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Pediatric Health Literacy

An Honors College Project Presented to
the Faculty of the Undergraduate
College of Health and Behavioral Studies
James Madison University

by Grace Gardyne Lloyd and Morgan Elizabeth Sapper

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Accepted by the faculty of the School of Nursing, James Madison University, in partial fulfillment of the requirements for the Honors College.

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Abstract

Background: Unless you are a healthcare provider or licensed healthcare professional, understanding the United States healthcare system and its accompanying medical jargon can be confusing and overwhelming to try to navigate. Even more difficult is comprehending what resources are available to specific populations and how to gain the most benefit from these offered resources. Limited health literacy skills have been identified as the largest barrier in identifying an individual's health outcomes. Health affects every stage of life. The purpose of this paper is to analyze what health literacy implementations look like as well as the age and developmental stage that is most effective for individuals to begin learning about health literacy, and how continued education for nurses can be centered around improving health literacy. By identifying these important components, the question of the importance of health literacy, where disparities exist, and what assessment tools are the most valuable in collecting data to create interventions can be further understood.

Methods: The method for answering this question includes a literature synthesis of academic resources. The sample size for this project is forty total sources, found through James Madison University's library database including PubMed, CINAHL, and EBSCO host. These sources define health literacy literature and related topics; the studies analyzed are interventions for pediatric health literacy. The collection of research was in an effort to answer our primary research question of what pediatric health literacy is and how interventions can be effective. There was a total of 8 sources involved in the literature review of Pediatric Interventions. Sources were chosen based on peer-reviewed status, relevancy and date.

Results: Our findings indicate the importance of health literacy, the individual's understanding of their healthcare needs and being able to communicate this with healthcare professionals in order to set them up for lifelong well-being. Findings also indicate that it is important to begin education about health, wellbeing, and autonomy in childhood, defined as ages school-aged (age 5-12) interventions, and adolescent interventions (age 13-17).

Discussion: The research findings support the thesis of early intervention. Health literacy education as early as school-aged and into adolescence allows children to continue to grow in understanding their health as they age; thus, becoming individuals who can make sound judgments and take control of their own health later in adulthood. Health literacy is of great importance for physical well-being and the foundations for this need to be laid in childhood.

Key words: health literacy, pediatrics, childhood intervention, health, comprehension

Introduction

Health literacy is of increasing importance in the constantly changing health field. Overall literacy is one of many factors in determining health literacy. According to the U.S. Department of Education, 54% of U.S. adults 16-74 years old - about 130 million people - lack proficiency in literacy, reading below the equivalent of a sixth-grade level (National Center for Education Statistics, 2019). Literacy is a national problem and is lower than expected. Health literacy rates are even more staggering: only 12 percent of English-speaking adults in the United States have proficient health literacy skills (USDHHS, 2020). The severity of both illiteracy and health illiteracy is harmful to individuals. There are many factors that can impact one's literacy levels, both general literacy and health literacy specifically, leading to disparities. These factors include income, education level, primary language, etc. and these differences in literacy levels are a major factor in resultant health disparities that may occur across the lifespan (Rikard, 2016). As research surrounding psychology and learning has progressed, more assessment tools have been created and utilized to measure health literacy levels. Once this assessment has been conducted, results can be synthesized to plan implementation to increase a patient/client's health knowledge. The ability to assess an individual's health literacy and then gear their healthcare towards their needs is an important skill for licensed healthcare professionals. The research indicates that intervention is most effective for the pediatric population, whether that be in childhood or adolescence (Bröder, 2017). Nurses are uniquely situated as being in the position to assess and influence a patient's understanding - increasing patient knowledge and understanding. In order to make the needed strides nationally for increased health literacy, continued education for nurses is needed. The research findings support the thesis of early intervention. Health literacy education as early as school-aged and into adolescence allows children to continue to grow in understanding their health as they age; thus, becoming individuals who can make sound

judgments and take control of their own health later in adulthood. Health literacy is of great importance for physical well-being and the foundations for this need to be laid in childhood

Synthesis of the Literature

Defining Literacy

In order to fully understand health literacy, the overall concept of literacy is to be defined and explored. The National Literacy Act of 1991 defines literacy as ‘an individual's ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential’ (Public Law 102–73, 1991). Literacy impacts every aspect of daily life from reading menus to prescription bottles. Literacy experts also point out that literacy skills are context and setting specific. This means that an individual may have adequate literacy skills in one content area, but inadequate skills in a different content area or setting (Parker, 2000). It is also important to note that there is a relationship between literacy and health literacy, but this is a complex relationship. Even if someone knows how to read, they may not have a high enough literacy level to process medical information.

Nationally, literacy statistics are lower than expected. “1 out of every 6 adults in the U.S. lack basic reading skills – that means 36 million people can't read a job application, understand basic written instructions, or read the Internet” (Miller, 2017, p. 22). This national concern is addressed in government plans and metrics such as Healthy People 2020 and National Action Plan to Improve Health Literacy by the US Department of Health and Human Services. “Literacy has multiple components, including oral literacy (listening and speaking skills), print literacy

(writing and reading skills), numeracy (the ability to understand and work with numbers), and cultural and conceptual knowledge” (Language and Literacy, para. 1). There is not just one historical factor or event that has drastically improved the literacy of both adults and children but rather many initiatives over time step back and note the overall direction of health literacy rates. There is still lots of improvement that needs to occur on the national level. Increase in literacy has longer historical roots than this awareness of even the concept of health literacy. The two are related but not the same.

Defining Health Literacy

What is health literacy? Health literacy is the ability of an individual to understand information about their health and use the information to make sound judgements and goals directed towards their well-being. It is estimated that approximately 36% of Americans have less than basic health literacy (NAAL, 2006). With growing knowledge about learning and the brain, experts began to ask if literacy, or lack thereof, had an impact on the way individuals interacted with medical professionals. The assessment of health literacy in children can be done through multiple diagnostic tools and these metrics are used to get results related to how to improve health literacy. These metrics allow for interventions to be evidence-based and used at the most effective developmental time. Some factors found to impact an individual's health literacy level are socioeconomic status, education, English as a second language, and being part of a minority group (Parker, 2000). There are many correlations that can be drawn among different environmental factors and an individual's health literacy. Understanding a disease process is complicated, as is the added confusion of complex medical terminology, leading to a lack of health literacy for the average adult. In general, researchers demonstrate that interventions to improve health literacy in adults are unsuccessful. Geboers (2018) maintains that health literacy

education is something that needs to be obtained before adolescence. The age of implementation for education is one of the strongest predictors. This literature synthesis seeks to explore the topic of health literacy and the interventions that are most effective in improving health literacy; is pediatric intervention the most effective?

This National Action Plan to Improve Health Literacy, created by the U.S. Department of Health and Human Services and endorsed by Howard K. Koh, M.D., M.P.H., the Assistant Secretary for Health, is based on the principles that (1) everyone has the right to health information that helps them make informed decisions and (2) health services are delivered in ways that are understandable and beneficial to health, longevity, and quality of life. Some of the tenets of this include promoting changes in the healthcare system that improve health information, communication, informed decision making, and access to health services and supporting and expanding education of local efforts to provide adult education, English language instruction, and culturally and linguistically appropriate health information services in the community. There is a push to come together and build partnerships between, for example, governmental agencies like the Department of Health and Department of Education to develop guidance and change policies. In the field of ever-developing research, the goal is to increase basic research and the development, implementation, and evaluation of practices and interventions to improve health literacy. The purpose of this National Plan to Improve Health Literacy is to translate the problem and the needs into tangible actions as stated:

“[The Plan] aims to stimulate a society wide movement to make the vision of a health literate America a reality. No single action will be sufficient, and disconnected actions

will not create the scale of change required. This plan provides an integrated framework to bring together organizations and people at all levels of society to work for fundamental changes in the design and delivery of health information and services” (U.S. Department of Health and Human Services, 2010, p. 48)

These goals will hopefully enact change and increase health literacy. Health literacy involves multiple mental processes and cognitive facets, centered around an intake of health information, synthesis and comprehension that makes the information personal. Because of this complexity, there are different levels of health literacy where one can be. Nutbeam (2000) has found one of many ways to measure and classify an individual's health literacy into one of three sequential levels, basic/functional level, communicative/interactive literacy, and critical literacy. An individual falls into the first category of basic functional health literacy if they have basic reading skills that allow them to complete basic life skills autonomously. An example includes being able to read a provided pamphlet or prescription instructions and to follow along with basic understanding of a diagnosis and the instructions being provided. The next level and slightly more advanced is communicative and interactive literacy. Individuals fall within this stage if they are able to listen to medical advice or instructions verbally and take away knowledge or ask clarifying questions about what the licensed healthcare professional is saying. An example of this type of literacy includes listening to pre-operative instructions given by a doctor and understanding and following directions to not eat before surgery. The most advanced health literacy level is critical literacy, which refers to the ability “to critically analyze information and use this information to exert greater control over life events and situations” (Nutbeam, 2000, p. 264). In the critical literacy level, a parent may learn about the effects of high cholesterol on future health outcomes and go home and make healthier eating choices for

themselves and their families. In this case they are learning about long-term diseases and the meaning of lab values and using this knowledge to make small health changes that can prevent negative long-term outcomes. Each one of these levels is able to measure health literacy and correlates their knowledge with their ability to be autonomous and in control of their health outcomes. The higher an individual's level of health literacy, the more independent and successful they are expected to be in terms of their own individual health management.

