Health Literacy and Health Information Seeking Behaviors of Student at the University of Central Florida

Abigail McWhorter
*University of Central Florida*

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HEALTH LITERACY AND HEALTH INFORMATION SEEKING BEHAVIORS AMONG STUDENTS AT THE UNIVERSITY OF CENTRAL FLORIDA

By

ABIGAIL MCWHORTER

A thesis submitted in partial fulfillment of the requirements for the Honors in the Major Program in Health Sciences in the College of Health Professions and Sciences and in The Burnett Honors College at the University of Central Florida Orlando, Florida.

Fall Term, 2019

Thesis Chair: Dr. Suha Saleh
ABSTRACT

Health literacy is the skill needed to acquire, read, understand, and use health related information to make informed healthcare decisions. It is also the skill needed to follow and maintain a treatment plan. Having a high or adequate health literacy level is important because possessing poor health literacy skill can have a negative impact on one’s overall health. This research is important because there are few studies available on the health literacy levels of undergraduate college students. The majority of health literacy studies focus on at risk or underserved populations with low education. Previous studies have shown that education is not a strong indicator of good health literacy skill. The aim of this study is to evaluate the health literacy rate of students at the University of Central Florida (UCF), and to analyze the health information seeking behavior. Students were given the Test of Functional Health Literacy in Adults (TOFHLA) to assess the levels of health literacy among undergraduate students. The Health Seeking Information Behaviors (HSIB) survey was also given to analyze common information seeking behaviors among college students. Additional questions were included to collect demographic information to compare differences in health literacy levels among different subgroups of students. The survey questionnaires were built into “Qualtrics, an online survey system, and shared with undergraduate students at UCF for participation. Survey results were downloaded into SPSS software version 25. Data analysis included one-way ANOVA to assess possible associations between student demographics and level of health literacy skill and health information seeking behavior among participants. Survey results showed that students at UCF had very high health literacy skills among all demographics. The study results suggest the need for development of a survey tool measuring health literacy skills of an educated population be designed and validated to assess the health literacy skills of an educated population.
DEDICATION

For my mentor, Dr. Saleh, who encouraged me to participate in the Honors in the Major Program through which I gained new experiences and skills.

For my family, who supported me throughout this process and with everything else I choose to do.
ACKNOWLEDGEMENTS

I would like to take the time to acknowledge and thank everyone who has helped me make completing this thesis possible. To all my friends who helped encourage me and pushed me to do my best. For coming to campus early to meet me for meetings and to answer all of my questions, I thank you. To Dr. Saleh, thank you for taking the time to mentor me for the Honors in the Major Program and encouraging me to apply myself in different situations. If it wasn’t for you, I would not have had the opportunities I’ve had, and this research would not have been completed.

To Ms. Valerie Schulz, thank you for being a committee member for this thesis. All of your editing was greatly appreciated. To my family, thank you for listening to me talk about my research for hours on end and supporting me through this process. You have all played a role in my undergraduate experience, and I am grateful for your helping me achieve this accomplishment.
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INTRODUCTION

Statement of the Problem

Health literacy is the skill needed to acquire, read, understand, and use health related information to make informed healthcare decisions. It is also the skill needed to follow and maintain a treatment plan. A growing number of studies have shown that individuals who are comfortable engaging in their health care environment have better health outcomes and improved health status over their lifetime (Schillinger, 2002). Having a high or adequate health literacy level is important because possessing poor health literacy skills can have a negative impact on one’s overall health.

This research study sought to determine the health literacy levels of undergraduate college students. It also examined common information seeking behaviors of undergraduate students and the relationship between these behaviors and health literacy levels. Interest for this study came from finding a lack of research on the health literacy levels of an educated population, particularly young adults of college age (18-25 years). The majority of current health literacy studies focus on at risk or underserved populations, even though previous studies have shown that education is not a strong indicator of a good health literacy skill. Individuals with higher levels of education are still reported to have difficulty understanding and using health related information (Schwartz, 1997).

The purpose of this study was to assess the health literacy levels of undergraduate students at the University of Central Florida (UCF) to determine if there is a need to implement health literacy education programs. This study specifically evaluated the functional health literacy level
of college students. In addition, this study aimed to evaluate common health information seeking behaviors of undergraduate students to determine if there is a link between health information seeking behaviors and health literacy levels. Finally, this study examined the influence of demographic factors and undergraduate college major on the student health literacy level and health information seeking behaviors.

The target population for this study included students enrolled at the University of Central Florida. The average health literacy score of college students was expected to be adequate; however, it was expected that students with a health-related major would have a higher health literacy score. Internet use was expected to be the primary source of information that college students use to obtain health related information. It also was expected that students who searched for health information with multiple sources and confirmed their findings with a health care professional would have a higher level of health literacy.
LITERATURE REVIEW

Health Literacy in the Nation

Health literacy is defined by the Institute of Medicine as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Nielsen-Bohlman, 2004).” Some of these skills include the ability to read and interpret prescription bottles, engage in self-care, and to effectively fill out complex healthcare forms. One study found that the average health literacy of college students was adequate, well above the national average; however, despite this average score, it was found that students still lacked specific functional health literacy skills (Ickes & Cottrell, 2010). This means that college students were unable to use specific health related skills, such as reading a prescription bottle, to positively affect their health outcome.

The National Assessment of Adult Literacy (NAAL) was conducted by the Department of Education in 2003. The NAAL was a national survey that assessed the status of overall adult literacy in the United States (US). This survey includes a section that assesses information about health literacy levels of American adults and the relationship between background variables, such as demographics, and an individual’s health literacy score (Crane-Cutilli, 2009). The health-related tasks on the NAAL assesses health literacy over three domains: clinical, prevention, and navigation of the health care system. These domains are used to calculate the health literacy scores of US adults. The NAAL health literacy study found that the majority of US adults possessed only an intermediate health literacy level and that over 75 million adults had below basic health literacy skills, with a higher percentage of men possessing below basic skill compared to women. The
study also found that on average, female participants scored six points higher than males. The age group with the lowest average health literacy score was individuals 65 years and older. This study found that among Americans with college degrees, there was a higher percentage of individuals with proficient health literacy skills (NAAL, 2003). The results of the NAAL show that there is a need for improved health education and promotion throughout the United States.

The NAAL highlights one of the reasons there is a need to study the health literacy levels of college students. The skills that apply to health literacy and information seeking behaviors are reading comprehension, numeracy, and research skills. These skills are routinely used by college students who are expected to understand new material presented to them and to be able to find information on their own for completing assignments and for studying in general. These skills are transferable to the skills needed to be health literate. This is because reading comprehension skills are an important predictor of health literacy. In addition, the research skills that college students use on a regular basis may enable them to access and process health information more efficiently. These research skills may affect the common health information seeking behaviors that college students exhibit and may also affect their health literacy level.

**Importance of Health Literacy and Impact on Health Outcomes**

Health literacy can have a huge impact on an individual’s health outcomes over a lifetime. Health outcomes are changes in health status that are typically a result of a health care service. This measure can be used to assess the patient’s quality of life after a diagnosis or an intervention. Individuals with low health literacy levels are more likely to have poor health outcomes over a
lifetime. For example, a study found that diabetes patients with inadequate health literacy had poorer diabetes outcomes (Schillinger, 2002). With the results of the NAAL in 2003 showing that over 75 million US adults had below basic health literacy scores and that these findings were clustered in minority and elder communities, the same communities with a higher burden of chronic disease, it is important to assess health literacy skills in younger and unburdened populations to ease the load on the health care system in the future and to improve the health outcomes of later generations (Hixon, 2004).

A study by Batista et al. (2017), found that individuals with low health literacy skills were more likely to have poor overall health and were more likely to avoid preventative health services. This study also found that individuals with low health literacy were significantly more likely to use emergency services, had higher rates of hospitalization, and had higher healthcare costs (Batista et al, 2017). Therefore, it is imperative that health literacy and health education are addressed at an earlier age. This is because the actions taken now, in regard to health, can impact an individual’s health later in life. Developing effective health literacy skills should positively affect health outcomes over a lifetime.

