

(Note from the Editor: this article is presented in three parts.)

Part I: Professional Allied Health Student Characteristics that Influence Health Literacy Awareness

Part II: The Effects of Online Health Literacy Focused Training on Professional Allied Health Students' Knowledge of Health Literacy

Part III: The Effects of Frequency of Interaction with Healthcare Providers on Health Literacy Awareness Levels for Professional Level Allied Health Students

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**Professional Allied Health Student Characteristics that Influence Health Literacy
Awareness – Part I**

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ABSTRACT

An investigation was conducted to assess health literacy awareness for 106 professional level allied health students enrolled in physical, occupational, and respiratory therapy programs at a southeastern public university. A quantitative approach employing a non-experimental design was used in concert with a modified version of the Health Literacy Knowledge and Experience Survey (HL-KES) to gather data for this investigation. Chi-square tests were utilized to determine the existence of an association between specified characteristics and the level of awareness, knowledge, and comprehension of health literacy. Results from this study indicate that age was the only personal characteristic that showed an association with awareness ($\chi^2 = 7.432, p = .006, n = 86, df = 1$). However, gender, race and program of study had no influence on health literacy awareness.

Key words: allied health students, health literacy, student characteristics, awareness

Professional Allied Health Student Characteristics that Influence Health Literacy Awareness – Part I

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Introduction

Health literacy can be defined as the capacity of a patient to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Ratzan & Parker, 2000; Nielson-Bohlman, Panzer, & King, 2004; Baker, 2006, Berkman, Davis, & McCormack, 2010). Health literacy education for health professionals is critical to the development of competent physicians and other care providers such as nurses, pharmacists, allied health professionals, and public health workers (Nielsen-Bohlman et al., 2004). Ineffective patient care occurs when health professionals fail to recognize the significance of a patient's limited health literacy (Bass, Wilson, Griffith, & Barnett, 2002; Mackert & Lopez, 2011). Health professionals are responsible for improving health literacy for all individuals by mitigating the negative effects of limited health literacy skills (Nielsen-Bohlman et al., 2004). Moreover, limited health literacy is not an individual deficit, but a systematic problem that should be addressed by ensuring health care and health systems are aligned with the needs of the public (Nielsen-Bohlman et al., 2004; Institute of Medicine, 2013).

Institutions of higher education, which are responsible for supplying the manpower needed to operate health care systems, have inadequately prepared professionals to address the issue of patient health literacy deficiencies (Nielsen-Bohlman et al., 2004). Researchers have found that most curricula for health professional students do not include health literacy as a separate topic within the program (Nielsen-Bohlman et al., 2004). For example, health literacy is not taught as an independent concept within the medical student curriculum, but is embedded in courses that address general patient-provider communication (Nielsen-Bohlman et al., 2004). Likewise, many allied health professional programs do not formally address the topic of health literacy (Nielsen-Bohlman et al., 2004; Harper, Cook, & Makoul, 2007). More specifically, health literacy is a major factor that is overlooked by health professionals when providing care and guidance to patients (Shaw et al., 2009). A majority of health literacy training is offered as post-graduate continuing education programs (Nielsen-Bohlman et al., 2004). Furthermore, allied health professional students' awareness and knowledge level of the ramifications of limited health literacy are unknown.

Current strategies that address inadequate health literacy training primarily target physicians, nurses, and pharmacists, but omit allied health practitioners responsible for providing a significant proportion of patient services (Brown et al., 2004). Research on health literacy skills among allied health professionals is almost non-existent (Nielsen-Bohlman et al., 2004). Accrediting entities and licensing agencies do not recognize health literacy comprehension as a skill set necessary for degree and licensure requirements (Nielsen-Bohlman et al., 2004). Therefore, it is imperative that health literacy be taught at all levels in the educational and professional development training of allied professionals.

Colleges and universities are primarily responsible for providing health literacy training for allied health professionals. Few studies have assessed the awareness of the significance of health literacy deficiencies for nursing, pharmacy, physical therapy, occupational therapy or respiratory therapy students (Clark, 2009; Devraj et al., 2010; Sand-Jecklin, Murray, Summers, & Watson, 2010; Knight, 2011). Also, the topic of health literacy is rarely formally discussed in the allied health student curriculum (Nielsen-Bohlman et al., 2004).