The push to increase health literacy through concerted interventions is relatively novel. “As findings emerged that literacy is linked to health outcomes, interest in efficacious action increased” (Rudd, 2015, p. 8). When compared to centuries of medical research, the knowledge about the science of learning and literacy is relatively new, beginning within the last 30 years. This provides an explanation for why this idea of health literacy is an evolving topic that many clinicians are only now incorporating into their practice. “Research linking literacy skills to health outcomes firmly began after the publication of findings from adult literacy surveys conducted in 22 industrialized nations in the early part of the 1990s” (Rudd, 2015, p. 7). Thirty years of research and implementation is longitudinally a short amount of time, with ever-changing information as parts of society progresses such as technology.

Disparities and Poor Health Outcomes

This misunderstanding regarding health care topics is multifaceted; contributing factors include lack of education, access, or comprehension, all which are interrelated. It wasn't until recently that this was even considered to be a part of patient care, understanding that the patient and their health outcomes are affected by their environment. For example, vegetables are more expensive than fast food so lower socioeconomic areas may see an increase in BMI or weight

gain. In the way that finances affect diet and health, education and thus health literacy is also impacted. The lack of health literacy and patient comprehension was recognized largely by the advances in healthcare and the push for patient self-management of health. This has brought increasing attention to the ability or inability of individuals to understand and make informed decisions about their healthcare (Cutilli & Bennett, 2009). This gives direction for research and professionals moving forward. Another factor that could be at play is the caregiver or parent's reading level which directly affects the children's reading level. There is research regarding the relationship between parental health literacy and the impact that this has on child health literacy as well as child health outcomes. According to Betz, "preliminary findings suggest that low parental health literacy is associated with worrisome and negative child health outcomes" (2008, p. 235). It is the role of the nurse to perform assessments on parents, transition-age youth, and children regarding their health literacy levels and areas of improvement. This can sometimes be difficult to assess due to multiple confounding factors. Low health literacy is also more prevalent among racial and ethnic minorities, older adults, and individuals who have not completed high school, spoken a language other than English before starting school, or who are living in poverty (U.S. Department of Health, 2010). An important disparity exists between divergent socioeconomic classes; this plays into an individual and family's health based on their level of access. Healthcare comes with increasing costs that are becoming less accessible for those with lower incomes, leading to poorer health outcomes based on socioeconomic status (SES).

Rikard examined health literacy disparities in the United States and that in order to increase health outcomes, a fundamental shift needs to occur. "Instead of focusing on health literacy as an individual deficit; a shifting perspective of health literacy emphasizes the

importance of social context, the role of social interaction, and the creation of social connections as an asset” (Rikard, 2016, p. 1). When the national recognizes the severity of this problem and the changes needed, then will the disparities cease to exist. The impacts of these health factors affect these individuals throughout their entire life and continue to build on each other preventing further development of health literacy skills later on in life.

The reason health literacy is of vital importance is because of its correlation to low health outcomes. The U.S. Department of Health and Human Services (HHS) definition of health literacy is “the degree to which individuals have the capacity to obtain, process, and understand basic health information needed to make appropriate health decisions” (U.S. Department of Health and Human Services, 2010, p. 1). HHS estimated 80 million Americans are considered to have low health literacy. This is a staggering number of individuals not understanding the language and procedures surrounding their physical healthcare. Thus, a large number of individuals who could have poor health outcomes. Every individual should have the fundamental right to information and education that encourages and allows them to make sound decisions regarding their health and well-being.

As early as 2004, researchers were addressing the correlation between low literacy and bad health outcomes. Darren DeWalt, who holds both an MD and a MPH, formed a team to review this relationship and this systematic review confirmed the association of low literacy with many adverse health outcomes. They began by exploring the relationship between reading and healthcare: “Based on the published data identified by our systematic review, reading ability is related to knowledge about health and health care, hospitalization, global measures of health, and some chronic diseases. People who read at lower levels are generally 1.5 to 3 times more likely to have an adverse outcome as people who read at higher levels” (DeWalt, et al., 2004, p. 1236).

Low literacy rates lead to lower health literacy rates. While this is true, there are many confounding factors at work that can also not be ignored, such as race, stage of presentation of illness, socioeconomic status. It is often that these are not accounted for, but DeWalt's team did not forget:

A key aspect of understanding the true etiologic relationship between reading ability and health is the analysis of confounding factors. If researchers do not appropriately address confounders, they risk misestimating the independent relationship between reading ability and poor health, leading to faulty conclusions and policy decisions, including ineffective interventions. For example, reading ability may be associated with a lack of health insurance or poverty, both of which affect health outcomes (DeWalt, et al., 2004, p. 1237).

This study exemplifies the complexity of the issue but draws clear results regarding a correlation between health literacy and healthcare decisions. The reason to improve health literacy is to improve health outcomes. The first step in this process is an assessment of levels of health literacy that exist in children so that in-need populations can be targeted for education and intervention. The variety of assessment tools used is explored below.

Assessment Tools of Health Literacy

There are a variety of assessment tools used to objectively measure health literacy of both adults and children. These diagnostic, psychologically based tests provide data related to make the abstract idea of low versus high health literacy levels a reality. It is important to have metrics able to assess, measure, and compare individual health literacy levels in order to know where improvements can be made. This data can be used to maximize their understanding in the presentation of healthcare material. This will promote one's authority over their own healthcare.

The assessment tools that will be discussed include the New Vital Sign (NVS), REALM, REALM-teen, and WRAT-3.

The Rapid Evaluation of Adult Literacy in Medicine (REALM) is a reading recognition instrument, based in healthcare words. This tool is one of the most effective in determining health literacy because it can be evaluated efficiently in under three minutes and can provide a reading grade estimate for anyone below a ninth grade reading level (Collins, 2012). It is important to note that this evaluation instrument does not measure understanding, however, the way the test is administered is outlined.

REALM is an instrument that is one page in length and contains a list of 66 words related to health. The individual says each of the words out loud to the evaluator to the best of their ability. If the individual does not know how to pronounce a word, they are asked to try their best or to say “skip” and move on. The client has five seconds to read aloud each word while the evaluator marks them off on their paper. Once the individual finishes a raw score is calculated by the number of correct responses the individual had. The raw score is later converted to connect with a grade range estimate (Murphy, Davis, Long, Joelson, & Decker, 1993).

This procedure illustrates the depth of which these diagnostic assessments explore one’s reading level. Statistically, the REALM appears to provide highly reliable data. Peer-reviewed and research results are explored below. There is also a The Rapid Evaluation of Adult Literacy in Medicine Teen (REALM-teen), geared to adolescent health. “Both tests commonly used health terms; with the REALM-Teen, the difference is that the words to be recognized are geared toward teen health” (Davis et al., 2006, p. 4). This differentiation is important based on different developmental stages of children as they grow up and have more understanding of their health needs. The existence of a similar but separate test proves the importance of exploring this need.

This concept of age-appropriate implementation will be explored in more detail in the following pages.

Another measure of adolescent health literacy is the Slosson Oral Reading Test-Revised (SORT-R), which evaluates an individual's ability to pronounce words at various levels of difficulty. Creator Richard Slosson reinforces that the SORT-R tool has "historically held a respected position in education as a quick screening test to determine a student's reading level" (Slosson, 2002, para. 1) since its creation in 2002. This test only takes 10 minutes to administer thus giving an initial screening result. It is typically used for regular education testing populations so for the purpose of this study, it has the limitation of not being related to healthcare. In regard to reliability and validity, the SORT-R has adequate reliability, but the test has limited relevance to school-based instruction. The content and construct validity of the SORT-R is questionable. This would be a good test to show overall literacy level but not when related to health literacy or pediatric understanding of healthcare.