Influencing Factors of Health Literacy

Poor health literacy is routinely associated with racial and ethnic minorities, the elderly, and people with chronic diseases or conditions. It is also common among lower socioeconomic classes. The majority of current health literacy studies focus on these at-risk populations, but there are few that look at the college-aged population. Even though education is not a strong indicator
of health literacy level, it is still an influencing factor. Literacy is associated with academic achievement and academic achievement is associated with health behaviors (Snow & Biancarosa, 2003). Thus, education level can impact and influence the health literacy of an individual, however; education is not the only factor that can influence health literacy and health behaviors and outcomes. In a study with the aim of developing a framework to analyze the influencing factors of adolescent health literacy, the authors found that individual traits, family and peer pressure, and systems, such as the health system, the education system, and social media, play an important role in an adolescent’s health literacy and subsequently their health outcomes (Manganello, 2007). Although this study looked at adolescents (0-17 years of age), it is still relevant to this proposed study. College students are still part of an education system that can influence them. Family and peers are still largely involved in the choices they make, and many students are navigating the health care system on their own for the first time. Developing the health literacy skills needed to successfully navigate the health care environment is vital, especially for college students who are starting their adult lives and learning behaviors that will affect them later in life.

Demographic factors can also influence health literacy. In a study by Sukys, Cesnaitiene, and Ossowsky (2017), females had a higher health literacy in both domains, numeracy and reading comprehension, than compared to males. This study also found that student enrollment in health-related courses predicted a higher health literacy score, but only in the domain of accessing, understanding and applying health information. Students in this study were found to have low health literacy with regard to the disease prevention and the health care systems domains (Sukys, Cesnaitiene, & Ossowsky, 2017). Knowledge of disease prevention and the health care
environment is vital to ensuring a positive health outcome over a lifetime, which would decrease the long-term strain on the U.S. healthcare system.

**Health Literacy and Health Information Seeking Behaviors**

Health literacy skills include health information seeking behaviors (HISB). Health information seeking behavior is the process of gathering information about health. There are various factors that affect an individual’s need to seek information, but HISB generally occur when an individual is reacting to a specific health related need (Pesälä et al, 2017). Researching health information, whether it be symptoms of an illness or the next steps in maintaining one’s health, can have a significant impact on an individual’s overall health. Although easy access to the internet can facilitate the ability to become better informed, when searching for health-related information, it is important for individuals to have a high e-health literacy to ensure that they are safely engaging with and using health resources appropriately (Norman & Skinner, 2006).

There are many resources available today for accessing and researching health information. College students use the internet for many aspects of their life, so it makes sense that the majority of college students use the internet to obtain information related to their health and to the health of others. The internet, social media, television, books and newspapers, and health care providers are all resources from which health information can be obtained. Gender affects HISB, with females being most likely to use the internet and consult with and confirm their findings with a health care provider (Basch et al, 2018). Although studies have looked at how individuals get their health-related information, there has been little to no research to determine if there is a link between
information seeking behaviors and health literacy. There are also a lack of studies focusing on an educated population, rather than an at-risk population. This study sought to determine if there is a relationship between health literacy and HISB. The college student population was chosen because this group has research skills that are not common in the general population.

The Health Information National Trends Survey (HINTS) is a national surveillance program that began in 2003 and has been repeated every couple of years since then. This program is run by the National Cancer Institute under the National Institute of Health. This survey tracks changes in the health communication and information environment and has been an invaluable tool for many researchers. Many studies have used HINTS to analyze how HISB and health literacy are related. In these studies, health literacy was twice as likely to be a predictive variable, rather than an outcome variable (Hesse et al, 2017). This indicates that there is a possibility of a connection between health literacy and HISB. If this connection is found to be valid, then information seeking skills need to be added to current health education curriculum to help individuals develop skills, such as finding information on the internet and interpreting that information, to improve health literacy and to improve health outcomes.
STUDY DESIGN

Research Instruments

Two survey instruments were utilized to collect data on health literacy and health information seeking behaviors: the Test of Functional Health Literacy in Adults (TOFHLA) survey and the Health Seeking Information Behaviors (HISB) survey. To access the TOFHLA survey, a grant proposal was submitted to UCF’s Office of Undergraduate Research to obtain funds to purchase the survey. The grant was approved and the TOFHLA survey was purchased. The TOFHLA is a survey tool used to measure the functional health literacy of an individual (Baker et al, 1999). This survey tool specifically measures numeracy skills and reading comprehension. In previous studies, this survey had a reliability (Cronbach’s alpha) of 0.68 for numeracy prompts and a reliability of 0.97 for reading comprehension passages (Nurss, 2018). Both of these skills are necessary to successfully navigate the health care environment. An abbreviated version of the TOFHLA survey, “A Brief Test to Measure Functional Health Literacy”, was used for this study. This survey consists of reading passages A and B and four numeracy items. It takes approximately 12 minutes to administer and still yields reliable data and information on an individual’s functional health literacy. This survey is scored out of a 100, with 72 points coming from the reading comprehension (RC) portion of the TOFHLA and 28 points coming from the numeracy (N) portion of the TOFHLA. The literacy (HL) level scores are:

- Inadequate Functional Health Literacy: 0-53 points
- Marginal Functional Health Literacy: 54-66 points
- Adequate Functional Health Literacy: 67-100 points
The HISB survey collects data on information seeking trends and behaviors. The questions pertaining to the HISB survey were taken from the Health Information National Trends Survey from the National Cancer Institute at the National Health Institute (NIH) (Hesse et al, 2017). The HISB survey is comprised of 20 questions taken from the Health Information National Trends Survey (HINTS) with permission from the National Cancer Institute. These questions look at common trends in information seeking behaviors as they relate to health-related situations.

Additional questions were included to collect data on student demographics and college major, so that differences in health literacy levels and information seeking behaviors could be compared among the different student demographics.

**Study Design**

The survey questionnaires were built in the online survey system “Qualtrics” and shared with students at UCF for participation through email. Students were invited by e-mail to participate in this study. The e-mail invitation included a link to the survey. The e-mail was sent to all students enrolled in classes during the summer 2019 semester. Students 18 years old and above and who provided consent to participate in the study had access to complete the survey and participate in the study.

Survey results were downloaded into SPSS software version 25. This is a computer-based program used for statistical analysis. Data analysis included comparisons of frequencies, means, and one-way ANOVA to assess possible associations between student demographics, level of health literacy skills, and health information seeking behaviors among participants. The study
proposal was submitted to and approved by the UCF’s International Review Board. The approved survey questions can be found in Appendix A.
RESULTS

Sample

The study sample included 1194 respondents. Of these respondents, 22.6 % identified as male and 76.6 % identified as female. The majority of the study population was white (55.7 %). The next largest ethnic/racial groups were Hispanic or Latino/a, at 14.7 %, and biracial or multiracial, at 12.8 %. The majority of responses were juniors (24.1 %), followed by seniors with 91-120 credit hours (23.4 %), and graduate students (19.9 %). The predominant age range of respondents was 18-22 years (58.6 %). The complete set of demographic data can be found in Table 1. The overall sample demographics are consistent with the UCF’s student demographics.

These data show that the study population is representative of the UCF student population. According to UCF Facts (2018), the student population consisted of 47.8% white, 26% Hispanic, 11% black, 6.3% Asian, and 3.7% multiracial. The slight difference in the ethnic distribution could be due to differences in enrollment during the summer term, which is when this survey was distributed. The status by credit hours was representative for Juniors, Seniors, and Graduate or Professional Students. The differences in Freshman and Sophomore percentages is also due to this study being conducted during the summer term.

The majority of respondents (84.1 %) were full-time students at UCF. There were very few differences in the means between full-time students and part-time students when looking at their Total Health Literacy (HL) score, Total Reading Comprehension (RC) score, and their Total Numeracy (N) scores. In addition, the majority of students worked part-time between 10-29 hours a week.
Table 1: Demographic information and Total HL, Total RC, and Total N score*.