As result of the limited research in this area, a formal investigation was conducted to assess health literacy awareness for professional level allied health students enrolled in physical, occupational, and respiratory therapy programs at a southeastern public university. For this study “Professional level” students were classified as juniors or seniors enrolled in the respiratory therapy program, and graduates students enrolled in physical and occupational therapy programs. There were 106 professional level allied health student participants in the study.

Methodology

A quantitative approach employing a non-experimental design was used for this project. A modified version of the Health Literacy Knowledge and Experience Survey (HL-KES) was used to gather data (Cormier, 2006). The HL-KES was originally designed to assess the health literacy knowledge and experience of nursing students in Louisiana. Data gathered from survey responses were analyzed using cross tab analyses and Chi-square tests to address research questions. Chi-square tests were utilized to determine the existence of an association between specified characteristics and the level of awareness, knowledge, and comprehension of health literacy. Demographic survey items solicited categorical responses for the specific characteristics analyzed in this study (e.g., age range, gender, race, program of study, frequency of interaction and experience). Descriptive statistics for demographic data, age and gender of participants are shown in Table 1.

Table 1
Demographic Characteristics of Sample (N=106)

Demographic Characteristics	Frequency (<i>f</i>)	Percentage (%)
<i>Age</i>		
20 or younger	1	0.9
21-25	58	55
26-30	20	19
31-35	12	11
36-40	2	1.9
41-45	1	0.9
Total	94	89
Missing	12	11
Total	106	100
<i>Gender</i>		
Male	24	23
Female	73	69
Total	97	92
Missing	9	8.5
Total	106	100

Most participants (61.70%) were between 21-25 years of age. The majority of professional level allied health student study participants were female ($N = 73$). Descriptive statistics and frequency distribution for race and ethnicity are shown in Table 2. The majority of participants were Black or African American ($N = 59$). The remaining participants identified their race as White ($N = 13$), Hispanic or Latino ($N = 6$), Haitian or Haitian American ($N = 6$), Asian ($N = 4$), and Native Hawaiian ($N = 2$). Two participants identified themselves as being more than one race and two participants identified their race as Other (2.20%).

Table 2
Race and Ethnicity Distribution of Professional Level Allied Health Students

Variable	<i>f</i>	%
Asian	4	3.8
Black or African American	63	59.4
Haitian or Haitian American	6	5.7
Hispanic or Latino	6	5.7
Native Hawaiian or Other Pacific Islander	2	1.9
White	13	12.3
More than one race	2	1.9
Other	2	1.9
Total	98	92.5
Missing	8	7.5
Total	106	100.0

Descriptive statistics and the frequency distribution for program of study is shown in Table 3. The majority of participants were students enrolled in the physical therapy program ($N = 47$, 48.5%). Frequency distributions for occupational therapy and respiratory therapy students were 39.2% ($N = 38$) and 12.4% ($N = 12$), respectively.

Table 3
Program of Study Distribution of Professional Level Allied Health Students

Variable	<i>f</i>	%
Physical Therapy	47	44.3
Occupational Therapy	38	35.8
Respiratory Therapy	12	11.3
Total	97	91.5
Missing	9	8.5
Total	106	100

For this study, the existence of a relationship between health literacy awareness and specified characteristics was assessed by the following question: “Is there an association between health literacy awareness and allied health student characteristics such as age, gender, race, and program of study?”

Health literacy awareness was addressed using nine survey items. Item responses were categorized into a five-point Likert-type scale, tabulated and converted to a numerical score (minimum score = 0; maximum score = 36). Specific responses were strongly agree (score = 4),

agree (score =3), disagree (score = 2), strongly disagree (score =1), and not applicable (score =0). Awareness scores were categorized as poor (0 – 9), fair (10 – 18), good (19 – 27), or very good (28 – 36). These four levels were then collapsed into two categories, “poor or fair,” and “good or very good”, to meet the Chi-square minimum requirements for individual cell counts.