The Wide Range Achievement Test-Revised (WRAT-3) is a nationally standardized achievement test consisting of letter reading (naming 15 letters) and word reading. This test was devised in 1995 and has had alterations to be more accessible. Researcher Heins describes the effectiveness of the WRAT test: "Assessing [the] level of formal education is easy, but unfortunately not always an accurate indicator of literacy. Tests such as WRAT can be used to evaluate an individual's literacy level. Their best use may be to assess reading levels in targeted groups prior to development of educational materials rather than for individual assessment in clinical practice" (Heins, 2001, p. 105). In order to prepare effective material in advance, this test would allow you to get information on how a kid can receive literature so you can improve retention. This diagnostic test is an effective tool to get a baseline measurement of literacy for a

group. Similar to the REALM and REALM-teen, this provides a snapshot of overall literacy, not health literacy.

As discussed, there are a variety of resources that give a measure of one's reading level since literacy is a topic that has been more researched in the past, when compared to health literacy. Shealy notes "Most tools currently available primarily measure health literacy by assessing reading skills" (Shealy, 2016, p. 686) which shows a deficit in the metrics for assessing health literacy. The New Vital Sign was created to add an alternative measurement, gauging quickly a patient's level and ability to understand.

The Newest Vital Sign (NVS) is a tool that has been used to assess health literacy in a variety of patients. It has been validated against other measures. Patients are categorized as high likelihood of limited health literacy, possible limited health literacy, or adequate literacy. The NVS has been used in a variety of settings and tested among a wide range of patient groups. The NVS is reliable and relatively easy to administer in various health-related environments. This may be a particular advantage of this tool, compared to others, in busy health care settings, such as pharmacies, hospitals, and primary care clinics." (Shealy, 2016, p. 686).

The New Vital sign offers a quick, effective, health-centered alternative, in addition to all the reading comprehension diagnostics. Similar to the other assessment tools, it provides information about entry level and how to move forward in education of healthcare topics. This tool is not being as widely utilized as it could be (Shealy, 2016).

The variety of assessment tools exhibits the breadth and depth of this concept of "health literacy" and how difficult it can be to define and work around. The benefit of the accessibility of multiple tools is that their findings are able to cover each other's gaps to hopefully provide a

more complete picture of an individual or group's health literacy. The data from these tools can be interpreted to point to correlations that inform decision making in regard to improving health literacy.

Assessment Tool Findings

The existence of these tools provides statistics and interpretations of varying needs across different levels of both literacy and health literacy. Literature surrounding the assessment tool findings will be discussed but is not limited to these studies. Elizabeth Perry performed an integrative review surrounding 10 different studies that focused on instruments and interventions that promote health literacy in adolescence. The Rapid Estimate of Adolescent Literacy in Medicine (REALM-teen) was found to be the only “reliable and effective health literacy instrument for adolescents” (Perry, 2014, p. 212). All ten of the studies that Perry reported in the literature review took place in a school setting rather than a clinical or hospital setting. These outcomes proved that “it is, indeed, feasible to improve health literacy among adolescents with specific health literacy interventions in schools” and it also opens doors to further investigate health literacy interventions that combine general literacy and health education (Perry, 2014, p. 215). Ultimately, it is important to note that there is a scarcity of information surrounding health instruments and interventions for improving childhood (ages 5-12) and adolescent (ages 13-17) health literacy however, the REALM-teen instrument is a step in the right direction of quick ways of assessing literacy for now, but more work needs to be done.

The results from an analysis of the Newest Vital Sign (NVS) revealed that there are very few facilities and studies surrounding the NVS and its use in advancing health literacy. It proved effective when used; “The NVS had good sensitivity; in fact, based on the distribution of scores. Although the specificity of NVS may result in overestimating the percentage of patients with

limited literacy, using the test can alert physicians to patients who may need more attention and help physicians focus on physician-patient communication using recommended techniques" (Weiss et al., 2005, p. 520). The implementation of this could change the tide in healthcare and health literacy. Researchers explored the possibilities of implementing the NVS in a variety of settings including both primary care and non-primary care, "The creators and authors of the original research on the NVS tool described future intentions to investigate the validity of the NVS in non-primary-care settings and determine whether raising clinicians' awareness of patients' literacy level by using the NVS improved clinician-patient communication and gave better health outcomes (Weiss et al., 2005, p. 521). The hope is that this could become part of the routine patient assessment, allowing healthcare professionals to have a complete picture of a patient's physical symptoms and also their literacy level.

Methods

The method for answering this question includes a literature synthesis of academic resources. The sample size for this project is forty total sources, found through James Madison University's library database including PubMed, CINAHL, and EBSCO host. Among many keywords, the search terms included health literacy, pediatrics, childhood intervention, health, comprehension. Results were further narrowed down based on evidence-based status. These sources defined health literacy literature and relating topics; the studies analyzed are interventions for pediatric health literacy. The collection of research was in an effort to answer our primary research question of what pediatric health literacy is and how interventions can be effective. There was a total of 8 sources involved in the comprehensive literature review of Pediatric Interventions. Sources were chosen based on peer-reviewed status, relevancy and date.

The purpose of these studies and results were then analyzed and compared (see Appendix 1) to get a fuller understanding of pediatric health literacy interventions.

Interventions

In order to know what intervention is the most effective, there has to be a measure of what can be considered “effective.” Effectiveness could be based on assessment testing scores improvement or based on meeting the needs of the population - and noting an improvement in literacy at that level. Different populations and subgroups also have been shown to have different needs and issues that may need to be addressed on an individualized level, and tailored to that person’s needs (Sheridan, 2011). If interventions are geared to fulfill these needs, they will be the most productive. It is easily observable across the nation that different areas and populations have different social and medical needs. This knowledge of the power of pediatric intervention prompts licensed healthcare professionals to question the needs in their area and how they can gear education towards the areas of lack. Problems can range from obesity, diabetes, drug use or heart conditions. By looking at the medical issues of the adults in an area, healthcare professionals can tailor the education for children to the specific problem. There are some universal teaching methods that may be helpful to all but also some interventions that will be most effective based on population.

Geboers researched this with the development of a Health Literacy Intervention Model, with central research questions relating to both pediatrics and health factors such as, “Do environmental factors play an integral part in the needs of a community and the health literacy of that respective population?” and, “Are children young enough to not be affected by their environments before receiving health literacy?” (Geboers, 2018, p. 1268). Understanding the needs of a particular population and how a child’s environment impacts this is important

information that needs to be obtained prior to the development of an education curriculum or set of interventions to improve health literacy among the population of that particular area or region.

The power of education in healthcare begs the question: when is intervention most effective? The interventions should begin in childhood, when the child is in elementary school: “Health literacy is understood as a variable construct that is acquired in a life-long learning process, starting in early childhood” (Bröder, 2017, p. 2). The assessment tools provide context. With readily available statistics about lack of education, the next logical step is creation and implementation of interventions. Interventions typically include education, though this can take many different forms. This education on health literacy has taken an emphasis on skill building, and delivery by a health professional, for example, a pharmacist or a diabetes educator (Lambert, 2014). Skill building can be interpreted as the ability to comprehend results such as blood pressure readings or processes such as the administration of insulin. This can also include education on the importance of management and persistence, hands-on skills for how to monitor for certain symptoms and performing self-assessments, and when it is appropriate to consult their primary care provider. Education is a universal concept to all ages across the world and can be empowering for someone to change the course of their life.

This education can begin as young as with infants. An example of early intervention occurred surrounding babies at their pediatrician. Child health nurses (CHNs) in Western Australia aimed at implementing an early literacy program for new moms. The goal is for CHNs to use their “medical authority” to teach parents about the importance of beginning to read to your baby at young ages and how this can help their development at as early as six months old. This early literacy program is designed to supply parents with a suitable book and information on reading to infants at a child’s seven-month check-up (Hewer, 2006). Nurses understand that

reading to children at this young of an age does not necessarily teach them reading or language skills, but it can help lay a foundation for children later on by promoting concentration and focused language stimulation. By supplying parents with appropriate books at a child's check-up and encouraging reading, the aim was to reassure parents that it is developmentally appropriate to begin at this age. This is an example of early intervention by parents. The topic of direct intervention to the children themselves is to be explored, as it proves to be effective.

What level of development is most effective to improve retention? The basis for why age of intervention is being considered is the correlation between age of intervention and health literacy. In the 2009 study from NAAL, researched and interpreted by Cutilli and Bennett, Adults who aged 65 and older had the lowest average health literacy when compared with the other age groups. Adults aged 25–39 had higher average health literacy when compared with the other groups (Cutilli & Bennett, 2009). These findings could be indicative of many factors but show that those in advanced age have a less developed understanding of health. Interventions to improve health literacy have been found to have little to no success in adults when focusing on increasing knowledge, improving self-efficacy, and changing behaviors (Verney, 2019). Later in life, moving into adulthood, the studies have found that retention is lower. The effects of teaching one about their health in later adulthood also results in years of habits of not taking proper care of the body. By that point, it may be difficult to make the needed changes in a healthy lifestyle.