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<th></th>
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<th>Total N Score</th>
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<td>27.18</td>
<td>98.86</td>
</tr>
<tr>
<td>20-29</td>
<td>233</td>
<td>21.0</td>
<td>71.46</td>
<td>27.22</td>
<td>98.69</td>
</tr>
<tr>
<td>30-39</td>
<td>127</td>
<td>11.5</td>
<td>71.58</td>
<td>27.14</td>
<td>98.69</td>
</tr>
<tr>
<td>40</td>
<td>96</td>
<td>8.7</td>
<td>71.21</td>
<td>27.58</td>
<td>99.21</td>
</tr>
<tr>
<td>40+</td>
<td>112</td>
<td>10.1</td>
<td>71.18</td>
<td>27.62</td>
<td>98.90</td>
</tr>
<tr>
<td>Work Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-campus</td>
<td>258</td>
<td>23.3</td>
<td>71.18</td>
<td>27.19</td>
<td>98.59</td>
</tr>
<tr>
<td>Off-campus</td>
<td>851</td>
<td>76.6</td>
<td>71.55</td>
<td>27.26</td>
<td>98.89</td>
</tr>
<tr>
<td>Average Hours of Sleep per Night</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 8 hours</td>
<td>85</td>
<td>7.7</td>
<td>71.75</td>
<td>27.48</td>
<td>99.22</td>
</tr>
<tr>
<td>6-8 hours</td>
<td>747</td>
<td>67.4</td>
<td>71.47</td>
<td>27.26</td>
<td>98.91</td>
</tr>
<tr>
<td>4-6 hours</td>
<td>261</td>
<td>23.5</td>
<td>71.33</td>
<td>27.23</td>
<td>98.53</td>
</tr>
<tr>
<td>2-4 hours</td>
<td>11</td>
<td>1.0</td>
<td>72.00</td>
<td>26.60</td>
<td>98.60</td>
</tr>
<tr>
<td>Less than 2 hours</td>
<td>5</td>
<td>.5</td>
<td>72.00</td>
<td>21.00</td>
<td>93.00</td>
</tr>
<tr>
<td>Overall Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>97</td>
<td>8.7</td>
<td>71.70</td>
<td>27.31</td>
<td>99.02</td>
</tr>
<tr>
<td>Very Good</td>
<td>412</td>
<td>37.2</td>
<td>71.34</td>
<td>27.20</td>
<td>98.89</td>
</tr>
<tr>
<td>Good</td>
<td>439</td>
<td>39.6</td>
<td>71.46</td>
<td>27.18</td>
<td>98.89</td>
</tr>
<tr>
<td>Fair</td>
<td>142</td>
<td>12.8</td>
<td>71.71</td>
<td>27.46</td>
<td>99.23</td>
</tr>
<tr>
<td>Poor</td>
<td>19</td>
<td>1.7</td>
<td>71.69</td>
<td>28.00</td>
<td>99.64</td>
</tr>
</tbody>
</table>

* HL: Health Literacy; RC: Reading Comprehension; N: Numeracy

**Health Literacy Scores**

The average score for health literacy (HL) was calculated following the guidelines established for the “Brief Test to Measure Functional Health Literacy.” The Total HL score consists of two parts; the Total RC and Total N scores. These are the reading comprehension (Total
RC) and numeracy (Total N) scores. The reading comprehension score consisted of 36 questions. Participants could score a total of 72 points in this section. The second part of the Total HL score was comprised of 4 numeracy prompts for a total of 28 points (Appendix A). These points were summed to calculate the total HL score out of 100 points. Participants were placed in a literacy level category based on this score. The health literacy levels are:

- Inadequate Functional Health Literacy: 0-53 points
- Marginal Functional Health Literacy: 54-66 points
- Adequate Functional Health Literacy: 67-100 points

The overall average health literacy score (Total HL) was 98.82 points out of a score of 100. This indicates that students at the University of Central Florida have adequate health literacy. The total reading comprehension score (Total RC) was 71.41 out of a total of 72 points. The total numeracy score (Total N) was found to be 27.24 points out of a possible 28 points. This can be seen in Table 2.

Table 2: Average HL, RC, and N scores* for entire study population.

<table>
<thead>
<tr>
<th></th>
<th>Total RC</th>
<th>Total N</th>
<th>Total HL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>71.47</td>
<td>27.24</td>
<td>98.82</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.15</td>
<td>2.38</td>
<td>3.67</td>
</tr>
</tbody>
</table>

* HL: Health Literacy; RC: Reading Comprehension; N: Numeracy

One-way ANOVA

A one-way ANOVA was chosen because this test compares means of two or more groups to a single independent variable. The dependent variables for this study were the mean RC, mean N, and the mean total HL scores. The independent variables in this study were each of the
demographic variables that were included in the survey. A summary of the one-way ANOVA is summarized in Table 3.

Table 3: One-Way ANOVA results comparing health literacy scores by demographics on the Brief Test to Measure Functional Health Literacy

<table>
<thead>
<tr>
<th>Demographic</th>
<th>RC Score</th>
<th>N Score</th>
<th>HL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.019*</td>
<td>0.491</td>
<td>0.467</td>
</tr>
<tr>
<td>Gender</td>
<td>0.195</td>
<td>0.543</td>
<td>0.646</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>0.000*</td>
<td>0.284</td>
<td>0.000*</td>
</tr>
<tr>
<td>Status by Credits</td>
<td>0.048*</td>
<td>0.041*</td>
<td>0.027*</td>
</tr>
<tr>
<td>Enrollment Status</td>
<td>0.268</td>
<td>0.555</td>
<td>0.838</td>
</tr>
<tr>
<td>Major</td>
<td>0.000*</td>
<td>0.506</td>
<td>0.423</td>
</tr>
<tr>
<td>Working Status</td>
<td>0.644</td>
<td>0.166</td>
<td>0.627</td>
</tr>
<tr>
<td>Hours Worked</td>
<td>0.823</td>
<td>0.650</td>
<td>0.933</td>
</tr>
<tr>
<td>Work Location</td>
<td>0.166</td>
<td>0.761</td>
<td>0.346</td>
</tr>
<tr>
<td>Hours of Sleep</td>
<td>0.883</td>
<td>0.004*</td>
<td>0.128</td>
</tr>
<tr>
<td>General Health</td>
<td>0.826</td>
<td>0.690</td>
<td>0.519</td>
</tr>
</tbody>
</table>

Significant results are denoted with an “**” for a $p < .05$.

**Association Between Health Literacy and Age**

A one-way ANOVA was computed comparing the demographics data of the participants and averaged Total RC, Total N, and Total HL scores. A significant difference was found in Total RC among different age groups ($F(4, 793) = 2.98, p < .05$). On average, respondents in the age range of 28-32 had a lower reading comprehension score with an average score of 70.32 points (Figure 1b). The majority of participants who were 28-32 years old were Graduate or Professional Students (Figure 1a). Additionally, respondents over 40 years of age had a lower average numeracy score of 26.97 points.
Figure 1a: Age distribution

Figure 1b: RC scores by age groups
Association Between Health Literacy and Race/Ethnicity

A significant difference was found among different races/ethnicities and the Total RC (F(6, 791) = 4.51, \( p < .05 \)) and Total HL scores (F(6, 724) = 5.23, \( p < .05 \)). Respondents who identified as a race/ethnicity other than the major ones listed in the survey (i.e., American Indian, Alaskan Native, Hawaiian and other) had lower scores across all three score categories. Those who identified as “other” had an average Total RC score of 65.43 (Figure 2b) and an average Total HL score of 91.17 (Figure 2c). This still puts these respondents in the adequate health literacy category.

Figure 2a: Race/ethnicity of study participants
Figure 2b: Total HL scores among different races/ethnicities

Figure 2c: Total RC scores among different races/ethnicities
Association Between Health Literacy and Student Status

One way ANOVA revealed statistically significant differences in Total RC (F(5,792) = 2.25, p < .05), Total N (F(5, 725) = 2.33, p < .05) and Total HL F(5,725) = 2.54, p < .05) scores based on student credit hours completed. Graduate or Professional Students and freshmen had the lowest average reading comprehension scores (Figure 3b). Juniors with 61-90 credit hours had the lowest average numeracy score of 26.98 points (Figure 3c). The Total HL scores (for Juniors (61-90 credit hours; 98.72) and Graduate or Professional Students (98.75) were slightly lower (Figure 3d) than sophomores and seniors, but they still had an adequate health literacy skill level. Freshmen students with 0-30 credit hours had slightly lower scores for all three score categories (Total RC score: 70.69, Total N score: 26.41, and Total HL score: 97.09). Nevertheless, they still had adequate health literacy skill levels.

