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The Influence of Social Determinants of Health on High School Students' Health Literacy

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The Influence of Social Determinants of Health on High School Students' Health Literacy

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Abstract

The broad topic of health literacy has been assessed in a variety of studies. The most extensive research has been completed on how a lack of health literacy contributes to specific disease progressions. However, there is a deficit of research on how general health literacy contributes to overall individual health in high school students. The purpose of this study was to evaluate the health literacy scores of Northwest Arkansas high school students and examine the impact that age, gender, and ethnicity have on their health literacy. Health literacy was assessed using the Health Literacy Questionnaire (HLQ). A cross-sectional research design was utilized at a high school in Northwest Arkansas. A total of 100 high school students completed the HLQ. The results indicated no significant correlation between students' age, gender, or ethnicity and their health literacy. The total student population scored lowest on scale 5 of the HLQ, meaning they find it difficult to understand most health information, especially when they receive conflicting messages. Determining the health literacy deficits and identifying social determinants that affect health literacy could help high schools alter their health curriculum to meet student needs.

Background and Significance

Health literacy, known as the ability to access, understand, appraise, and apply health-related knowledge, is a major factor for health promotion and disease prevention (Sorensen, Van den Brouke, Fullam, Doyle, & Brand, 2012). Conversely, low health literacy has been linked to increased hospitalizations, healthcare costs, and mortality. In order to improve the health literacy in Arkansas, it's imperative to first understand what

areas of health literacy are lacking. Therefore, the primary objective of this study was to evaluate the health literacy of high school students, while the secondary objective was to detect any correlating disparities. By assessing these aspects of health literacy, we can better understand where our current education is lacking in health promotion and disease prevention.

To conduct this research, a sample size of 100 high school health students completed the Health Literacy Questionnaire (HLQ). The questionnaire covers all aspects of health literacy and normally takes 30 minutes or less to finish. Nurses and teachers alike will be able to use the results of the study to focus education on student needs. With resulting improved health literacy, students will graduate with improved confidence in their furtherance of well-being.

Literature Review

The broad topic of health literacy has been assessed in a variety of studies. The most extensive research has been completed on how a lack of health literacy contributes to specific disease progressions. However, there is a deficit of research on how general health literacy contributes to overall individual health in high school students. The focus points of this literature review will discuss studies regarding consequences of low literacy rates, disparities in health literacy, and ways that assessing health literacy can improve it.

The literature is clear that health literacy is a determinant of actual health outcomes. Multiple authors have linked low health literacy to increased risk for illness (Dodson, Beauchamp, Batterham, & Osborne 2015; Chari, Warsh, Ketterer, Hossain, & Sharif, 2014). Dodson et al. (2015) expressed the importance of increasing health literacy rates by

pointing out that low health literacy is associated with increased hospital admissions and readmissions, poor medication adherence, increased adverse medication events, increased mortality, lower functional status, and increased healthcare costs. Many of these findings are also related to obesity, which is highly correlated to low health literacy (Chari et al. 2014; Lam & Yang 2012). Obesity is a preventable condition that is a main cause of chronic diseases such as hypertension and diabetes. Chari et al. (2014) described obesity as a large and growing problem which is strongly linked to health literacy. While demonstrating that adolescent health literacy is correlated to adolescent obesity, it is also proven that parental health literacy correlates to their children's obesity. However, by positively influencing the health literacy of adolescents, it will improve their children's weight and health outcomes if the current adolescents so choose to become parents in the future. This is because it is hard to "unlearn" health literacy; it's a skill that will be continually beneficial. Lam and Yang's (2012) also completed a study that deals with obesity and its relation to health literacy. This study population was children in China ages 12-16, and although their studied population differs from our sample, the findings are in agreement with the 2014 study by Chari. Both studies clearly found correlation between low health literacy and being overweight or obese. These findings are significant because the results revealed low health literacy as a causation factor for the most widespread and costly diseases. Now that it is known how improved health literacy can improve health, steps can be taken to make health literacy education a priority.

Identifying low health literacy as a major cause for multiple health issues has provoked recent studies to be conducted for detection of causes and factors that lead to low health literacy (Rikard, Thompson, McKinney, & Beauchamp,2016; Wilkinson, Haslem,

& Prusak 2016). Both Rikard et al. (2016) and Wilkinson et al. (2016) explored the correlation of gender to health literacy rates; both found females to have overall higher health literacy. Wilkinson's et al. (2016) study focused on high school students, and although it specifically assessed the health-related fitness knowledge of the students instead of overall health literacy, the findings are still applicable. This study was conducted in Washington and has helped schools in the state better educate students on their health-related fitness knowledge.