Childhood Interventions - Review of the Literature

In conjunction with our research findings, we created and presented an educational model to the children of the Gus Bus (see Appendix 2). These children were in grades second through fifth, which is an effective age for education and the target population of this study. In

further reviewing and synthesizing literature related to school-aged intervention, the conviction of its importance is only made clearer. The availability of literature related to health literacy in general is growing but “While much academic discourse pertains to the importance of building parental health literacy, there is less literature that explicitly focuses on child-centered health literacy” (Velardo, 2017, p. 8). It is a juxtaposition between the importance of early education and the quantity of studies. The questions to be explored are, how is pediatric health literacy implemented? What setting allows for the most learning? What delivery method is most effective for school-aged children at their developmental stage? And, at the school-aged level, what other contributing factors are at play? There are limited interventions in existence: involving those for young children that include parents, school-aged (age 5-12) interventions, and adolescent interventions (age 13-17). The focus of this cessation will be the Pediatric Interventions and their effectiveness, followed by a short argument for Adolescent Interventions.

Firstly, the developmental stage is to be defined. Jean Piaget was a psychologist who worked on childhood development, specifically cognitive development. For middle childhood, around ages 7-11, the average child is in the Concrete-Operational Thinking stage. “According to Piaget, thinking in this stage is characterized by logical operations, such as conservation, reversibility or classification, allowing logical reasoning” (Börnert-Ringleb, 2018, p. 1). Children are able to process and understand reality and concrete situations but cannot wrap their minds around hypotheticals. This is perfectly applicable to health because learning about the body and taking care of one’s body is very tangible. This background of the way a child's brain works and processes information allows education to meet them at their level. “Therefore, knowledge of the mental operations involved might contribute to the development of effective instruction”

(Börnert-Ringleb, 2018, p. 3). This can be applied to both children's general education as well as their health literacy education. At this age, they are willing to accept instruction, so the teacher is incredibly important in their scheme of the world. "...more recent research highlights the importance of interaction between child and educators for developing cognitive competencies" GRAC (Börnert-Ringleb, 2018, p. 2). The children in the Concrete-Operational stage are incredibly open and susceptible to being taught and can complete concrete tasks. If education is geared to the appropriate developmental stage, and paired with real, palpable tasks to be accomplished, the children of this age will benefit the most.

The school is the best place for this education. In 2016, McDaid and team investigated the co-benefits to the educational sector of investing in the health literacy of students. There was an awareness of the importance to develop health literacy skills early in life and most participants held this belief. The school setting appeared to be the most conducive to learning as the children were already gathered, materials were present, social norms and principles regarding school were in place. It became clear that "the promotion of health literacy for children and young people will typically be delivered outside the health sector, often in the education sector" (McDaid, 2016, p. 5) as it is unrealistic to create a "third place" outside of home and school just for the purpose of this education. The children are in school five days a week as opposed to the once-a-year visit to the pediatrician, therefore it will have the most lasting impact in this setting.

McDaid noted an implementation trial program that classified a school as a "Health Promoting School" in that health literacy was something that could be considered a valuable investment. "Embedding health literacy within routine educational activities, aids implementation and additional costs may be considered a reasonable investment if the needs of

the educational sector are also met” (McDaid, 2016, p. 5). It is clear that McDaid recognized the value of incorporating health literacy into everyday education beginning at a young age, noting that the additional costs of this education are worthwhile because the long-term investment can pay off in the future of children’s health and well-being. “Health Promoting Schools therefore demonstrate an example of a general health promotion programme in schools that can contribute to better health literacy. They can foster health literacy explicitly through teaching, as well as implicitly by providing examples of good practice, improving community relationships and creating supportive school environments” (McDaid, 2016, p. 14). Schools in this model center learning or lessons around healthy habits through multiple outlets. A large part of this equation includes the role that the teacher plays a large part in education. In these school settings, there is a balance to find in navigating what the students need and what the teachers need. There is a need to understand, however, how this is operationalized and incorporated into lesson planning and implementation.

For children, the information needs to be adapted to their cognitive level of maturity. “In light of the recognition that health literacy is an important determinant of health for adults, addressing child health literacy early on is essential to maximize future health outcomes. Meeting children’s specific needs arguably includes the delivery of information that can be easily accessed and understood by younger age groups” (Velardo, 2017, p. 5). There is the risk of presenting material that goes right over their heads, thus wasting the efforts of education. The children need to be able to comprehend the topic being presented and take the information into their own contextualization of a healthy self. For elementary school-aged children who are in the

Concrete Operational Stage developmentally, it will be best if education involves the children making comparisons between these abstract concepts and their physical bodies.

The teachers also have needs if expected to collaborate in health literacy education. Objectively, this is not the background or training of the elementary school teachers. There will be a need for education and instruction of evidence-based practices and research for all teachers. McDavid also reviewed what the teacher's needs would be in a Health Promoting Schools: "This review concluded that to be effective such training courses should include practical experience and skills, taking account of differences in teacher needs. Barriers to health training that need to be overcome included limited time, balancing the breadth and depth of courses, and inequalities in access to training" (McDaid, 2016, p. 19). This could be more of a reality for a greater number of schools if these barriers did not exist. It is difficult to navigate this education without putting a burden on the teachers in their already busy schedules with the demands of their regular obligations.

Marco Franz's (2011) example of teacher education related to pediatric implementation comes from GeKoKids which sought to create school-based programs for elementary schoolers and to gauge what methods will increase the response of schools, students and parents. There were many goals and areas of focus detailed below: "The GeKoKids programme was developed as a compilation of components of already published health promotion and prevention programmes for children aged 9 to 13 years. The goals of the GeKoKids programme are: the promotion of dental health, the promotion of vaccination, the prevention of starting smoking, the prevention of chronic pain, the prevention of obesity including an improved nutritional status, and the promotion of physical activity" (Franze, 2011, p. 340). The main goal was promotion of

health literacy; the teachers were part of this effort. The teachers were able to receive three special training sessions regarding implementation of the GeKoKids Program, specified for each area. For the Nutrition module, the teacher training was “instruction referring to overweight and obesity, teachers were informed about epidemiological and medical aspects (e.g., the definition of overweight and obesity, prevalence rates and associated diseases). Furthermore, the five teaching units were described in detail.” (Franze, 2011, p. 342). Not only did they learn the material to teach, but they also learned the background needed relating to medical information to present a cohesive unit. In reviewing with teachers, they noted that the teaching material was “predominantly student-oriented” and based on “student-centered learning” which allows for maximum retention. There were five total nutrition lessons and each of them were suited well to school aged children in the Concrete-Operational developmental stage as they had a variety of activities to make the concepts concrete.

“In the first unit, students describe the most important nutrients and their effects on the body, and learn about the related foods. Within the second unit students classify their regularly consumed food into different food groups. This unit also includes knowledge of the “food pyramid” and recommendations of healthy food. The third unit offers several learning stations that allow students to taste and smell different fruits and vegetables, and to determine the different sugar and fat contents of sweets, snacks and beverages. Within the fourth unit, students learn how to prepare a healthy breakfast, including aspects of food shopping. The invitation of other classmates to a breakfast and positive experiences while eating together are the goal of the fifth unit” (Franze, 2011, p. 342).

This is just one detailed example of how the program works through complicated health topics to make it accessible to children. It is through this breakdown that children are able to process and comprehend topics. With an activity such as making a healthy breakfast, they are able to adapt knowledge to fit the context of their lives. These activities support McDaid's findings about early intervention: "It also makes sense to invest early in the life course for all health literacy actions, thereby maximizing the opportunity for these actions to positively influence the life chances of children. Empowering children to take control and make informed decisions that can influence their health can have immediate benefits for their health and well-being, but there are also opportunities to enhance critical health literacy skills that can last for a lifetime" (McDaid, 2016, p. 23). These activities implanted by GeKoKids match this goal of empowering children.

This example shows the teacher involvement in health literacy programming implementation. With pre-planned programs such as this, the hope is that teachers will not bear the burden of material creation. This programming was well-received, as the teacher evaluations indicated that the teachers had no need to change or add to the material; it was well suited for their classrooms of 5th and 6th graders. One teacher evaluation shared: "The material is easy to integrate into the regular curriculum of the school subject biology in grade 5, which offers a good opportunity to implement such a programme" (Franze, 2011, p. 345). This models the coalition that can exist between schools, educators, and healthcare professionals working to educate children. This study proves that with extra planning and education, it is very possible to incorporate health literacy into the school day.