Figure 3a: Student Status by Credit Hour
Figure 3b: Total reading comprehension score and student status by credit hour

Figure 3c: Total numeracy score and student status by credit hour
Association Between Health Literacy and Major

A significant difference in Total RC scores among different majors at UCF (F(10,608) = 10.29, p < .05) was detected by one-way ANOVA. Finance majors had a low RC score of 62.40 points out of 72 (Figure 4b). However, there were only 13 respondents in this group (Figure 4a). Significant differences in Total N and Total HL scores among college majors were not detected.
Figure 4a: Major distribution among participants

Figure 4b: Total reading comprehension scores among different majors
Association Between Health Literacy and Sleep

A one-way ANOVA was computed comparing Total RC, Total N, and Total HL scores among participants who reported different average hours of sleep per night (Figure 5a). A statistically significant difference in the Total N score by average hours of sleep per night (F(4,726) = 3.82, p < .05) was detected. Students who indicated that they slept between 2-4 hours per night had a mean numeracy score of 26.60, and students who responded that they slept less than 2 hours per night had a mean numeracy score of 21.00 (Figure 5b). Students who responded that they slept less than 2 hours per night also had a lower mean Total HL score of 93.00 points; however, there were only 5 participants who reported this level of sleep.

Figure 5a: Average hours of sleep among participants
One-way ANOVA was used to assess possible associations between Total RC, Total N and Total HL and the other demographic variables including gender, enrollment status, work status, hours worked per week, work location, and overall health. No significant differences were detected for any of these variables Table 3).

**Health Information Seeking Behaviors**

The trends seen in the HISBs survey and the relationship to the Total RC, Total N, and Total HL scores are presented in Table 4.
Table 4: HISB survey responses and total RC, N, and HL scores*

<table>
<thead>
<tr>
<th>In general, how often do you use each of the following sources to get health information?</th>
<th>N</th>
<th>Percent of Study Population</th>
<th>Total RC Score</th>
<th>Total N Score</th>
<th>Total HL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family and/or friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>67</td>
<td>7.2</td>
<td>71.26</td>
<td>26.51</td>
<td>97.96</td>
</tr>
<tr>
<td>Rarely</td>
<td>150</td>
<td>16.1</td>
<td>71.20</td>
<td>27.45</td>
<td>98.99</td>
</tr>
<tr>
<td>Sometimes</td>
<td>319</td>
<td>34.3</td>
<td>71.74</td>
<td>27.26</td>
<td>99.03</td>
</tr>
<tr>
<td>Often</td>
<td>301</td>
<td>32.4</td>
<td>71.58</td>
<td>27.21</td>
<td>98.80</td>
</tr>
<tr>
<td>Always</td>
<td>92</td>
<td>9.9</td>
<td>70.73</td>
<td>27.42</td>
<td>98.44</td>
</tr>
<tr>
<td>Health or medical Professionals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>22</td>
<td>2.4</td>
<td>72.00</td>
<td>27.00</td>
<td>99.00</td>
</tr>
<tr>
<td>Rarely</td>
<td>115</td>
<td>12.4</td>
<td>71.00</td>
<td>27.22</td>
<td>98.88</td>
</tr>
<tr>
<td>Sometimes</td>
<td>302</td>
<td>32.5</td>
<td>71.59</td>
<td>27.14</td>
<td>98.71</td>
</tr>
<tr>
<td>Often</td>
<td>334</td>
<td>36.0</td>
<td>71.38</td>
<td>27.32</td>
<td>98.80</td>
</tr>
<tr>
<td>Always</td>
<td>156</td>
<td>16.8</td>
<td>71.70</td>
<td>27.31</td>
<td>99.05</td>
</tr>
<tr>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>23</td>
<td>2.5</td>
<td>71.47</td>
<td>26.44</td>
<td>97.89</td>
</tr>
<tr>
<td>Rarely</td>
<td>89</td>
<td>9.6</td>
<td>71.03</td>
<td>27.11</td>
<td>98.63</td>
</tr>
<tr>
<td>Sometimes</td>
<td>289</td>
<td>31.1</td>
<td>71.47</td>
<td>27.34</td>
<td>99.07</td>
</tr>
<tr>
<td>Often</td>
<td>383</td>
<td>41.2</td>
<td>71.58</td>
<td>27.36</td>
<td>98.92</td>
</tr>
<tr>
<td>Always</td>
<td>145</td>
<td>15.6</td>
<td>71.41</td>
<td>27.24</td>
<td>98.83</td>
</tr>
<tr>
<td>Newspapers or Books</td>
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<tr>
<td>Never</td>
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<td>71.31</td>
<td>27.28</td>
<td>98.79</td>
</tr>
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<td>302</td>
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<td>71.41</td>
<td>27.02</td>
<td>98.56</td>
</tr>
<tr>
<td>Sometimes</td>
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<td>71.60</td>
<td>27.48</td>
<td>99.07</td>
</tr>
<tr>
<td>Often</td>
<td>83</td>
<td>8.9</td>
<td>71.84</td>
<td>27.16</td>
<td>99.07</td>
</tr>
<tr>
<td>Always</td>
<td>12</td>
<td>1.3</td>
<td>72.00</td>
<td>28.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Social media</td>
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<tr>
<td>Never</td>
<td>380</td>
<td>40.9</td>
<td>71.57</td>
<td>27.41</td>
<td>99.01</td>
</tr>
<tr>
<td>Rarely</td>
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<td>29.8</td>
<td>71.66</td>
<td>27.29</td>
<td>99.12</td>
</tr>
<tr>
<td>Sometimes</td>
<td>187</td>
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<td>70.89</td>
<td>26.87</td>
<td>97.98</td>
</tr>
<tr>
<td>Often</td>
<td>73</td>
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<td>71.63</td>
<td>27.00</td>
<td>98.64</td>
</tr>
<tr>
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<td>12</td>
<td>1.3</td>
<td>72.00</td>
<td>28.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Television</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>502</td>
<td>54.0</td>
<td>71.59</td>
<td>27.28</td>
<td>98.90</td>
</tr>
<tr>
<td>Rarely</td>
<td>279</td>
<td>30.0</td>
<td>71.24</td>
<td>27.25</td>
<td>98.61</td>
</tr>
<tr>
<td>Sometimes</td>
<td>122</td>
<td>13.1</td>
<td>71.41</td>
<td>26.98</td>
<td>98.87</td>
</tr>
<tr>
<td>Often</td>
<td>23</td>
<td>2.5</td>
<td>71.90</td>
<td>27.61</td>
<td>99.61</td>
</tr>
<tr>
<td>Always</td>
<td>3</td>
<td>0.3</td>
<td>72.00</td>
<td>28.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

About how often have you read health information on the internet in the past 12 months?

| Once a month or more | 645 | 69.4 | 71.59 | 27.21 | 98.81 |
Less than once a month | 284 | 30.6 | 71.16 | 27.31 | 98.86

**In the past 12 months when you talked with a health care professional, how interested were they in hearing about the information you found online?**

<table>
<thead>
<tr>
<th>Interest Level</th>
<th>Count</th>
<th>Percentage</th>
<th>Rating</th>
<th>Rating</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very interested</td>
<td>1107</td>
<td>11.5</td>
<td>71.66</td>
<td>26.80</td>
<td>98.46</td>
</tr>
<tr>
<td>Somewhat interested</td>
<td>291</td>
<td>31.3</td>
<td>71.40</td>
<td>27.47</td>
<td>99.04</td>
</tr>
<tr>
<td>A little interested</td>
<td>227</td>
<td>24.4</td>
<td>71.35</td>
<td>27.03</td>
<td>98.61</td>
</tr>
<tr>
<td>Not at all interested</td>
<td>304</td>
<td>32.7</td>
<td>71.56</td>
<td>27.34</td>
<td>98.91</td>
</tr>
</tbody>
</table>