As stated earlier, the study by Rikard et al. (2016) supported Wilkinson et al. (2016) concerning significant inequality in scores between genders. However, the research of Rikard et al. (2016) used a large national sample size to demonstrate the many other disparities in current health literacy. The disparities that this study explores are age, gender, and ethnicity; these three factors were also included in the national study that surveyed U.S. adults. The results of the National Assessment of Adult Literacy were that minorities, males, and older people have lower health literacy levels than younger people, females, and Caucasians (Rikard et al., 2016). Discovering these disparities which lead to low health literacy can help target focused education towards specific groups or cohorts.

The previously noted studies support, proper integration of health literacy education is a clear necessity. The struggle in teaching health literacy comes when determining the most effective approach. Heo et al. (2016) and MacDonald (2015) both conducted research about the implementation and progress in improving student's physical literacy and health knowledge. HealthCorps, an organization which provides health programs for New York high schools, has been found to increase health literacy in school age children (Heo et al., 2016). The program was found to not only increase student knowledge, but

to improve health promoting behaviors. One reason the New York high school programs are so practical are because they assess their students' needs before beginning education. By using an annual community needs assessment instrument, HealthCorps is able to focus their teachings on the identified lacking components of health (such as nutrition, physical fitness, or mental resiliency). This information further justifies the need for health literacy assessments in Northwest Arkansas schools in order to create effective teaching programs similar to HealthCorps.

MacDonald's study in 2015 differs by solely evaluating physical literacy of high school students. Physical literacy is an important part of overall health literacy, and getting students to plan their improvement goals in physical fitness is a huge accomplishment. As educators support students in making their goals, it is important for them to allow the students to choose their own methods in which to progress their fitness levels. However, if students are physically illiterate or health illiterate, it becomes much more of a challenge to create a realistic and beneficial plan. To further demonstrate how health literacy assessments can improve teaching, Sorensen et al. (2012) established different perceptions and definitions of health literacy. They also proposed an integrative model for health literacy that portrays the most important dimensions of the concept. On an individual level, the model shows that people need to have access to health information, as well as the capacity to understand, appraise, and apply it. Determining whether student needs lie in the accessing, understanding, appraising, or applying elements of health literacy can greatly aid in planning more effective teaching.

Research Design and Methods

This cross-sectional study utilized a single site convenience sample of 100 high school students from a Northwest Arkansas high school. This research was reviewed and approved by the University of Arkansas Institutional Review Board. Consent was obtained through the Office of Research Compliance Institutional Review Board. Passive consent was given by participants two weeks prior to completing the questionnaire. All students took the 44-question survey during their health class and completed it within 30 minutes. A health literacy profile with scores for 9 HLQ scales was generated for each participant.

Instruments

The HLQ consist of 9 rating scales, with a total of 44 questions. The scales are:

1	Feeling understood and supported by healthcare providers (HPS)
2	Having sufficient information to manage my health (HSI)
3	Actively managing my health (AMH)
4	Social support for health (SS)
5	Appraisal of health information (CA)
6	Ability to actively engage with healthcare providers (AE)
7	Navigating the healthcare system (NHS)
8	Ability to find good health information (FHI)
9	Understand health information well enough to know what to do (UHI)

The first five scales are measured in the first 23 questions, which use an agree/disagree format. The options correlating to given statements are: Strongly disagree, Disagree, Agree, Strongly Agree. Scales 4-9 are measured in the last 21 questions by the subjects ranking tasks on how easy or challenging they are to complete. Answer options for the subsequent questions are: Cannot do or always difficult, Usually difficult, Sometimes difficult, Usually easy, Always easy. Demographic information was also obtained on the last page of the HLQ. The HLQ has strong construct validity, reliability, and provides a means to evaluating differences (Osborne, Batterham, Elsworth, Hawkins, & Buchbinder, 2013). There were no identifiers beyond the demographic information (age, gender, and ethnicity) associated with the HLQ, to ensure confidentiality for participants.

Data Analysis

After collecting the data from the Northwest Arkansas High School students, the data was input into an Excel scoring sheet provided with the HLQ. Each participants age, gender, and ethnicity were then coded and added to the spreadsheet to distinguish variables among the disparities.

The supporting Excel scoring sheet was used to calculated the mean scores and standard deviations for each individual participant. Correlations and t-tests were then performed to further analyze the data.

The HLQ scale averages weren't directly compared due to the first 5 scales were one to four and the last four scales were one to five. Therefore, to rank the mean scores on each HLQ scale, the mean scores were divided by the highest possible score for that scale to come up with comparison scores.