Even with focusing just on the school-aged implantation of health literacy, there are many contributing factors at hand. Here, the variable of parents plays a large role in the child's developmental stage. In Alexandra Fretian's 2020 study "Exploring Associated Factors of Subjective Health Literacy in School-Aged Children," the research team explores the variety of factors that could be at play. The methods for this were "based on a cross-sectional study in which health-related data were obtained from fourth grade schoolchildren as part of a study validating a newly developed measure of children's subjective health literacy" (Fretian, 2020, p. 1720). By using this cross-sectional method, they were able to examine multiple relevant components in a child's life. In the way that socioeconomic status affects both literacy and adult health literacy, it is also a determining factor when looked at elementary schoolers.

"Family affluence was the only significant variable in the first model and remained significant even when controlling for functional health literacy, self-efficacy, and health-related motivation in the last model. While material living conditions and socio-economic status have manifold implications for healthy child development and seem to play a role in shaping health literacy of children at the same time" (Fretian, 2020, p. 1705).

Following an analysis of the statistics, the significance of family affluence was striking. In analyzing and discussing this, it is meaningful to recognize that children have no authority over this area. The situation and family that a child is born into will determine many factors, including how healthy the child will be. Not only is health impacted, but so is their individual understanding of health: their health literacy. Another striking correlation found that: "children

with higher family affluence perceived dealing with health information to be significantly easier than their less well-off peers did” (Fretian, 2020, p. 1718). This quote illustrates the concept of health literacy well. When an individual is able to process and understand the information being communicated to them by their healthcare team, they are able to make empowered decisions. If affluence is correlated with this level of understanding, then those with lower socioeconomic status are at a disadvantage.

These findings indicate why early intervention can be effective. While children are educated in the home, their formation also largely comes in in the school setting. A child from a lower socioeconomic status family is not necessarily predestined to have low health literacy. The other factors at play include education of parents, engagement with healthcare teams, reading materials, and school in the area. Another correlated factor from the study by Fretian and team includes the student’s motivation to learn. “Based on the results of this study, it can be hypothesized that the motivation to learn something new about health, as well as a supportive environment in which health-promoting behaviors are endorsed, could benefit the health literacy of children” (Fretian, 2020, p. 1718). The in-school interventions will prove most effective if the children perceive support from their teachers and staff and also have some intrinsic motivation to learn.

Childhood intervention includes starting conversations about healthcare at an elementary school age. With matters like physical health that develop and change over a lifetime, there is a need for interventions at all ages, including pediatrics. Koller explores the way that “assessment of children’s competencies continue to be largely influenced by developmental stages and

theories” (2017, p. 2658). This is age-dependent which is why it is important to use assessment tools to get baseline information about what the child is able to understand.

“In contrast [to adult education], healthcare education for pediatric patients remains highly variable: some children are provided opportunities to learn and engage in health-related discussions while others are not. This is particularly the case with younger children (two to six years of age) or children with complex care needs and intellectual disabilities, despite research repeatedly showing that young children, for example, are capable of understanding complex medical issues. Therefore, evidence from research is disconnected from pediatric practice” (Koller, 2017, p. 2659).

This disconnect exists because the lack of a standard of care involves including children in their own healthcare. This exists across all ages, despite ever-advancing developmental stages; this could be hurting the future of these children. Some professionals view school-aged children as “too young” or want to shield them from complicated topics. But attainable education is possible. An example of a successful intervention in school-aged children was by UCLA/Johnson & Johnson Head Start Management Fellows Program in the Health Care Institute (HCI), implemented in 2001. The program director recognized “many of their families were not making full use of the programs and resources available to them. The reason, was their lack of knowledge about basic health care.” (Johnson & Johnson, 2019, para. 2) This spurred action. The Head Start program worked to educate both parents and children on a variety of health issues; results were evident. The researchers found that around 70% of those children involved in this program were able to identify the difference between foods they should eat more often, or less often. There was a total of a 66% increase in physical activity among parents and Head Start staff. Body Mass Index (BMI) ranges for parents and staff saw a downward shift (from 30.11 to

29.2), and the number of children classified as obese decreased significantly by 32 percent. (Johnson & Johnson, 2019). These findings are very significant in tangible healthy changes based on a program of intervention.

Interventions proved effective and were able to be received by school-aged children involved in the Head Start Program. By involving families and medical professionals, success rates were tangible. This is just one example of implementation in young childhood which sets up these young children to be healthier for more time.

Another example includes literacy and reading in education about healthcare. Multiple literacy programs including 'Sainbury's Bookstart Program' and 'Reach out and Read' programs have discussed the benefits of nurses and other healthcare professionals utilizing their 'medical authority' to recommend reading to infants and they even attribute health professionals to the success of these programs. However, the success of these programs is dependent on the area where they are done. If books are being given to families during pediatrician appointments, attendance rates at these appointments need to be assessed. In each of these literacy programs the strengths of the individual community need to be assessed and utilized in order to see success within the program. A lot of these initiatives are backed by what has been successful in other places but as Hewer says, "the challenge for small health services seeking to adopt these successful interventions is to ensure that implementation is locally appropriate but still incorporates the critical elements" (Hewer, 2006, p. 118). This research potentially supports the stance that intervention of health education is most effective as early as possible.

The Argument for Adolescent Intervention

It could be argued that the goal is to begin healthy habits as young as possible so pediatric interventions should always be considered. But often, children are not able to wrap their

minds around these complicated topics so information may not be retained. Adolescence, defined as the teenage years, when critical thinking and decision-making skills are more finely developed, may be a better time than childhood to educate about health. While the focus of this research and literature review was childhood intervention, based on the population of the students at the Gus Bus where the educational deliverable was presented, there are also findings to indicate adolescence health literacy education is equally as effective.

Adolescence is a very dynamic time, so each age is at a different stage of comprehension. It is a complicated place between childhood and adulthood which parts of each life stage are still present. When it comes to high-stakes medical decisions, this is difficult to navigate.

“The cognitive and emotional regulation skills required to make decisions evolve during adolescence. It has long been known from laboratory experiments that youth as young as 14 can understand medical information and come to reasoned decisions resembling those of young adults. However, teenagers are less likely than adults to engage their rational decision-making abilities in emotionally fraught situations with psychosocial implications such as important or stressful medical decisions” (Sawyer, 2020, p. 374)

Sawyer & Rosenberg (2020) explored the idea of decision making by adolescents in the healthcare setting. This decision-making of this age is rooted in knowledge of health which shows the value of increased health literacy. With involving adolescents, Sawyer and Rosenberg suggest that “that clinicians engage with an adolescent patient and his or her parent(s) before a decision is required to understand the family’s treatment values, goals, preferences, and decision-making style and to communicate how decisions will be made together” (Sawyer & Rosenberg, 2020, p. 377). This balance of parent and teen involvement will maximize good healthcare decisions. If the teenager is involved in some part of their healthcare, they will likely

care more about their overall health. This active participation will prepare them for adulthood. Because of variety in maturity and level of interest, it makes it difficult to make blanket statements about when and how children should be included in their education as some are more “ready” than others. While this is a difficult domain to navigate, it seems clear that there needs to be at least some involvement on the part of the teen, even if in incremental steps. This is not a universally applied concept across the country in the realm of healthcare professionals.

Koller (2017) explored this topic relating to healthcare education and participation for pediatric, adolescent-aged patients and the findings support the importance of early intervention. The study design involved interviewing a sample of inpatient pediatric patients about their involvement in their care of chronic medical conditions. The interview focused on three categories, the patients' knowledge of their illness, communication with healthcare providers, and participation and decision making. From here, all participants' answers were analyzed and compared by age group. This gathering of data allows evidence-based research to be developed and thus applied to children at large, giving a tangible definition of pediatric health literacy. The results from this extensive study are staggeringly in support of our thesis related to early intervention:

“Engaging young children in the process of health care was deemed essential preparation for self-care and future decision-making. Although participants described diverse preferences for involvement, the majority identified that all children should have opportunities to learn about their condition. As one 16-year-old female explained, ‘I think it's important to slowly add on responsibilities so it's not like one moment I don't have any responsibility and then the next I have a ton’” (Koller, 2017, p. 2660).

This teenager explains well the importance of involving adolescents and increasing their health literacy. This study shows a commonly occurring problem when it comes to healthcare: no pediatric involvement to complete responsibility. The ideal model of intervention would be developmentally appropriate education surrounding health at all ages and stages so that an individual feels increasing responsibility as they grow up.

Implementation is effective for pediatric patients compared to adult patients. The research surrounding both childhood and adolescence interventions proves that both life stages are effective points for interventions. In conclusion, it is always better to start young rather than old. The implementation of education is important, and in addition, the implementation of pediatric involvement matters. The research points at the importance of health literacy and education but what does this practically look like in the clinical setting? Both the gaps and the places where pediatric intervention is working are to be explored.