The age characteristic was collapsed into two categories: 25 years of age and under and 26 years and older. Race was recoded and categorized as either Black or Other to meet the minimum cell count requirement of five for the Chi-square test. Most students (n = 54; 62.8%) were 25 years and younger. Table 4 shows that 31.5% of participants, ≤ 25 years of age, and 6.2% of participants ≥ 26 years of age reported a poor or fair awareness level for survey items 1 to 9. In contrast, 68.5% of participants ≤ 25 years of age and 93.8 % of participants ≥ 26 years of age reported a good or very good awareness level.

Table 4
Age and Pre-Awareness Cross Tabulation

		Pre-Awareness				
		Poor or Fair	Percent	Good or Very Good	Percent	Total
Age (yrs)	≤25	17	31.5%	37	68.5%	54
	≥ 26	2	6.2%	30	93.8%	32

Chi-square tests assumptions (i.e., variables measured at an ordinal or nominal level; variables consist of two or more independent groups) were met. The secondary analysis was selected to address the small sample size in the 2x2 contingency tables. The Fisher’s Exact test confirmed an association between age and awareness ($p = .007$), which is more accurate than the Chi-square test because it calculates the statistical significance exactly, instead of using approximation.

The Chi-square results also indicated an association between age and health literacy awareness, ($\chi^2 = 7.432, p = .006, n = 86, df = 1$) (Table 5). Based on the Chi-square results, there was no association found between students’ gender ($\chi^2 = .712, p = .399, n = 87, df = 1$), race ($\chi^2 = .013, p = .909, n = 85, df = 1$), or program of study ($\chi^2 = .1.531, p = .465, n = 87, df = 1$) and health literacy awareness.

Table 5
Chi-Square Tests for Age, Pre-awareness, and Test Summary

	Value	df	Asymp. Sig (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi Square	7.432	1	.006*		
Fisher’s Exact Test				.007*	.005*
McNemar Test of Valid Cases	86			.000*	

Chi-Square Tests Summary

Variables	Test Statistic	df	p value*
Age and Awareness	$\chi^2 = 7.432$	1	.006

Gender and Awareness	$\chi^2 = .712$	1	.399
Race/Ethnicity and Awareness	$\chi^2 = .013$	1	.909
Program of Study and Awareness	$\chi^2 = .484$	1	.487

*Significance level $\alpha=.05$

Conclusion

Results from this study indicate that age was the only personal characteristic that showed an association with awareness. Prior to this study, data on the current level of health literacy awareness among allied health professional students in physical, occupational, and respiratory programs was unknown. As a result of this study, the level of awareness for allied health professional students is better understood. From the responses provided for the health literacy awareness section of the survey, 78.0% of the participants' scores indicated a good or very good level of awareness.

Age significantly impacted health literacy awareness. Most participants aged 25 years and older had a good or very good health literacy awareness level, whereas, most participants aged 25 years and younger had a poor or fair health literacy awareness level. Statistical analyses also revealed no association between health literacy awareness, and the other personal characteristics examined (i.e., gender, race, and program of study). Thus, gender, race and program of study have no influence on health literacy awareness.

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**The Effects of Online Health Literacy Focused Training on Professional Allied Health
Students' Knowledge of Health Literacy – Part II**

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ABSTRACT

This research study assessed the effectiveness of online health literacy training tutorials on allied health professional students' awareness, knowledge and comprehension of health literacy. The interventions consisted of a 25-minute Power Point presentation and a 23-minute video. A revised version of the Health Literacy Knowledge and Experience Survey (HL-KES) was used for this study. Four hypotheses were tested using paired *t* tests to assess the differences between pre-and post-test means. A significant difference was found for the comparison of post-test with pre-test mean scores for awareness, knowledge, and comprehension ($p = .001$, $.003$, and $.010$, respectively). This research supports the positive impact of online tutorials on students' awareness, knowledge, and comprehension of health literacy. However, findings indicate online health literacy training tutorials had no effect on students' knowledge of intervention strategies ($p = .145$).

