemours. (2017). KidsHealth. Retrieved from http://kidshealth.org/
- Patient Protection and Affordable Care Act, 42 U.S. C. § 18001 (2010).
- U.S. National Library of Medicine. (2017). MedlinePlus: Trusted health information for you. *National Institute of Health.* Retrieved from https://medlineplus.gov/
- U.S. National Library of Medicine. (2016). Evaluating internet health information. U. S. Department of Health and Human Services. Retrieved from http://www.nlm.nih.gov/medlineplus/evaluatinghealthinformation.html
- World Health Organization. (2017). World Health Organization. Retrieved from http://www.who.int/en/

# APPENDIX J

PRESENTATION HANDOUT

**How to evaluate a website**

1. Who runs the site?
2. Why have they created the site?
3. What do they want from you?
4. Who is paying for the site? Does the site's information favor the sponsor?
5. Is the information reviewed by experts?
6. Where did the information come from?
7. Does the site make unbelievable claims?
8. Is it up-to-date?
9. Does the site want your personal information? Why?

**Sources and Apps**

- Internet Sources
    - Kidshealth.org
    - Healthychildren.org
    - Medline
    - Mayoclinic
    - WHO (World Health Organization)
- Apps
    - HealthyChildren
    - PocketDoc
    - ChildrensMD

# APPENDIX K

## POST-TEST SURVEY

1.1 Dear Student,

Thank you for your participation in this project to improve health literacy. You are being asked to complete the following survey following the presentation on health literacy during your sophomore health class.

No identifying information is collected in the surveys. Your participation or non-participation will not affect your grade or class standing in any way. You may choose to answer or not answer any question and you may stop at any time. Do you wish to continue?

O Yes

O No

2.1 What number did Mr. Scott give you?

Please use the below ice cream nutrition label to answer the following 6 questions.

| **Nutrition Facts** | |
|---|---|
| Serving Size | 1/2 cup |
| Servings per container | 4 |
| Amount per serving | |
| Calories 250 | Fat Cal 120 |
| | %DV |
| **Total Fat** 13g | 20% |
| Sat Fat 9g | 40% |
| **Cholesterol** 28mg | 12% |
| **Sodium** 55mg | 2% |
| **Total Carbohydrate** 30g | 12% |
| Dietary Fiber 2g | |
| Sugars 23g | |
| **Protein** 4g | 8% |

* Percent Daily Values (DV) are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

**Ingredients:** Cream, Skim Milk, Liquid Sugar, Water, Egg Yolks, Brown Sugar, Milkfat, Peanut Oil, Sugar, Butter, Salt, Carrageenan, Vanilla Extract.

3.1 If you eat the entire container, how many calories will you eat?

3.2 If you are allowed to eat 60 grams of carbohydrates as a snack, how much ice cream could you have?

3.3 Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?

3.4 If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?

3.5 Pretend that you are allergic to the following substances: penicillin, peanuts, latex gloves, and bee stings.

Is it safe for you to eat this ice cream?

o Yes (please skip question 6)

o No (please answer question 6)

3.6 Why not?

4.1 How useful do you feel the Internet is in helping you in making decisions about your health?

o Not useful at all o Not useful o Unsure o Useful o Very Useful

4.2 How important is it for you to be able to access health resources on the Internet?

o Not important at all o Not important o Unsure o Important o Very Important

4.3 I know what health resources are available on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.4 I know where to find helpful health resources on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.5 I know how to find helpful health resources on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.6 I know how to use the Internet to answer my questions about health

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.7 I know how to use the health information I find on the Internet to help me

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.8 I have the skills I need to evaluate the health resources I find on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.9 I can tell high quality health resources from low quality health resources on the Internet

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

4.10 I feel confident in using information from the Internet to make health decisions

o Strongly Disagree o Disagree o Undecided o Agree o Strongly Agree

5.1 Have you learned the content of this presentation before?

- o Yes
- o No
- o Unsure

5.2 How might this presentation change where or how you look for your health information?

5.3 What was most helpful about this presentation?

5.4 Please share any additional comments you have about the presentation or this project

Thank you for completing the survey. If you have any questions, please ask Mr. Scott or contact me. Mr. Scott has my contact information. I greatly appreciate your participation in my study of health literacy in adolescents. Thank you.

# TABLES

Table 9. Evaluation Question 1 Responses

| **How might this presentation change where or how you look for your health information?** |
|---|
| What refrences that are not very good for you. |
| How do find better info |
| It will help me to double check information that I am reading about on the internet to see if its reliable. |
| I usually just asked SiRi cause she's a "Mrs. Know It All" |
| |
| He will help me because i know what to look for on the site and see if it is good enough |
| It showed some of the better sites to use for accuracy. |
| I might try and look on my own instead of going to my mom. |
| Checking the website to make sure its reliable and the information is true |
| I know to how to point out websites that are bound to have more quality info based on the owner/owners |
| it gives me reliable sources to use when they are needed in my life |
| It taught me more ways to make sure the sources I find health information from is valid and credible. |
| I will use the sources given, when necessary. |
| It changes how I look at health websites and actually trusting them. |
| it may change how i look at health information by looking at it more closely |
| i'll know what a higher quality health website looks like |
| It changes how i see if it is reliable or not. |
| that instead of the internet i could use apps |
| Because it was really informing and now I understand how to take care of myself better. |
| Now i know how to tell if a website is reliable. |
| Now I look for more resourceful sites |
| I will make sure to research who published the website before reading what they say. |
| It has changed my understanding of different ways to tell what sources are reliable. |

Table 10. Evaluation Question 2 Responses

| **What was most helpful about this presentation?** |
|---|
| Learning good websites to go to. |
| The information about who made the website |
| I thought that the evaluation of a website was most helpful because I can use this skill in every class. |
| all the websites |
| the card |
| It showed us what to look for in the sites we use. |
| learning all the new things, i mean i knew a little but now i know alot more than i did. |
| Learning to evaluate a health website and find health information on the internet |
| the sources provided |
| The different ways to find a credible health source |
| The sources given. |
| How to identify a trustworthy health website |
| what to look for in a website |
| examples of where to get good info |
| The websites |
| how to tell if its a good website or not |
| That I liked how she showed us how to go to the right and better internet sites and understand how we can take care of ourselves. |
| The websites that were given to us. |
| learning how to make good health decisions |
| How to tell if the website is useful and correct. |
| Learning how to evaluate a website. |

Table 11. Evaluation Question 3 Responses

| **Please share any additional comments you have about the presentation or this project.** |
|---|
| thanks for sharing this presentation with me i really learned a lot form this. |
| It showed how to use data and info in a good way so i can get the best info from quality websites rather then info that i dont need |
| big thumbs up from me |
| thank you for coming and teaching us about health literacy! |
| i liked it |
| Dont really have any but thank you. |
| I though it was very helpful. |
| I thought the presentation was very good and it was also very informative. |