Pediatric Healthcare Involvement

There are many ways that children can be directly involved in their own healthcare. This involvement can take many appearances: explaining to a child why they are in the hospital, education in schools surrounding a healthy lifestyle, teach-back methods about a specific health condition. Health literacy is even involved in the events leading up to a child's hospitalization, whether that is a planned or spontaneous visit. The educational component should become a universal standard and part of routine visits from medical professionals because of its importance.

“Hospitals and providers should use a universal precautions approach and routinely incorporate health-literacy-informed strategies in communicating with all patients and families to ensure that they can understand health information, follow medical

instructions, participate actively in their own/their child's care, and successfully navigate the health care system. Interventions that incorporate health-literacy-informed strategies and that target patients and families and health care systems should be implemented to improve patient outcomes and patient-centered and family-centered care” (Glick, 2019, p. 805)

Truly patient-centered care means that both the patient and their family are aware of what is going on and have had informational conversations about these important matters. When the child is not included in these conversations, they may be more afraid or left with big questions they do not have the words for. This lack of inclusion does not set someone up for a healthy lifetime. Participation and communication with the family unit as a whole helped inpatient children feel more in control of their help, pointing to the likelihood that even healthy children can benefit from this kind of partnership. When asked whether children should be involved in making healthcare decisions, participants generally agreed that “older children should have greater involvement but that participation should start early and evolve and expand over time” (Koller, 2016, p. 2661). One way to begin to combat this problem would be additive instruction as one progresses from childhood to adolescence. Age group is also a determinant for pediatric health literacy. A limitation to when health literacy education needs to begin includes age-appropriate curriculum and the effectiveness of universal teachings opposed to individualized interventions and resources for different populations of people. Many areas lack the resources to educate the youth in general, much less about the intricacies of health. There has been a focus on adults for so long that the resources needed for pediatric health education are lacking. They cannot use the same resources or plans of implementation as adults as children

need to have some level of critical thinking and cause-effect comprehension to understand lessons about their health that may be lacking.

An issue related to implementation present among many sources revealed that while there is increasing knowledge of lack of health literacy, there is not an increase in involvement. This separation between research and implementation: "...this [education] is of particular importance when the child is in a vulnerable situation and in need of healthcare. Despite this, healthcare professionals often fail to provide opportunities for children to understand their conditions, share their views and participate in decisions regarding their care" (Larsson, 2019, p. 800). By not educating children in schools or hospitals about both their general wellness or sick condition, healthcare professionals are potentially harming that individual's understanding and opinion on health at a vulnerable age.

Education proves to be strongly correlated with good outcomes - including health outcomes. As overall education and literacy rates increase, health literacy rates are likely to increase as well (National Center for Education Statistics, 2019). For example, in Pakistan, this emphasis on learning has proved effective: "From the time this decision [declaring education as a primary right] was made and framed into law, Pakistan's education sector has reported an increase in the number of children enrolled in preschool and primary school at large. Additionally, the literacy levels in Pakistan have increased considerably over the past few years" (Ashraf, 2016, p. 648). Although this is a statistic referring to literacy, it is clear that there is a need for improvement in health literacy as well. There is likely a correlation between these increasing literacy levels. Even still, there will also need to be good health education to the children of this country. A child's education affects a country at large and its advancement into a more prosperous, developed country. Education is a powerful catalyst of change.

Results

Our findings indicate the importance of an individual's understanding of their healthcare needs and being able to communicate this with healthcare professionals in order to set them up for lifelong well-being. Findings also indicate that it is important to begin education about health, wellbeing, and autonomy in childhood, defined as ages school-aged (age 5-12) interventions, and adolescent interventions (age 13-17).

Discussion

The research findings support the thesis of early intervention. Health literacy education as early as school-aged and into adolescence allows children to continue to grow in understanding their health as they age; thus, becoming individuals who can make sound judgments and take control of their own health later in adulthood. Health literacy is of great importance for physical well-being and the foundations for this need to be laid in childhood.

Significance to Nursing

From a nursing perspective, there are many steps that can be taken to improve health literacy in practice. “Nurses have a professional and ethical obligation to communicate in a clear, purposeful way that addresses the unique information needs of each patient” (Speros, 2011, p. 321). A component of the job revolves around communication and education to advance health. Nurses in the in-patient setting are often responsible for discharge teaching and information about what life looks like outside of the hospital or living with a chronic condition. This task should be treated seriously as the time the patient spends in a hospital is much shorter than the time outside of the hospital, building routines that dictate their health. “Practical strategies that the nurse can use include to assess, communicate with, and evaluate comprehension in patients with low literacy skills” (Speros, 2011, p. 324). Because nurses have a unique role in healthcare,

spending the most contact time with patients, it is up to them to take time to advance health literacy.

An essential component of a nurse's role is to provide healthcare instructions to their patients. Sometimes these can be complex and as a result, difficult to explain in terms simple enough for an individual to understand. However, utilizing interventions such as the "teach-back method", nurses have found a way to teach patients important instructions while simultaneously gauging their understanding of their health outcomes and how likely an individual is to stick to a health care regime as prescribed. "By communicating with families, nurses can increase understanding by determining pre-existing educational and motivational barriers that may affect patient learning" (Kornburger, 2013, p. 285). This method is one of many that allows nurses to be confident of patient's retention of health information to better equip patients to feel confident about managing their health.

When interacting with a patient a nurse should care not only about an individual's physical needs but their emotional needs as well. Ultimately, this will improve patient sharing with their health care team to thus, maximize patient outcomes. It is the nurse's role to ensure that health education is done in "a shame-free environment so families are encouraged to ask questions about what they don't understand" (Kornburger, 2013, p. 286). Creating this type of environment might include affirming the patient and families' answers and rephrasing what they said to ensure the nurse understands. If it appears that something the patient says about their care or a procedure is wrong, take the blame and explain to the patient that you may not have explained it well enough. Never let the patient feel as if they are unable to understand or that they are doing something wrong. Patients and families may feel insecure asking questions if they do not feel as if it is a safe environment to do so.

Another role of the nurse to promote patient understanding is to use the simplest language possible when explaining medical processes to a patient. This again goes back to assessment. If nurses, both in hospital and primary care settings, were to use assessment tools at the beginning of their visit to know where the patient is coming from, teaching would be more effective. “Importantly, health literacy assessment has also enabled our medical center to raise staff awareness of low health literacy, develop appropriate resources, conduct large-scale research on the consequences of low health literacy, and assess the effect of system interventions by patients’ level of health literacy” (Cawthon, 2014, p. 68). Nurses are able to increase health literacy by taking a few minutes to do an assessment. This is not something that they need to do on their own but could be an area of continued education.

As this push for increased health literacy goes forward, the education for nurses will need to continue to advance as well. As stated, there has not always been as much of a focus on assessing a patient’s health literacy and adapting material to best suit them. This is an area of improvement in nursing education. “Given the significance of low health literacy in the US, all nursing education programs should be incorporating health literacy content throughout their undergraduate and graduate curricula” (Sand-Jecklin et al., 2010, para. 31). The research surrounding the psychology of learning is relatively recent so there is a population of nurses in practice who may be unfamiliar with even the concept of health literacy. In a 2020 study in Nursing and Health Science, Nantsupawat et al. had shocking results related to this. Upon a cross-section study, they found: “Approximately 55% of the participants had heard about the concept of health literacy; 9% had received formal training specific to interaction with patients with low health literacy. About 50% of the nurses were aware of their patients’ low health literacy; therefore, they applied the recommended communication techniques for them”

(Nantsupawat et al., 2020, p. 577). This finding of only approximately half of nurses being familiar with the vital concept of health literacy is alarming. This could account for a gap in health literacy interventions in practice. A possible explanation for lack of awareness may include the relative novelty of literacy in health and also a lack of education at the foundational level of nursing students. Nursing education programs have likely not caught up to health literacy research, therefore many lack the material within the standard nursing curriculum.

However, nursing education programs often fail to specifically address health literacy issues when covering patient education content and currently, there is no standard for the depth of health literacy content to be included in undergraduate nursing education. A review of the literature revealed a gap in demonstration of the effectiveness of health literacy education in changing student knowledge and application of health literacy principles in practice. (Sand-Jecklin et al., 2010, para. 10)

Not only is there a lack of education for nursing students about health literacy, but there is also a lack of a metric to ensure retention of health literacy training. Students are entering the care setting without having been vetted for their knowledge of conveying important information to patients. This will have negative outcomes for other providers and patients. In addition to adding this as part of the nursing curriculum, practicing nurses should be educated; “completion of a continuing education program about health literacy should be required for re-licensure of RNs. Outcome measures for such an education program would need to be identified and monitored, including both measurement of patient understanding of health information presented by nurses who had completed health literacy education, and also patient health outcomes” (Sand-Jecklin et al., 2010, para. 31). This standard of practice would be evidence-based and could improve health outcomes.