**In the past 12 months, have you talked to a doctor, nurse, or other health professional about any kind of health information you have gotten from the Internet?**

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
<th>Rating</th>
<th>Rating</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>445</td>
<td>47.9</td>
<td>71.55</td>
<td>27.27</td>
<td>98.81</td>
</tr>
<tr>
<td>No</td>
<td>484</td>
<td>52.1</td>
<td>71.39</td>
<td>27.22</td>
<td>98.84</td>
</tr>
</tbody>
</table>

**In the past 12 months, have you done the following things while using the internet?**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Count</th>
<th>Percentage</th>
<th>Rating</th>
<th>Rating</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looked for health or medical information for yourself?</td>
<td>Yes</td>
<td>823</td>
<td>88.6</td>
<td>71.55</td>
<td>27.21</td>
</tr>
<tr>
<td>No</td>
<td>106</td>
<td>11.4</td>
<td>70.74</td>
<td>27.52</td>
<td>99.25</td>
</tr>
<tr>
<td>Looked for health or medical information for someone else?</td>
<td>Yes</td>
<td>630</td>
<td>67.8</td>
<td>71.54</td>
<td>27.28</td>
</tr>
<tr>
<td>No</td>
<td>299</td>
<td>32.2</td>
<td>71.31</td>
<td>27.17</td>
<td>98.82</td>
</tr>
</tbody>
</table>

**When searching health or medical issues on the Internet, how likely are you to consider the quality of information from one web source as accurate?**

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Count</th>
<th>Percentage</th>
<th>Rating</th>
<th>Rating</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td>53</td>
<td>5.7</td>
<td>71.87</td>
<td>27.20</td>
<td>99.07</td>
</tr>
<tr>
<td>Unlikely</td>
<td>148</td>
<td>15.9</td>
<td>71.54</td>
<td>27.60</td>
<td>99.15</td>
</tr>
<tr>
<td>Neutral</td>
<td>406</td>
<td>43.7</td>
<td>71.45</td>
<td>26.98</td>
<td>98.56</td>
</tr>
<tr>
<td>Likely</td>
<td>196</td>
<td>21.1</td>
<td>71.56</td>
<td>27.26</td>
<td>98.89</td>
</tr>
<tr>
<td>Very Likely</td>
<td>126</td>
<td>13.6</td>
<td>71.13</td>
<td>27.64</td>
<td>99.07</td>
</tr>
</tbody>
</table>

**When searching health or medical issues on the Internet, how likely are you to gather information using several web sources to evaluate and approve its accuracy?**

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Count</th>
<th>Percentage</th>
<th>Rating</th>
<th>Rating</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td>31</td>
<td>3.3</td>
<td>71.48</td>
<td>26.16</td>
<td>97.74</td>
</tr>
<tr>
<td>Unlikely</td>
<td>35</td>
<td>3.8</td>
<td>70.59</td>
<td>27.16</td>
<td>97.80</td>
</tr>
<tr>
<td>Neutral</td>
<td>95</td>
<td>10.2</td>
<td>70.53</td>
<td>26.19</td>
<td>97.58</td>
</tr>
<tr>
<td>Likely</td>
<td>328</td>
<td>35.3</td>
<td>71.58</td>
<td>27.35</td>
<td>99.04</td>
</tr>
<tr>
<td>Very Likely</td>
<td>440</td>
<td>47.4</td>
<td>71.61</td>
<td>27.40</td>
<td>99.01</td>
</tr>
</tbody>
</table>

**When searching health or medical issues on the Internet, how likely are you to share the information you find with family or friends without checking its accuracy?**

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Count</th>
<th>Percentage</th>
<th>Rating</th>
<th>Rating</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td>261</td>
<td>28.1</td>
<td>71.80</td>
<td>27.38</td>
<td>99.18</td>
</tr>
<tr>
<td>Unlikely</td>
<td>292</td>
<td>31.4</td>
<td>71.55</td>
<td>27.21</td>
<td>98.74</td>
</tr>
<tr>
<td>Neutral</td>
<td>161</td>
<td>17.3</td>
<td>71.15</td>
<td>27.02</td>
<td>98.54</td>
</tr>
<tr>
<td>Likely</td>
<td>167</td>
<td>18.0</td>
<td>71.41</td>
<td>27.27</td>
<td>99.03</td>
</tr>
<tr>
<td>Very Likely</td>
<td>48</td>
<td>5.2</td>
<td>70.22</td>
<td>27.34</td>
<td>97.34</td>
</tr>
</tbody>
</table>
### When searching health or medical issues on the Internet, how likely are you to confirm the information you find with a health or medical professional?

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td>65</td>
<td>7.0</td>
<td>71.43</td>
<td>26.29</td>
<td>97.67</td>
</tr>
<tr>
<td>Unlikely</td>
<td>167</td>
<td>18.0</td>
<td>71.62</td>
<td>27.26</td>
<td>98.92</td>
</tr>
<tr>
<td>Neutral</td>
<td>237</td>
<td>25.5</td>
<td>71.03</td>
<td>27.42</td>
<td>98.88</td>
</tr>
<tr>
<td>Likely</td>
<td>311</td>
<td>33.5</td>
<td>71.57</td>
<td>27.08</td>
<td>98.65</td>
</tr>
<tr>
<td>Very Likely</td>
<td>149</td>
<td>16.0</td>
<td>71.75</td>
<td>27.66</td>
<td>99.44</td>
</tr>
</tbody>
</table>

### When searching for health or medical issues, how accurate do you think the information on the Internet is?

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very inaccurate</td>
<td>26</td>
<td>2.8</td>
<td>71.62</td>
<td>27.65</td>
<td>99.25</td>
</tr>
<tr>
<td>Inaccurate</td>
<td>95</td>
<td>10.2</td>
<td>71.75</td>
<td>27.15</td>
<td>98.93</td>
</tr>
<tr>
<td>Neutral</td>
<td>541</td>
<td>58.2</td>
<td>71.50</td>
<td>27.37</td>
<td>98.97</td>
</tr>
<tr>
<td>Accurate</td>
<td>257</td>
<td>27.7</td>
<td>71.29</td>
<td>26.99</td>
<td>98.46</td>
</tr>
<tr>
<td>Very accurate</td>
<td>10</td>
<td>1.1</td>
<td>71.50</td>
<td>27.13</td>
<td>98.63</td>
</tr>
</tbody>
</table>

### When encountering health or medical topics on social media, how accurate do you think the information is?

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very inaccurate</td>
<td>218</td>
<td>23.5</td>
<td>71.77</td>
<td>27.18</td>
<td>98.94</td>
</tr>
<tr>
<td>Inaccurate</td>
<td>346</td>
<td>37.2</td>
<td>71.60</td>
<td>27.39</td>
<td>99.09</td>
</tr>
<tr>
<td>Neutral</td>
<td>310</td>
<td>33.4</td>
<td>71.27</td>
<td>27.12</td>
<td>98.61</td>
</tr>
<tr>
<td>Accurate</td>
<td>48</td>
<td>5.2</td>
<td>70.39</td>
<td>27.18</td>
<td>97.41</td>
</tr>
<tr>
<td>Very accurate</td>
<td>7</td>
<td>0.8</td>
<td>71.60</td>
<td>28.00</td>
<td>99.60</td>
</tr>
</tbody>
</table>

### Please rate your agreement on the following statements.

**The number of followers and/or who is within the same network influences the accuracy of the information presented**

<table>
<thead>
<tr>
<th>Agreement</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>217</td>
<td>23.4</td>
<td>71.78</td>
<td>27.43</td>
<td>99.20</td>
</tr>
<tr>
<td>Disagree</td>
<td>239</td>
<td>25.7</td>
<td>71.65</td>
<td>27.23</td>
<td>98.90</td>
</tr>
<tr>
<td>Neutral</td>
<td>238</td>
<td>25.6</td>
<td>71.56</td>
<td>27.10</td>
<td>98.93</td>
</tr>
<tr>
<td>Agree</td>
<td>195</td>
<td>21.0</td>
<td>70.75</td>
<td>27.29</td>
<td>98.25</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>40</td>
<td>4.3</td>
<td>71.65</td>
<td>26.87</td>
<td>98.48</td>
</tr>
</tbody>
</table>