Key words: health literacy, awareness, knowledge, comprehension, online tutorials, health literacy intervention, allied health students

The Effects of Online Health Literacy Focused Training on Professional Allied Health Students' Knowledge of Health Literacy- Part II

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Introduction

For the past two decades, health advocates have promoted the importance of health professionals' comprehension of health literacy and its implications on the effectiveness of care and healthcare cost. As a result, the curricula of medical, nursing, and pharmaceutical programs have been modified to reflect an emphasis on health literacy. In addition, extensive research has been conducted to assess these students' awareness, knowledge, and comprehension of health literacy. There is limited research on both implementation of health literacy within allied health programs and the effectiveness of health literacy training for professional level allied health students (Nielsen-Bohlman, Panzer, & King, 2004).

Health literacy can be defined as the capacity of a patient to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Ratzan & Parker, 2000; Nielsen-Bohlman et al., 2004; Baker, 2006, Berkman, Davis, & McCormack, 2010). Health literacy education for health professionals is critical to the development of competent physicians and other care providers such as nurses, pharmacists, allied health professionals, and public health workers (Nielsen-Bohlman et al., 2004). Ineffective patient care occurs when health professionals fail to recognize the significance of a patient's limited health literacy (Bass, Wilson, Griffith, & Barnett, 2002; Mackert & Lopez, 2011). Health professionals are responsible for improving health literacy for all individuals by mitigating the negative effects of limited health literacy skills (Nielsen-Bohlman et al., 2004). Moreover, limited health literacy is not an individual deficit, but a systematic problem that should be addressed by ensuring health care and health systems are aligned with the needs of the public (Nielsen-Bohlman et al., 2004; Institute of Medicine, 2013).

Institutions of higher education, which are responsible for supplying the manpower needed to operate health care systems, have inadequately prepared professionals to address the issue of patient health literacy deficiencies (Nielsen-Bohlman et al., 2004). Educational systems have the capacity to increase health literacy awareness for students training to become health professionals. From a public health perspective, *Healthy People 2010* and *Healthy People 2020* have identified limited health literacy as a national health problem because of its effects on patient outcomes and healthcare costs (Department of Health and Human Services, 2010, 2011). *Healthy People 2010 and 2020* are national health objectives established and published by the federal government to improve the health status of the U.S. population, and to be achieved within a specified timeframe. The *Healthy People 2010* and *2020* objectives address challenges and barriers that restrict adequate healthcare utilization. These publications have cited health literacy as a future objective.

Researchers have found that most curricula for health professional students do not include health literacy as a separate topic within the program (Nielsen-Bohlman et al., 2004).

For example, health literacy is not taught as an independent concept within the medical student curriculum, but is embedded in courses that address general patient-provider communication (Nielsen-Bohlman et al., 2004). Likewise, many allied health professional programs do not formally address the topic of health literacy (Nielsen-Bohlman et al., 2004; Harper, Cook, & Makoul, 2007). More specifically, health literacy is a major factor that is overlooked by health professionals when providing care and guidance to patients (Shaw et al., 2009). A majority of health literacy training is offered as post-graduate continuing education programs (Nielsen-Bohlman et al., 2004).

Current strategies that address inadequate health literacy training primarily target physicians, nurses, and pharmacists, but omit allied health practitioners responsible for providing a significant proportion of patient services (Brown et al., 2004). Research on health literacy skills among allied health professionals is almost non-existent (Nielsen-Bohlman et al., 2004). Accrediting entities and licensing agencies do not recognize health literacy comprehension as a skill set necessary for degree and licensure requirements (Nielsen-Bohlman et al., 2004). It is imperative that health literacy be taught at all levels in the educational and professional development training of allied professionals. Colleges and universities are primarily responsible for providing health literacy training for allied health professionals. Few studies have assessed the awareness of the significance of health literacy deficiencies for nursing, pharmacy, physical therapy, occupational therapy or respiratory therapy students (Clark, 2009; Devraj et al., 2010; Sand-Jecklin, Murray, Summers, & Watson, 2010; Knight, 2011).

As result of the limited research in this area, a formal investigation was conducted to assess health literacy awareness for professional level allied health students enrolled in physical, occupational, and respiratory therapy programs at a southeastern public university. The purpose of this research is to determine if online health literacy training tutorials have an effect on allied health professional students' knowledge and comprehension of health literacy.