The ultimate goal is the current nurses and new nurse graduates would be able to assess than identify which patients have a lack of understanding regarding health information. The assessment tools discussed previously can be used in both in-patient and out-patient settings but do require training on how to be used and read. This education for nurses can be a part of school or a continued education credit. The benefit of this is “... identifying [those] who may be using detrimental behaviors to compensate for a lack of understanding. They [nurses] must also be able to adapt patient education interventions to assure patient understanding of vital health information” (Sand-Jecklin et al., 2010, para. 31). A few hours of applied education for nurses will result in a substantial difference in care of patients.

Limitations and Future Research

The most challenging limitation of this study is the lack of outcome results. Outcomes of interventions at a younger level are not easily measured because the effects are so long-term, and participants would need to be followed in a longitudinal study. This would be very expensive and time intensive. There are also a variety of factors (as discussed) which contributed to health literacy, so it is not possible to draw a direct cause and effect of intervention. An example of this: if a fourth grader is presented to about heart health and then does or does not have a heart attack when they are fifty, the correlation between the lesson and the health outcome is not able to be drawn.

Another limitation is that a vast body of literature is centered around adult health literacy and intervention so in the future, it is imperative that more studies are conducted involving pediatric health literacy. While long-term longitudinal studies may be difficult, future research could track changes over the period of a few years. The results may be small, but this could still provide context for future studies. Lastly, research regarding the correlation between low health

literacy and poor health outcomes can continue to be improved, especially as it relates to different disparities among populations.

Recommendations

The findings of this literature synthesis can emphasize the importance of health literacy for nurses and for nursing education. This review provides context for a subset within a population, but the larger hope is changing the direction of health literacy in the future. With the knowledge about who needs careful education, licensed healthcare professionals will hopefully be more aware of their patient's needs. "Healthcare professionals need to provide health information in a meaningful manner to ensure that Americans can understand their health and make informed decisions. The first step in this process is to understand the health literacy abilities of the population" (Parker, 2000). The recommendation for implementation includes beginning at the pediatric level, assessing the needs of a population based on their environment and social factors, and creating a shame-free environment.

While it is important to assist adults in navigating the ever-growing demands of their health and understanding as they age, it is important to understand that a bulk of the knowledge surrounding health literacy is developed in adolescence and foundational education. This education needs to be focused on providing children with useful knowledge about their health and the ways to prevent later chronic illnesses and further manage their health as they continue to develop. Sheridan suggests that interventions provided to adults to boost their health literacy have not been statistically significant in showing improvement over time in improving their understanding and literacy. Due to this finding, Sheridan has explored the idea of providing similar interventions to children with more successful outcomes (Sheridan, 2011).

A commonality among all education regarding health literacy is the goal of education for health literacy to be a “supportive, instructional and capacity-building global resource across the life-course” for all individuals (Vamos, 2020, p. 1). However, it is imperative to consider the differences in need among different populations. To analyze this, a *health needs assessment* can be used and should be used to navigate the proper interventions and education resources for particular populations. The Health Needs Assessment focuses on addressing the differences in needs among individuals and populations to best identify the pertinent issues in particular areas (Wright, 1998, p. 1311). This assessment would be a useful tool in developing interventions regarding health literacy across the globe to maximize patient health outcomes and successes in development of literacy skills after receiving additional education.

While research shows the national literacy education levels are lower than we may believe, a stigma still exists surrounding reading ability. A patient with a lower reading comprehension may feel shame about this that prevents them from interacting or asking their healthcare team questions. The health care setting must become a ‘shame-free environment’ where patients of low literacy levels can seek help without feeling stigmatized (Parker, 2000). This can change the culture of American healthcare and give further freedom to patients to seek the help they need.

Another recommendation is to directly intervene in the health literacy of children, starting at a young age. “Children's competence and autonomy mainly develop through direct social and personal experience and not through age and physical growth. Some of the youngest children can be among the most informed and confident” (Koller, 2017, p. 2664). If healthcare professionals explain what is occurring in a child’s body, the child will be more attuned and affirmed in making decisions relating to their own health.

Implementation with The Gus Bus

The knowledge of the effect of low health literacy provides the opportunity to reach out to the community and increase education. Harrisonburg is home to more than 53,000 people and known to be a model of international coexistence. There is a large percentage of non-native English speakers in Harrisonburg, with over 55 languages spoken in the public school system of Harrisonburg (HCPS, 2019). The individuals who make up “The Friendly City” come from all over and all arrived in the United States in very different ways. This variety of languages and cultural backgrounds results in literacy and health literacy disparities.

Within JMU, there is the Institute for Innovation in Health and Human Services (IIHHS) which is a multi-disciplinary community for promoting health. A subset office within IIHHS coordinates the services of The Gus Bus. The Gus Bus is a mobile literacy program that travels to many neighborhoods in Harrisonburg and Page County to provide literacy opportunities to the students who make up these neighborhoods. The target neighborhoods for the Gus Bus are typically neighborhoods that are considered lower income. It visits 18 neighborhoods each week to read with children in grades Kindergarten to 5th Grade in an effort to raise their literacy levels. By bringing the Bus into the neighborhood, they reach a population with limited access. Harrisonburg, Virginia offers opportunities for children and their families to improve literacy through programs such as the Gus Bus but throughout Harrisonburg, there is a limited number of health literacy geared programs, only existing within the Gus Bus.

In the past few years, The Gus Bus has collaborated with the Blue Ridge Area Food Bank to distribute fresh foods at each neighborhood stop and provide education to families about healthy eating practices and recipes to follow. This new type of nutrition awareness and education has helped to get families involved with the Gus Bus as well as the children and has

opened new opportunities within the Harrisonburg Community (n.d.). This program shows the potential to incorporate health literacy research into evidence-based intervention through a partnership. There is an initiative within The Gus Bus called The Health and Wellness Program that teaches grade-school children each week about different aspects of a healthy life. This program is a health literacy program, as it works to educate children about their health, with a large focus on health and wellness practices such as sleep, yoga, and good eating.

As the deliverable for this study regarding Pediatric Health Literacy, we have prepared a sample educational module in conjunction with Gus Bus, based on the findings of this literature review. Our lesson plan taught about the heart and explained the importance of taking care of the heart. We were able to prepare the material in advance with the program coordinator so as to match the explanations to the children's level of understanding. The teach-back method was used. Due to restrictions of COVID-19, The Gus Bus has moved all programming online, to a Google Meet group call, including the presentation of this deliverable. Our original hope was to join the Gus Bus in going into neighborhoods to be fully immersed in this population of this area and these children, but this was not feasible with the unprecedented pandemic beginning in the middle of the planning of this honors project. Instead of letting go of the idea of intervention, we revised our plan and formatting to work on an online setting. The teaching included two separate classes, each lasting 60 minutes and following the pre-approved lesson plan that included a book, questioning, physical activity, a craft, and a video all related to the human heart. We were working with a Gus Bus representative to facilitate each class, with about ten children from ages 5-8. We followed the format of the lesson plan, while also balancing the children's questions and energy. Our method was teach-back by sharing a piece of information and then asking the kids to tell us what we meant in their own words. They were eager, receptive, and had lots to share.

A formal survey is not the scope of this project so to attain results, an informal survey of the children was conducted. This is congruent with the goal of the project: knowledge acquisition rather than outcomes, as further discussed in the Limitations section. When asked at the end of the 60 minutes what the children learned today, a second grader responded, “we need to take care of our hearts and not eat fried stuff!” Another student in third grade noted that they learned “the heart does not look like a circle but has a lot of different parts.” The children responded with shock and understanding when we had them find their heartbeat on their chest, then do jumping jacks, then feel their heartbeat again. This example explained how the heart beats faster with exercise and a fourth grader noted “that makes the heart strong.” After the 60-minute session, each student in both classes was able to share a piece of informational they learned about the heart. This lesson plan used for this presentation was shared with the Health and Wellness staff so could be used in the future for other classes. While this is just one example of an implementation of pediatric involvement in healthcare, it exemplifies the way of the future.

Conclusion

An estimated 80 million Americans are considered to have low health literacy. However, every individual should have the fundamental right to information and education that encourages and allows them to make sound decisions regarding their health and well-being. Interventions to better educate individuals have proved to be the most effective when begun in childhood. This education needs to be focused on providing children with useful knowledge about their health and the ways to prevent later chronic illnesses and further manage their health as they continue to develop. The Gus Bus and their initiatives provides an example of neighborhood, smaller-scale support for increasing pediatric health literacy. With further advances in research, hopefully providers can curate their work more towards administering healthcare and education to their

patients in a meaningful and effective way, as the Gus Bus does with their students. As nurses, there is a responsibility to ensure that all patients have adequate understanding of their health and conditions. It is no coincidence that nursing has been considered the most trusted profession for so many years and it is important that this honor is utilized to its full capacity, aiding individuals in understanding the most about their health and outcomes.