Participant Demographics

A total of 100 High School students completed the HLQ for this study. All participants completed the consent process. The participants were all high school students attending a high school in Northwest Arkansas and enrolled in a health course. The HLQ was taken on December 6th, 2017. Participants were predominately Hispanic (53%), followed by Pacific Islanders (18%). Other ethnicities included Caucasian (14%), African American (4%), Native American (2%), and Other (9%). The student population included 41 females and 56 males ranging in age from 15 to 19 years old. A small number of participants did not mark gender (.03), age (.04) or ethnicity (0.5).

Results

The comparison scores were analyzed to determine the highest and lowest priority aspects of health literacy that needed improvement. The lowest scored scale was HLQ's scale five, which measured the ability to appraise health information. Students indicated they have the needed support to maintain good health by scoring highest on scale four. Age, gender, or ethnicity were not significantly correlated to health literacy in high school students in this study.

Table 1: Mean and Comparison for HLQ Scales

Scale #	Mean score	Comparison score
1 Supported by healthcare providers (HPS)	2.69	.67
2 Having sufficient information (HIS)	2.87	.72
3 Actively managing health (AMH)	2.81	.70
4 Social support (SS)	3.09	.77
5 Can appraise (CA)	2.55	.64
6 Actively Engage (AE)	3.55	.71
7 Navigating the healthcare system (NHS)	3.53	.71
8 Can find health information (FHI)	3.64	.73
9 Understand health information (UHI)	3.61	.72

Table 2: Ethnicity analysis

Report

Ethnicity		Total	Scale 1 (HPS)	Scale 2 (HSI)	Scale 3 (AMH)	Scale 4 (SS)	Scale 5 (CA)	Scale 6 (AE)	Scale 7 (NHS)	Scale 8 (FHI)	Scale 9 (UHI)
1	Mean	3.0735427363 33434	2.5357	2.6607142857 14286	2.3857142857 14286	2.757	2.2928571428 57142	3.5714285714 28571	3.5357142857 14286	4.042o8u8571428571 43	3.5857142857 14285
	N	14	14	14	14	14	14	14	14	14	14
	Std. Deviation	.62906903632 3695	.91912	.69064589931 5820	.52309308313 7575	.7852	.56631641836 8994	.96987594086 0139	.84524454416 3604	2.3718588249 96607	.67237483005 2339
2	Mean	3.1662411743 58770	2.6887	2.8930817610 06288	2.7471698113 20755	3.117	2.4905660377 35849	3.5811320754 71698	3.5125786163 52202	3.6264150943 39623	3.6188679245 28301
	N	53	53	53	53	53	53	53	53	53	53

	Std. Deviation	.51131054945 0471	.69494	.50170046272 4217	.49013490041 9853	.4548	.57588198274 9202	.78079264551 9624	.81311962343 3464	.63734755142 4057	.73407623890 7310
3	Mean	3.6818181818 18182	3.5625	3.4375000000 00000	3.1500000000 00000	3.500	3.0000000000 00000	4.2000000000 00000	4.1250000000 00000	3.8500000000 00000	4.1500000000 00000
	N	4	4	4	4	4	4	4	4	4	4
	Std. Deviation	.17108469379 7518	.42696	.51538820320 2208	.44347115652 1669	.1155	.28284271247 4619	.28284271247 4619	.15957118462 6056	.19148542155 1267	.19148542155 1268
4	Mean	3.4431818181 81818	3.2500	3.0000000000 00000	3.5000000000 00000	3.200	2.4000000000 00000	3.5000000000 00000	4.0000000000 00000	4.0000000000 00000	3.9000000000 00000
	N	2	2	2	2	2	2	2	2	2	2
	Std. Deviation	.08035304331 6653	.70711	.00000000000 0000	.14142135623 7310	.2828	.00000000000 0000	.14142135623 7310	.00000000000 0000	.00000000000 0000	.14142135623 7310
5	Mean	3.1518582396 79537	2.5395	2.8289473684 21052	3.0526315789 47368	3.284	2.7052631578 94736	3.3684210526 31579	3.3859649122 80702	3.4315789473 68422	3.5368421052 63158
	N	19	19	19	19	19	19	19	19	19	19
	Std. Deviation	.44699907280 7379	.76948	.64578027512 6680	.55714392819 5530	.3962	.52225332742 9990	.85443459640 4057	.60362237699 5002	.68722681972 8673	.56195148694 9016
6	Mean	3.1590909090 90909	2.5000	3.0000000000 00000	3.1333333333 33333	3.133	2.9333333333 33333	3.2666666666 66667	3.3888888888 88889	3.4666666666 66667	3.4000000000 00000
	N	3	3	3	3	3	3	3	3	3	3
	Std. Deviation	.38836380660 5342	.50000	.25000000000 0000	.61101009266 0779	.2309	.41633319989 3226	.61101009266 0779	.67357531405 4564	.23094010767 5850	.34641016151 3776
Total	Mean	3.1770168020 47401	2.6789	2.8745614035 08773	2.8000000000 00000	3.116	2.5378947368 42106	3.5515789473 68421	3.5228070175 43861	3.6610526315 78948	3.6189473684 21052
	N	95	95	95	95	95	95	95	95	95	95
	Std. Deviation	.50594082708 9674	.74970	.56268859252 5889	.55120757182 2125	.5133	.56270224683 1329	.80356428834 8803	.75465870916 9991	1.0647439745 04200	.66465392320 0623