**The Internet provides helpful resources for health information**

<table>
<thead>
<tr>
<th>Agreement</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>6</td>
<td>0.6</td>
<td>72.00</td>
<td>26.25</td>
<td>98.25</td>
</tr>
<tr>
<td>Disagree</td>
<td>44</td>
<td>4.7</td>
<td>71.52</td>
<td>27.52</td>
<td>99.03</td>
</tr>
<tr>
<td>Neutral</td>
<td>196</td>
<td>21.1</td>
<td>71.10</td>
<td>27.27</td>
<td>98.65</td>
</tr>
<tr>
<td>Agree</td>
<td>547</td>
<td>58.9</td>
<td>71.51</td>
<td>27.27</td>
<td>98.87</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>136</td>
<td>14.6</td>
<td>71.47</td>
<td>27.24</td>
<td>98.83</td>
</tr>
</tbody>
</table>

**Social media provides helpful resources for health information**
One question on the survey asked participants how often they gather health-related information from several sources. These sources are family and/or friends, health or medical professionals, the internet, newspapers or books, social media, and television. The average number of participants who responded “often” or “always” for each category was analyzed and is shown in Figure 6a-d. Participants who always used family and/or friends as a resource for obtaining health-related information had a lower mean RC score of 70.73 points. Additionally, participants who never used family and/or friends as a health resource had a mean N score of 26.51. Participants who never used the internet to gather health-related information also had a lower N score of 26.44 points. Survey participants who “sometimes” gathered health information from social media had lower mean scores across all three categories. Their average RC score was 70.89, their average N score was 26.87, and their average HL score was 97.98. Despite these scores being lower, the respondents still had adequate health literacy skills. Participants who “sometimes” used television as their source for obtaining health-related information had a lower mean N score of 26.98. This score did not impact their overall HL, score and the respondents still had adequate health literacy.
Figure 6a: Analysis of the source of health information among participants who answered “often” or “always” for each health information source

Figure 6b: Mean RC scores among participants who answered “often” or “always” for each health information source
Figure 6c: Mean N scores among participants who answered “often” or “always” for each health information source

Figure 6d: Mean HL scores among participants who answered “often” or “always” for each health information source
The HISB survey asked participants “when searching health or medical issues on the Internet, how likely are you to gather information using several web sources to evaluate and approve its accuracy?” Respondents who answered “very unlikely” or “unlikely” had lower N scores (Figure 7d) and lower mean HL scores (Figure 7c). Participants who responded as “neutral” to this question had lower averages across all three categories. The majority of students were “likely” and “very likely” to use multiple sources when searching for health-related information (Figure 7a). These lower scores in each domain are still high and indicate that students at UCF have very adequate health literacy skills.

Figure 7a: Participants’ use of multiple sources when searching for health-related information
Graph 7b: Mean RC score and use of multiple sources when searching for health-related information

Figure 7c: Mean HL score and use of multiple sources when searching for health-related information
Figure 7d: Mean N score and use of multiple sources when searching for health-related information
DISCUSSION

Health literacy is the skill needed to acquire, read, understand, and use health-related information to maintain a treatment plan and make informed healthcare decisions. Individuals with high health literacy are able to effectively navigate the healthcare environment. A low health literacy level can have a detrimental impact on the health of an individual and the overall health of a community (Hixen, 2004). A growing number of studies have shown that individuals who are comfortable engaging in their health care environment have better health outcomes and improved health status over their lifetime. Skills that help make an individual more comfortable in a healthcare environment include the ability to read and interpret prescription bottles, engage in self-care, and effectively fill out complex healthcare forms. Each of these is a learned skill and is related to reading comprehension and numeracy skills, skills that are used to evaluate functional health literacy as determined from administration of the TOFHLA.

The overall mean health literacy (Total HL) score for students at UCF was 98.82. This puts students at the University of Central Florida in the adequate functional health literacy level. This level of functional health literacy ranges from 67-100 points. This level of functional health literacy implies that students at UCF are able to effectively navigate the healthcare environment and are able to effectively collect and utilize health-related information. Across all demographic variables, students had an adequate functional health literacy. In fact, there was no demographic group with a total HL score below 90 points. Because students in all demographic groups scored considerably high in the adequate functional health literacy level, it is difficult to assess the need
for health literacy related education on campus. The TOFHLA survey has historically been used to assess the functional health literacy levels of low income or disadvantaged populations. It was not designed to test the functional health literacy of an educated population who are very likely to have well developed reading comprehension and numeracy skills. College students are part of this educated population. The skills that apply to health literacy and information seeking behaviors are reading comprehension, numeracy, and research skills, which are all skills used regularly by college students. These students are expected to understand new material presented to them and to be able to find information on their own to be successful in their education. They use reading comprehension and numeracy skills daily in their studies, which explains the high reading comprehension and numeracy scores found in this study that contribute to the very high functional health literacy scores of students who participated in this study. It is recommended that a survey tool measuring health literacy skills of an educated population be designed and validated to assess the need for any potential short falls in health education on college campuses.

The mean Total RC score for participants was 71.47 points out of a total of 72 points. The lowest Total RC score was 62 points out of 72, which indicates that students at UCF do not have issues with reading comprehension as it applies to health-related information. The mean Total N score for study participants was 27.24 points out of a total of 28 points. The lowest Total N score was 21 points out of a total of 28 points possible in this section. This average score indicates that study participants did not struggle with the numeracy prompts presented in the TOFHLA survey.

A previous study by Sukys, Cesnaitiene, and Ossowsky (2017), found that females had higher health literacy compared to males in reading comprehension and numeracy. This previous
study also found that student enrollment in health-related courses predicted a higher health literacy score. The data collected and reported in this thesis does not support this trend as no significant differences were detected between gender and the three domains of health literacy. While students in health-related majors, such as Health Sciences, Psychology, Biomedical Sciences, and Nursing, did score in the adequate health literacy range with scores in the high 90s, they did not score significantly higher than the other majors. In fact, no significant difference was detected between Total HL score and major at UCF; however, a one-way ANOVA revealed a significant difference among college majors at UCF and the reading comprehension score. A significant difference also was detected when comparing different age groups and the Total RC score. The mean score was lowest for participants who reported being between the ages of 28-32, and the majority of students in this age group were Graduate or Professional Students; however, post-hoc statistical analyses were not conducted, so no further conclusions can be made Interestingly, data collected in the National Assessment of Adult Literacy (NAAL, 2003) found that health literacy scores decreased as age increased, but in our study, participants over 32 years old had a higher average health literacy and reading comprehension score 28-32 year old. The NAAL study also found that individuals with college degrees had proficient health literacy skills. The results of our study are consistent with these previous findings. Despite the age range of 28-32 years having a lower mean RC score, they still had proficient health literacy skills in all domains.

Status classification at UCF by credit hours completed showed a significant difference between all three health literacy domains: Total RC, Total N, and Total HL. Freshman students with 0-30 credits had the lowest mean scores overall. Despite these lower scores, freshmen still
had adequate functional health literacy and scored a mean Total HL of 97.09. This health literacy score is still in the higher end of the range for adequate health literacy (67-100 points). The health literacy scores increased as the credit hours increased. This could be due to the fact that some skills tested in the TOFHLA survey are learned skills. For example, the lower reading comprehension score could be due to the fact that freshmen have less experience with critical thinking and have less exposure to healthcare related information that would aid other students in obtaining a higher score. The mean reading comprehension score for Graduate or Professional Students was also lower than other categories. This finding was unexpected. It was predicted that students with greater education would have a higher mean health literacy score, but Graduate students, who should have already completed an undergraduate degree, had a lower reading comprehension score of 70.95 points out of a total of 72. This score is lower than the others in this demographic, but it still indicates that Graduate or Professional Students had very high health literacy skills despite the slightly lower mean reading comprehension score.