Methodology

A quantitative approach employing a non-experimental design was used for this project. A modified version of the Health Literacy Knowledge and Experience Survey (HL-KES) was used to gather data (Cormier, 2006). The HL-KES was originally designed to assess the health literacy knowledge and experience of nursing students in Louisiana. Interventions consisted of two online tutorials, a 25-minute Power Point presentation and a 23-minute video on health literacy which provided a definition for health literacy and its link to reading comprehension and patient outcomes. The Power Point presentation was produced by a health literacy subcommittee of the American Medical Association (AMA) in conjunction with the Medical College of Georgia (Weiss, 2007). The health literacy toolkit was developed by Dr. Barry Weiss and published by the American Medical Association as a manual for training clinicians (Weiss, 2007; AMA, 2012).

The Power Point presentation and the health literacy video both described characteristics that indicate low health literacy skills as well as intervention strategies health professionals can adopt to counteract adverse effects of deficiencies in patient comprehension (AMA, 2012). For example, the online tutorials denoted that health literacy deficiencies are most prevalent among patients who are 65 years of age and older, regardless of ethnicity or educational background.

The tutorials also included live recordings of actual encounters with patients with low health literacy skills, and captured intervention techniques, such as the teach-back method, demonstrated by the provider.

Research Hypotheses

The following null hypotheses were tested: H₀₁ Online training tutorials will have no effect on awareness of health literacy for allied health professional students; H₀₂ Online training tutorials will have no effect on knowledge of health literacy for allied health professional students; H₀₃ Online training tutorials will have no effect on comprehension of health literacy for allied health professional students; H₀₄ Online training tutorials will have no effect on allied health professional students' knowledge of intervention strategies for health literacy.

Sample

The study population included professional level physical therapy, occupational therapy, and respiratory therapy students enrolled in public universities in Florida. For this study "Professional level" students were classified as juniors or seniors enrolled in the respiratory therapy program, and graduates students enrolled in physical and occupational therapy programs.

A GPower analysis calculation was conducted to determine the recommended number of participants needed for the hypotheses testing for this study. The recommended sample size was 34; based on a two-tailed dependent *t* test for matched pairs with an alpha value of 0.05, power (1- β) set at 0.80, and an effect size of 0.85. The sample size consisted of 106 volunteers, of which 37 completed the pre and post-tests. Data analyses were conducted using version 22.0 of the Statistical Package for the Social Sciences (SPSS).

The paired *t* test assessing the differences between two dependent means for matched pairs was used to assess the hypotheses. The assumptions for the dependent *t* test included the following: (a) the dependent variable should be measured on a continuous scale; (b) the independent variable should consist of two categorical, matched pairs; (c) there should be no significant outliers in the differences between the two related groups; and (d) the distribution of the differences in the dependent variable between the two related groups should be approximately normally distributed. The number of participants with a pre- and post-test score needed to satisfy the sample size criterion for the paired *t* test was met.

The Health Literacy Knowledge and Experience Survey (HL-KES) was revised and used to gather data for this study (Cormier, 2006). The instrument used in this study demonstrates a very high level of internal consistency as measured by Cronbach's alpha of .95. The HL-KES was designed in 2005 for a similar study to assess the health literacy knowledge and experience of nursing students in Louisiana. The original HL-KES had an overall reliability rating of .82, as measured by Cronbach's alpha (Cormier, 2006). A revised version of the HL-KES was used in the study for practicing experienced nurses in Georgia; and respiratory therapists in North Carolina. Permission was obtained from Dr. Cormier to use the HL-KES for this research.

The HL-KES version used for this study was comprised of 63 items organized into six sections. Part I, which includes demographic data, consists of eight multiple choice items that capture participants' gender, race, age, program of study, and experiences. Part II, the Health

Literacy Experience section, consists of eight items relating to the independent variable, health literacy experiences. Item responses were categorized into a five-point Likert scale: not applicable (score = 0); never (score = 1); sometimes (score = 2); frequently (score = 3); and always (score = 4). Responses for Part II were tabulated and converted to a numerical score (minimum score = 0, maximum score = 32). The reliability rating for Part II had a Cronbach's alpha of .76.