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Appendix 1

Summary Review of Pediatric Interventions

Literature Chart

Research Team	Year	Purpose of the Study	Results
Howard K. Koh	2010	This plan for Health Literacy exists to outline goals that will hopefully enact change and increase health literacy	The goal of the plan is promoting changes in the healthcare system that improve health information, communication, informed decision making, and access to health services and supporting and expanding education of local efforts to provide adult education, English language instruction, and culturally and linguistically appropriate health information services in the community
Geboers, B., Reijneveld, S., Koot, J., & de Winter, A.	2018	The purpose of this was to develop the Health Literacy Intervention Model, with central research questions relating to both pediatrics and health factors	By creating a model, there can be a better understanding of the needs of a particular population and how a child's environment impacts this is important information that needs to be obtained prior to the development of an education curriculum or set of interventions to improve health literacy among the population of that particular area or region.

<p>Lambert, M., Luke, J., Downey, B., Crengle, S., Kelaher, M., Reid, S., & Smylie, J.</p>	<p>2014</p>	<p>This education plan on health literacy has taken an emphasis on skill building, and delivery by a health professional, for example, a pharmacist or a diabetes educator</p>	<p>The results of this show that education on the importance of management and persistence, hands-on skills for how to monitor for certain symptoms and performing self-assessments, and when it is appropriate to consult their primary care provider.</p>
<p>Hewer, L.-A., & Whyatt, D.</p>	<p>2006</p>	<p>This was designed as an early literacy program is designed to supply parents with a suitable book and information on reading to infants at a child’s seven-month check-up</p>	<p>By supplying parents with appropriate books at a child’s check-up and encouraging reading, the aim was to reassure parents that it is developmentally appropriate to begin at this age. This is an example of early intervention by parents. This study shows how interventions can be both related to children and parents.</p>
<p>Velardo, S., & Drummond, M.</p>	<p>2017</p>	<p>The purpose of this is meeting children’s specific needs arguably includes the delivery of information that can be easily accessed and understood by younger age groups</p>	<p>The results of this show encouragement and research to support delivering information in a way kids understand</p>

McDaid	2016	This investigated the co-benefits to the educational sector of investing in the health literacy of students	This project furthered the promotion of health literacy for children and young people will typically be delivered outside the health sector, often in the education sector
Franze, M., Fendrich, K., Schmidt, C. O., Fahland, R. A., Thyrian, J. R., Plachta-Danielzik, S., Seiberl, J., Hoffman, W., Splieth, C. H.	2011	The main goal was promotion of health literacy; the teachers were part of this effort. The teachers were able to receive three special training sessions regarding implementation of the GeKoKids Program, specified for each area.	This showed the power of incorporating teachers into health literacy education. Education for the teachers so that they could present health-related subjects for students. Not only did they learn the material to teach, but they also learned the background needed relating to medical information to present a cohesive unit. It was easily implemented into the curriculum.
Fretian, A., Bollweg, T. M., Okan, O., Pinheiro, P., & Bauer, U.	2020	This study explores the variety of factors that could be at play within kids' health literacy. Based on a cross-sectional study in which health-related data were obtained from fourth grade schoolchildren as part of a study validating a newly developed measure of children's subjective health literacy	The results of this show that children with higher family affluence perceived dealing with health information to be significantly easier than their less well-off peers did” There are always many factors at play, even on the pediatric level and this study shows that.

Appendix 2

The Gus Bus Health and Wellness Lesson Plan

Daily Lesson Plan

Date: 3/31/2021

Program Name:

Program Specialist: Nicholas Lankau

Facilitated by: Grace Lloyd and Morgan Sapper

Book Title/Author/Description: *Hear your Heart* by Paul Showers

This story introduces how the heart works all the time and what the heart sounds like. It also introduces ways that kids can get involved and make their own stethoscopes from a paper towel tube. This story allows children to better understand how their heart works and what they need to do to keep their heart healthy.

Learning Objective: Students will understand what their heart does and how it works. They will engage in activity to make their own stethoscopes at home and will be able to listen to their family members' hearts.

Vocabulary: Stethoscope, heart, heartbeat

SLOs (Student Learning Outcomes):

https://www.doe.virginia.gov/testing/sol/standards_docs/health/index.shtml

Health: K.3, 1.3, 2.2, 2.3, 3.1, 3.3, 4.1, 4.2, 5.1, 5.2, 5.3

Phys Ed: K.1, K.2, K.3, 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 3.2, 3.3, 4.2, 4.3, 5.1, 5.4

Science: 1.5, 2.5, 3.5, 4.3

English: K.1, K.2, K.5, K.7, K.8, 1.1, 1.4, 1.6, 1.7, 1.9, 2.1, 2.4, 2.5, 2.6, 2.7, 3.1, 3.5, 4.1, 4.4, 4.5, 5.1, 5.5

Materials and Resources, including Technology Resources:

- Google Meet video conferencing platform
- Book used in this lesson:
 - *Hear your Heart* by Paul Showers
- Other books about stress reduction and yoga:
 - *Stickmen's Guide to Your Beating Heart* by John Farndon
- YouTube video:
 - https://www.youtube.com/watch?v=tg_ObDJEaGo
- Kids may need: markers, toilet paper roll or paper towel roll, paper to draw

Introduction/ Anticipatory Set:

Have you ever heard of or seen a stethoscope? Have you ever had someone, such as a nurse or a doctor, listen to your heart?

If they have, where did they listen to their heart?

Today, we are going to learn how our heart beats and what it sounds like. After learning about the heart today through this book, I hope you can utilize this to listen to your heart at home.

Before Reading:

In this book, we will learn about where the heart is and how it works. Tell the students that we will be making something to help them listen to their hearts, we will be doing this together so make sure they have a tube of some kind nearby. We will also be doing exercises to make our hearts beat faster so make sure they have space to move.

During Reading:

Have the students and volunteers take turns reading. Make sure the students don't turn this into a competition. It is important that they stay in their body's comfort zone, so they don't hurt themselves.

After Reading:

How does your body feel after completing those exercises? Were you able to hear your heart?

What was the hardest thing about completing these exercises?

Enrichment Activities:

1. Introduction to the heart: discussion

- Open the canva presentation and have a conversation about what the heart does. Ask the student if they know what makes their hearts beat slower and faster.

Where is the heart and what does it do?

- Your heartbeat can be felt by placing your hand on the left side of your chest.

The heart pumps blood throughout your entire body and makes sure that all your

muscles have enough blood and oxygen. The heart also carries oxygen to all of these areas.

- Make them do jumping jacks then listen

Discuss ways to keep our hearts healthy

- We can exercise! Playing sports and being active keeps our hearts healthy and makes all of our muscles strong.
- Eating healthy! By making sure we have a balanced diet of fruits and vegetables along with other healthy foods we can make sure it stays healthy. If we eat too much “bad food” or junk food” it can make our heart work harder and not pump blood as well as it should.

2. What does our heart sound like?

- Our heart makes a ‘bum-bum’ sound
- Sometimes this can be fast and sometimes it can be slower
- When we go to the doctor, they listen to our heart with a stethoscope.
- We can show the students the different parts of a stethoscope and how it works.

3. Make a craft to allow students to listen to their own hearts

- Have student collect a paper towel or toilet paper roll
- They can decorate their roll with markers or pens
- Have the students place their “stethoscope” in the top left region of someone else’s chest and listen to hear their heart

4. Drawing Activity

- Allow the students to draw a picture to demonstrate what they learned.

- Have the students draw a picture of a person and correctly place the heart in the person's body
- Then have the student draw pictures around their person of different foods and activities that are good for a person and will keep their heart healthy

Formative or summative assessment:

Students will be informally assessed by answering questions throughout the lesson to check for understanding and assess previous knowledge.

Individualized/ Differentiated Instruction Strategies: *Include strategies for accommodation, remediation, and enrichment.*

Students are welcome to ask questions during the video call. One of the teachers, volunteers, or other students can help. If a parent is present during the call, they may help their student as well (especially during activities where the student may want to retrieve supplies to do it at home - although this is not a requirement for the activity)

For the exercise activities, if they are not physically able to do the poses or don't have enough space to do them, let them draw out what they would look like doing the exercises or have them just watch. The exercises don't need to be done perfectly. Encourage them to modify the exercises to be within their current range of motion. The activity is an introduction to the heart and should not cause the students too much discomfort or any pain.