Previous studies on health literacy have shown that racial/ethnic minorities are more likely to have poor health literacy skills. These studies focused on at-risk populations in low socioeconomic classes, but the research presented in this paper looks at an advantaged population on a college campus where the majority of respondents come from higher socioeconomic brackets. This research does not support the finding that racial/ethnic minorities had lower health literacy levels. All races/ethnicities had high Total HL scores and each race/ethnicity also scored high in the reading comprehension and numeracy sections, although the mean score for total HL was lowest among respondents who identified as “other”. Respondents in this group had an overall
health literacy score of 91.17. This score is lower than the scores of the other ethnic groups, who scored 98 points and above, but this score still shows that students who identify as “other” possess adequate functional health literacy skills.

The survey asked participants to report the average hours of sleep they got per night to determine if sleep affects health literacy. This study found that there was a significant difference between the amount of sleep a student got per night and their Total N score. Students who reported only receiving 2-4 hours of sleep per night had a mean Total N score of 26.60 and students who reported receiving less than 2 hours of sleep per night had a mean Total N score of 21.00 points. This score was out of 28 points. There were only 11 participants who reported receiving 2-4 hours of sleep and only 5 participants who reported receiving less than 2 hours of sleep per night. Despite these scores being lower than the others in this group, these study participants still had high functional health literacy scores. Students receiving less than 2 hours of sleep per night had an overall Total HL score of 93.00 out of 100.

Health literacy influences an individual’s health outcomes over a lifetime. A health outcome is a change in health status as a result of a health care service and can be used to assess quality of life after a diagnosis or medical intervention. Students who participated in this survey had adequate functional health literacy. This measure can be used to predict health outcomes later in life. Because students had very high functional health literacy scores, they are more likely to have more positive health outcomes over a lifetime. This is because they have the skills to effectively navigate the health care environment and they possess the skills needed to maintain a treatment plan, seek medical treatment when necessary, and maintain a healthy lifestyle.
The second part of this survey asked students to about their health information seeking behaviors. In general, health information seeking behaviors did not influence the Total HL score of students. The lowest health literacy score in the HISBs survey was 97 points. This score is still a high health literacy score and does not indicate that the information seeking behaviors affect the health literacy skills of college students.

This study looked in-depth at the sources of information used to obtain health-related information and Total RC, Total N, and Total HL scores. The sources of information looked at were family and/or friends, health or medical professionals, the internet, newspapers or books, social media, and television. The mean scores for participants who answered “often” or “always” to using each of the sources of information to gather health or medical information were analyzed. Respondents who reported using family and/or friends often or always to get health information had a slightly lower RC score of 71.2 points out of 72 points Figure 6a shows that the Internet was the greatest source of information used for gathering health information with 56.8 % of study participants reporting that they use the internet often or always. This result is not unexpected. College students use the Internet daily in their everyday lives and in their studies. They use the internet for research purposes, so it makes sense that these skills translate to looking for health information on the Internet as a reaction to a specific health-related need.

The HISBs survey also asked students how likely they were to use multiple sources to confirm health information obtained from the internet. Figure 7a shows that 47.4 % of students were “very likely” and that 35.3 % were “likely” to use several web sources to evaluate and approve health information obtained from the Internet. The study participants who answered
“likely” or “very likely” had higher reading comprehension and numeracy scores compared to other respondents. In addition, participants who were more likely to verify their health information using multiple web sources had a higher Total HL score of 99.03, whereas those who were less likely to use multiple sources scored in the 97’s for Total HL scores. These are still very high health literacy scores, which indicates that the study participants had very good health literacy skills. Further research needs to be conducted to determine if information seeking behaviors have a significant impact on health literacy skills.
CONCLUSION

The functional health literacy level of students at the University of Central Florida was found to be adequate with a mean score 98.82 points out of a total of 100 possible points. The mean reading comprehension score was found to be 71.47 points out of a possible 72 and the mean numeracy score was found to be 27.24 out of a possible 28 points. Because students in all demographic groups scored considerably high in the adequate functional health literacy level, it is difficult to assess the need for health literacy related education on campus. The TOFHLA survey has historically been used to assess the functional health literacy levels of low income or disadvantaged populations. It was not designed to test the functional health literacy of an educated population who are very likely to have well developed reading comprehension and numeracy skills. It is recommended that a survey tool measuring health literacy skills of an educated population be designed and validated to assess the need for any potential short falls in health education on college campuses. Students also had high health literacy scores for each of the health information seeking behaviors that was assessed. There was no behavior that indicated a significant impact on the overall health literacy scores of college student at the University of Central Florida.
LIMITATIONS

This study utilizes an online questionnaire, which can result in differences in understanding or misinterpretation of questions. Also, without an interviewer, it is hard to determine if the responses are conscientious and that the respondent truly understood the questions. In addition, this questionnaire was distributed by email, so it may not have reached a representative sample. Some students may not check their university email, or they may have disregarded the questionnaire when they saw that it didn’t relate to their program of study. Another limitation of this study is that some students did not complete the survey in its entirety. This decreased the sample size of the study. The SPSS software did account for this discrepancy and the totals were calculated using the compensated numbers.
WORKS CITED


Sansom-Daly, U. M., Lin, M., Robertson, E. G., Wakefield, C. E., Mcgill, B. C., Girgis, A., & Cohn, R. J. (2016). Health Literacy in Adolescents and Young Adults: An Updated Review. *Journal of Adolescent and Young Adult Oncology, 5*(2), 106-118. doi:10.1089/jayao.2015.0059


APPENDIX A

Project title: Health Literacy and Health Information Seeking Behaviors among Students at UCF
Survey Questions

Demographics
1. How old are you?
   a. < 18
   b. 18-22
   c. 23-27
   d. 28-32
   e. 33-39
   f. ≥ 40
2. What is your gender?
   a. Female
   b. Male
   c. Other (please specify):
3. How would you describe yourself? (Mark all that apply)
   a. White
   b. Black or African American
   c. Hispanic or Latino/a
   d. Asian or Pacific Islander
   e. American Indian, Alaskan Native, or Native Hawaiian
   f. Biracial or Multiracial
   g. Other (please specify):
4. What is your status at UCF?
   a. Freshman (0-30 credit hours)
   b. Sophomore (31-60 credit hours)
   c. Junior (61-90 credit hours)
   d. Senior (91-120 credit hours)
   e. Senior (120+ credit hours)
   f. Graduate or Professional Student
   g. Non-degree Seeking Student
5. What is your enrollment status at UCF?
   a. I am enrolled in classes full-time
   b. I am enrolled in classes part-time
6. What is your major at UCF?
   a. Health Sciences
   b. Psychology
   c. Biomedical Sciences
d. Nursing  
e. Mechanical Engineering  
f. Integrated Business  
g. Computer Science  
h. Biology  
i. Finance  
j. Hospitality Management  
k. Other (please specify):  

7. Are you currently working?  
   a. Yes, full-time  
   b. Yes, part-time  
   c. I am not currently working  

8. On average, how many hours do you work per week?  
   a. 0  
   b. 1-9  
   c. 10-19  
   d. 20-29  
   e. 30-39  
   f. 40  
   g. 40+  

9. Where do you work?  
   a. On-campus  
   b. Off-campus  

10. On average, how many hours of sleep do you get per night?  
    a. More than 8 hours  
    b. 6-8 hours  
    c. 4-6 hours  
    d. 2-4 hours  
    e. Less than 2 hours  

11. In general, would you say your health is:  
    f. Excellent  
    g. Very Good  
    h. Good  
    i. Fair  
    j. Poor  