Part III, Health Literacy Awareness, was comprised of nine items that addressed the dependent variable, health literacy awareness. The item responses were categorized into a five-point Likert-type scale: strongly agree (score = 4); agree (score = 3); disagree (score = 2); strongly disagree (score = 1); and not applicable (score = 0). The responses for Part III were tabulated and converted to a numerical score (minimum score = 0; maximum score = 36). The reliability rating for Part III had a Cronbach's alpha of .91.

Part IV, Health Literacy Knowledge, consisted of seven multiple choice items that addressed the dependent variable health literacy knowledge. The directions instructed the participants to select one response for each of the multiple choice items. There was only one correct response for each item. The responses for Part IV were tabulated and converted to a numerical score (minimum score = 0, maximum score = 28). The reliability rating for Part IV had a Cronbach's alpha of .76.

Part V, Health Literacy Comprehension, consisted of 21 statement items that addressed health literacy comprehension, a dependent variable. The specific response options for the 21 items related to health literacy comprehension included the following: strongly agree (score = 4); agree (score = 3); disagree (score = 2); strongly disagree (score = 1); and not applicable (score = 0). The responses for Part V were tabulated and converted to a numerical score (minimum score = 0, maximum score = 84). The reliability rating for Part V had a Cronbach's alpha of .95.

Part VI, Knowledge of Health Literacy Intervention Strategies, was comprised of eight items that addressed the dependent variable, knowledge level of health literacy intervention strategies, and were categorized into a five-point Likert-type scale. Response options included the following: strongly agree (score = 4); agree (score = 3); disagree (score = 2); strongly disagree (score = 1); and not applicable (score = 0). The responses for Part VI were tabulated and converted to a numerical score (minimum score = 0, maximum score = 32). The reliability rating for Part VI had a Cronbach's alpha of .95.

Hypothesis Testing Results

Research Hypothesis 1

The results indicated that the post-test mean score was higher than the pre-test mean score for awareness, with a p value of .001. Based on these results, there is enough evidence to reject H_{01} , and conclude that online training tutorials will have an effect on awareness of health literacy for allied health professional students.

Research Hypothesis 2

The results indicated that the post-test mean score was higher than the pre-test mean score for knowledge, with a p value of .003. Based on these results, there is enough evidence to reject

H₀₂, and conclude that online training tutorials will have an effect on knowledge of health literacy for allied health professional students.

Research Hypothesis 3

The results indicated that the post-test mean score was higher than the pre-test mean score for comprehension, with a *p* value of .010. Based on these results, there is enough evidence to reject H₀₃, and conclude that online training tutorials will have an effect on comprehension of health literacy for allied health professional students.

Research Hypothesis 4

The results indicated that the post-test mean score was not significantly different from the pre-test mean score for knowledge of intervention strategies, with a *p* value of .145. Based on these results, there is not enough evidence to reject H₀₄, thus concluding that online training tutorials will not necessarily have an effect on allied health professional students' knowledge of interventions strategies for health literacy. Tables 1 through 3 illustrate pre- and post-test results for H₀₁, H₀₂, H₀₃, and H₀₄.

Table 1
Pre-test and Post-test Results for Hypotheses Testing

H ₀	Variables	Mean	Standard Deviation	Standard Mean Error	N
H ₀₁	Awareness				
	Pre-Test	21.7027	3.06290	.50544	37
H ₀₂	Knowledge				
	Pre-Test	15.2000	5.55613	.93916	35
H ₀₃	Comprehension				
	Pre-Test	44.8649	12.92105	2.12421	37
H ₀₄	Intervention				
	Pre-Test	51.6757	19.40655	3.19042	37
	Post-Test	.521	.001	37	

Table 2
Paired Samples Correlation for Hypotheses Testing

H ₀	Variables	Correlation	Significance	N
H ₀₁	Awareness	.311	.061	37
	Pre-Test			
H ₀₂	Knowledge	.504	.002	35
	Pre-Test			
H ₀₃	Comprehension	.625	.000	37
	Pre-Test			
H ₀₄	Intervention	.521	.001	37
	Pre-Test			
	Post-Test			

Table 3
T test Results for the Null and Alternative Hypotheses

H ₀	Variables	Mean (Difference)	Standard Deviation	Standard Error Mean	T	Df	Significance (2 tailed)*
H ₀₁	Awareness Pre-Test Post-Test	-3.24324	5.54980	.91238	-3.555	36	.001
H ₀₂	Knowledge Pre-Test Post-Test	-3.42857	6.37221	1.07710	-3.183	34	.003
H ₀₃	Comprehension Pre-Test Post-Test	-6.81081	15.16729	2.49349	-2.731	36	.010
H ₀₄	Intervention Pre-Test Post-Test	-1.37838	5.59936	.92053	-1.497	36	.143

*Significance Level $\alpha = .05$

Summary

The results of this study showed that the online health literacy training tutorials impacted students' level of awareness, knowledge, and comprehension of health literacy. However, research results indicate that the online health literacy training tutorials had no effect on students' knowledge of intervention strategies.

Conclusions

These research results for three of the hypotheses were consistent with findings of previous studies involving medical students and nursing students and use of tutorials to enhance students' knowledge and awareness of health literacy (Clark, 2009; Devraj et al., 2010; Sand-Jecklin, Murray, Summers, & Watson, 2010; Knight, 2011). In contrast, the results for H₀₄ were not consistent with previous studies in that there was no significant difference for students' knowledge of intervention strategies (Clark, 2009; Devraj et al., 2010; Sand-Jecklin, Murray, Summers, & Watson, 2010; Knight, 2011).

This research supports the positive impact of online tutorials on students' awareness, knowledge, and comprehension of health literacy. There was a significant increase between mean pre-test and post-test scores following use of the online tutorial. Students identified literacy as the best predictor of health status; as well as health behaviors that are common among patients with low health literacy skills.

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**The Effects of Frequency of Interaction with Healthcare Providers on Health Literacy
Awareness Levels for Professional Level Allied Health Students – Part III**

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ABSTRACT

An investigation was conducted to examine health literacy awareness based upon frequency of interaction with other health care providers. A modified version of the HL-KES Survey was used to collect data from professional level allied health sciences students. The survey results were synthesized using the Chi-square test to determine whether an association exists between frequency of interaction and students' awareness of health literacy. Study findings indicate no association between students' health literacy awareness and their frequency of interaction with health care providers ($\chi^2 = 1.014$, $n = 82$, $df = 1$, $p = .314$). The Fisher's Exact test (a more accurate analysis) also confirmed no association between frequency of interaction and awareness ($p = .230$).

Key words: health literacy, allied health students, frequency of interaction, health literacy awareness

The Effects of Frequency of Interaction with Healthcare Providers on Health Literacy Awareness Levels for Professional Level Allied Health Students – Part III

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Introduction

Health literacy can be defined as the capacity of individuals to obtain, process, and understand the basic health information and services needed to make appropriate health decisions (Ratzan & Parker, 2000; Nielson-Bohlman et al., 2004). There is limited availability of research that focuses on investigating allied health professional students' knowledge and awareness of the effects of health literacy on patient outcomes; patient characteristics which contribute to health literacy deficiencies; and health literacy challenges for patients (Coleman, 2011).

A few studies have assessed the awareness and knowledge of the significance of health literacy deficiencies for nursing and pharmacy students (Knight, 2011; Devraj et al., 2010). For example, U.S. studies have assessed professional level physical therapy, occupational therapy and respiratory therapy students' understanding of the effects of health literacy on patient treatment and outcomes (Sand-Jecklin, Murray, Summers, & Watson, 2010; Clark, 2009). Yet, health literacy is rarely formally a part of the curricula for most allied health students (Nielsen-Bohlman et al., 2004).

Previous studies examined the association between the frequency of encounters as a patient and health literacy awareness for nursing students (Cormier, 2006; Knight, 2011). No studies have investigated the frequency of interaction as a patient, and health literacy awareness for physical and occupational, therapy students; and one study examined respiratory therapy students (Clark, 2009). As a result, the following research question was examined: Is there an association between health literacy awareness and allied health students' frequency of interaction with healthcare providers for their own personal healthcare needs or the needs of their family member? The rationale for examining frequency of interaction was based upon the assumption that more encounters with healthcare providers would increase the likelihood for students to have an increased awareness of health literacy.