Health Information Seeking Behaviors Survey (HISBs)  
In general, how often do you use each of the following sources to get health information?  
1. Family and/or friends  
   a. Never  
   b. Rarely  
   c. Sometimes
2. Health or medical professionals
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Always
3. Internet
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Always
4. Newspapers or Books
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Always
5. Social media
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Always
6. Televisions
   a. Never
   b. Rarely
   c. Sometimes
   d. Often
   e. Always
7. About how often have you read health information on the internet in the past 12 months?
   a. Once a month or more
   b. Less than once a month
8. In the past 12 months, have you talked to a doctor, nurse, or other health professional about any kind of health information you have gotten from the Internet?
   a. Yes
   b. No
9. In the past 12 months when you talked with a health care professional, how interested were they in hearing about the information you found online?
   a. Very interested
   b. Somewhat interested
   c. A little interested
   d. Not at all interested
10. In the past 12 months, have you done the following things while using the internet? Looked for health or medical information for yourself?
   a. Yes
   b. No
11. In the past 12 months, have you done the following things while using the Internet? Looked for health or medical information for someone else?
   a. Yes
   b. No
12. When searching health or medical issues on the Internet, how likely are you to consider the quality of information from one web source as accurate?
   a. Very unlikely
   b. Unlikely
   c. Neutral
   d. Likely
   e. Very likely
13. When searching health or medical issues on the Internet, how likely are you to gather information using several web sources to evaluate and approve its accuracy?
   a. Very unlikely
   b. Unlikely
   c. Neutral
   d. Likely
   e. Very likely
14. When searching health or medical issues on the Internet, how likely are you to share the information you find with family or friends without checking its accuracy?
   a. Very unlikely
   b. Unlikely
   c. Neutral
   d. Likely
   e. Very likely
15. When searching health or medical issues on the Internet, how likely are you to confirm the information you find with a health or medical professional?
   a. Very unlikely
   b. Unlikely
   c. Neutral
   d. Likely
   e. Very likely
16. When searching for health or medical issues, how accurate do you think the information on the Internet is?
   a. Very inaccurate
   b. Inaccurate
   c. Neutral
   d. Accurate
   e. Very Accurate
17. When encountering health or medical topics on social media, how accurate do you think the information is?
   a. Very inaccurate
b. Inaccurate
c. Neutral
d. Accurate
e. Very Accurate

18. The number of followers and/or who is within the same network influences the accuracy of the information presented
   a. Strongly Disagree
   b. Disagree
   c. Neutral
   d. Agree
   e. Strongly Disagree

19. The Internet provides helpful resources for health information
   a. Strongly Disagree
   b. Disagree
   c. Neutral
   d. Agree
   e. Strongly Disagree

20. Social media provides helpful resources for health information
   a. Strongly Disagree
   b. Disagree
   c. Neutral
   d. Agree
   e. Strongly Disagree

Test of Functional Health Literacy in Adults (TOFHLA) Survey

I. Reading Comprehension
Here are some medical instructions that you or anybody might see around the hospital. These instructions are in sentences that have some of the words missing. Where a word is missing, a blank line is drawn, and 4 possible words that could go in the blank appear just below it. I want you to figure out which of those 4 words should go in the blank, which word makes the sentence make sense. When you think you know which one it is, select that word, and go on to the next one.

PASSAGE A

Your doctor has sent you to have a _____________ X-ray.
   a. stomach/chest
   b. diabetes
   c. stitches
   d. germs

You must have an ____________ stomach when you come for ________.
   a. asthma
   b. empty
   c. incest
   d. anemia

   a. is.
   b. am.
   c. if.
   d. it.

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The X-ray will _________ from 1 to 3 _________ to do so.

a. take  a. beds
b. view  b. brains
c. talk  c. hours
d. look  d. diets

THE DAY BEFORE THE X-RAY

For supper have only a _________ snack of fruit, _________ and jelly, with coffee or tea.

a. little  a. toes
b. broth  b. throat
c. attack  c. toast
d. nausea  d. thigh

After _____________, you must not ____________ or drink

a. minute,  a. easy
b. midnight,  b. ate
  c. during,  c. drank
d. before,  d. eat

anything at _____________ until after you have ____________ the X-ray.

a. ill  a. are
b. all  b. has
c. each  c. had
d. any  d. was

THE DAY OF THE X-RAY

Do not eat ________________.
Do not ____________, even __________.

a. drive, b. drink, c. dress, d. dose, a. heart, b. breath, c. water, d. cancer.

If you have any _____________, call the X-ray ______________ at 616-4500.

a. answers, b. exercises, c. tracts, d. questions,

a. Department, b. Sprain, c. Pharmacy, d. Toothache

PASSAGE B

I agree to give correct information to ___________ if I can receive Medicaid.

a. hair, b. salt, c. see, d. ache

If I _____________ to provide the county information to _____________ any

a. agree, b. probe, c. send, d. gain, a. hide, b. risk, c. discharge, d. prove

I _____________ to provide the county information to _____________ any

a. hair, b. salt, c. see, d. ache

I _____________ to provide the county information to _____________ any

a. agree, b. probe, c. send, d. gain, a. emphysema, b. application, c. gallbladder, d. relationship
the ____________ to get such proof. I ____________ that for

a. inflammation  a. investigate
b. religion       b. entertain
c. iron           c. understand
d. county         d. establish

Medicaid I must report any ____________ in my circumstances
within ____________ (1) ____________ of the change.

a. changes  a. award
b. hormones b. aware
c. antacids  c. away
  d. charges  d. await

I understand ____________ if I DO NOT like the ____________ made on my

a. thus  a. martial
b. this   b. occupation
  c. that  c. adult
  d. than  d. decision

case, I have the ____________ to a fair hearing. I can ____________ a

a. bright a. request
b. left    b. refuse
  c. wrong  c. fail
  d. right  d. mend

hearing by writing or ____________ the county where I applied.

a. counting
b. reading
c. calling
d. smelling
If you _________ TANF (Temporary Assistance for Needy Families) for any family

a. wash  
b. want  
c. cover  
d. tape

_______, you will have to_______ a different application form. _________, we will use

a. member,  
b. history,  
c. weight,  
d. seatbelt,
a. relax  
b. break  
c. inhale  
d. sign

the _________ on this form to determine your ________________.

a. lung  
b. date  
c. meal  
d. pelvic

a. Since,  
b. Whether,  
c. However,  
d. Because,

Prompt 1

If you take your first tablet at 7 am, when should you take the next one?
Options will include times between 7 am. – 6 am.

And the next one after that?
Options will include times between 7 am. – 6 am.

What about the last one for the day, when should you take that one?
Options will include times between 7 am. – 6 am.
Prompt 2

Could you take that medicine on July 10, 2019?
Answers include yes or no

Prompt 3

If you began taking your medicine Tuesday, when should you take it next?
Answers include the seven days of the week.

What day would you take it after that?
Answers include the seven days of the week.

Prompt 4

Normal blood sugar is 60 - 150.
Your blood sugar today is 160.

If this were your score, would your blood sugar be normal today?
Answers will include yes or no.

Prompt 5
When is your next appointment?
Answers include:
- April 10th
- Apr. 9th
- Apr. 3rd
- Apr. 2nd
- Aug. 2nd

Where should you go?
Answers include (multiple answers allowed)
- Hospital
- Diabetic clinic
- 2nd floor
- 3rd floor
- Nurse’s office

Prompt 6

How many of those pills should you take?
Answers include:
- 4
Prompt 7

GARFIELD IM 28 Dec 92
FF941857 Dr. LUBIN, MICHAEL

PHENOBARBITAL
30 MG 90/2

After two refills or six months from date of issue, this prescription can only be refilled by authority of physician.
(2 refills)

01 08 (9 of 90)

How many times can you get that prescription refilled?
Answers include:
I can refill it 1 time
I can refill it 2 times
I can refill it 8 times
I can refill it 9 times
I can refill it 12 times

When is the date of issue?
Answers include:
January 8, 1992
August 1, 1992
September 2, 1993
October 30, 2009
December 28, 1992

When is six months from the date of issue?
Answers include:
January
March
June
August
September
Prompt 8

If you eat lunch at 12:00 noon, and you want to take this medicine before lunch, what time should you take it?
Answers include:
- 8 am.
- 9 am.
- 11 am.
- 1 pm.
- 3 pm.

If you forget to take it before lunch what time should you take it?
Answers include: (multiple answers allowed)
- 9 am.
- 10 am.
- 2 pm.
- 3 pm.
- 4 pm.

Prompt 9

For clinic care, you only must apply once each six months.

Let’s just say the last time you came to the clinic was on Jul 12, 1992. When should you reapply for financial aid?
Answers include:
- August 1992
Prompt 10

Let's say that after deductions, your monthly income and other resources are $1,129. And let's say you have 3 children. Would you have to pay for your care at the clinic? Answers include yes or no.