Methodology

A quantitative approach employing a non-experimental design was used for this study. A modified version of the Health Literacy Knowledge and Experience Survey (HL-KES) was used to gather data (Cormier, 2006). The study sample was composed of "Professional level" students defined as students enrolled at public universities in Florida and classified as juniors or seniors for the respiratory therapy, and graduates for the physical and occupational therapy programs. Data gathered from responses to the survey items were synthesized using cross tab analyses and Chi-square tests to address research questions. The existence of an association between frequency of interaction and students' awareness of health literacy was determined via Chi-square analyses.

Results

Assumptions for the Chi-square tests included the following: variables measured at an ordinal or nominal level; and variables consist of two or more categorical, independent groups. The results indicated no association between students' health literacy awareness and frequency of interaction with health care providers, $\chi^2 = 1.014$, $n = 82$, $df = 1$, $p = .314$.

Further explanation of the operationalization of the variables is presented in the following statements. Demographic survey item from the HL-KES Part I was, "How frequently do you interact with healthcare providers for your own personal healthcare needs or healthcare needs of significant others and family members?" This item had a response rate of 77.4%. A cross tabulation for participants' frequency of interaction and levels of awareness is shown in Table 1. Responses for frequency of interaction (i.e., dependent variable) were every few years, once a year, three to four times a year, or more than four times a year. These responses were then collapsed into two categories: fewer encounters (i.e., every few years and at least once a year) and more encounters (i.e., three to four times a year and more than four times a year).

Table 1
Interaction (Encounters) as Patients and Pre-Awareness Cross Tabulation

		Pre-Awareness		Total	Percent
		Poor or Fair	Good/ Very Good		
Encounters as a patient	Fewer encounters	10	27	37	45.1%
	More encounters	8	37	45	54.9%
Total		18	64	82	100.0%

There were nine items specified on the survey that addressed health literacy awareness. These survey items were tabulated and converted to numerical scores. The minimum and maximum scores for the responses of Part III Awareness survey items were 0 and 36. Table 1 reflects the responses for Part III Awareness survey items. Four levels with corresponding numerical scores were assigned for awareness: poor (0 – 9), fair (10 – 18), good (19 – 27), and very good (28 – 36). These four levels were then collapsed into two categories: "poor or fair" and "good or very good." Table 2 shows that a majority of participants had a good/very good level of awareness, regardless of the number of encounters.

Table 2
Interaction (Encounters) as Patients and Pre-Awareness Level Results

		Pre-Awareness				Total
		Poor or Fair	Percent	Good/ Very Good	Percent	
Encounters as a patient	Fewer encounters	10	27.0%	27	73.0%	37
	More encounters	8	17.8%	37	82.2%	45

Chi-square analyses indicated no association between awareness (dependent variable) and frequency of interaction (independent variable), $\chi^2 = 1.014$, $n = 82$, $df = 1$, $p = .314$ (Table 3). The Fisher's Exact test (a more accurate analysis) also confirmed no association between frequency of interaction and awareness ($p = .230$).

Table 3

Chi-Square Tests for Interaction (Encounters) as Patients and Pre-Awareness

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi Square	1.014 ^a	1	.314		
Fisher's Exact Test				.423	.230
N of Valid Cases	82				

^a 0 cells (0%) have expected count less than 5. The minimum expected count is 8.

Summary

This study examined the research question: Is there an association between health literacy awareness and allied health students' frequency of interaction with healthcare providers for their own personal healthcare needs or the needs of their family member? The rationale for examining frequency of interaction was based upon the assumption that more encounters with healthcare providers would increase the likelihood for students to have an increased awareness of health literacy. Statistical analyses revealed no association between frequency of interaction and health literacy awareness.

The findings of this study support results of previous research for medical and nursing students. This study examined a sample of allied health students and provides data on health literacy awareness for this population, which was previously unknown.

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