These sample sizes and the lack of large standard deviations in the analysis conclude there is no correlation between ethnicity and health literacy. Future research with a larger sample size may be needed to draw a confident solution.

Table 3: Age analysis

Correlations

		Age	Total	Scale 1 (HPS)	Scale 2 (HSI)	Scale 3 (AMH)	Scale 4 (SS)	Scale 5 (CA)	Scale 6 (AE)	Scale 7 (NHS)	Scale 8 (FHI)	Scale 9 (UHI)
Age	Pearson Correlation	1	-.029	.024	.128	.130	.005	-.050	-.116	-.066	-.042	-.069
	Sig. (2-tailed)		.782	.819	.215	.207	.963	.631	.259	.524	.686	.503
	N	96	96	96	96	96	96	96	96	96	96	96
Total	Pearson Correlation	-.029	1	.780**	.698**	.582**	.549**	.682**	.830**	.827**	.692**	.771**
	Sig. (2-tailed)	.782		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 1 (HPS)	Pearson Correlation	.024	.780**	1	.503**	.404**	.392**	.498**	.646**	.636**	.430**	.564**
	Sig. (2-tailed)	.819	.000		.000	.000	.000	.000	.000	.000	.000	.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 2 (HSI)	Pearson Correlation	.128	.698**	.503**	1	.484**	.459**	.471**	.453**	.477**	.434**	.472**
	Sig. (2-tailed)	.215	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 3 (AMH)	Pearson Correlation	.130	.582**	.404**	.484**	1	.337**	.529**	.361**	.424**	.147	.395**
	Sig. (2-tailed)	.207	.000	.000	.000		.001	.000	.000	.000	.143	.000
	N	96	100	100	100	100	100	100	100	100	100	100

	N	96	100	100	100	100	100	100	100	100	100	100
Scale 4 (SS)	Pearson Correlation	.005	.549**	.392**	.459**	.337**	1	.297**	.402**	.281**	.321**	.297**
	Sig. (2-tailed)	.963	.000	.000	.000	.001		.003	.000	.005	.001	.003
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 5 (CA)	Pearson Correlation	-.050	.682**	.498**	.471**	.529**	.297**	1	.444**	.451**	.423**	.430**
	Sig. (2-tailed)	.631	.000	.000	.000	.000	.003		.000	.000	.000	.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 6 (AE)	Pearson Correlation	-.116	.830**	.646**	.453**	.361**	.402**	.444**	1	.778**	.465**	.657**
	Sig. (2-tailed)	.259	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 7 (NHS)	Pearson Correlation	-.066	.827**	.636**	.477**	.424**	.281**	.451**	.778**	1	.444**	.665**
	Sig. (2-tailed)	.524	.000	.000	.000	.000	.005	.000	.000		.000	.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 8 (FHI)	Pearson Correlation	-.042	.692**	.430**	.434**	.147	.321**	.423**	.465**	.444**	1	.438**
	Sig. (2-tailed)	.686	.000	.000	.000	.143	.001	.000	.000	.000		.000
	N	96	100	100	100	100	100	100	100	100	100	100
Scale 9 (UHI)	Pearson Correlation	-.069	.771**	.564**	.472**	.395**	.297**	.430**	.657**	.665**	.438**	1
	Sig. (2-tailed)	.503	.000	.000	.000	.000	.003	.000	.000	.000	.000	
	N	96	100	100	100	100	100	100	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Age was not an indicator of health literacy as shown by the large (greater than .05) p-values in the 'age' row (Table 3). By finding no significant values and no substantial effect size, it is apparent the sample size was sufficient in concluding that high schoolers' age does not impact health literacy scores. These results may be due to the limited variance (4 years) in the ages surveyed.

Table 4: Gender analysis (Sex 1=females; Sex 2=males)

Group Statistics

	Sex	N	Mean	Std. Deviation	Std. Error Mean
Total	1	41	3.200059299747331	.505235238740905	.078904487872855
	2	56	3.160723723950468	.501187591790956	.066974009106574
Scale 1 (HPS)	1	41	2.7622	.77248	.12064
	2	56	2.6339	.72608	.09703
Scale 2 (HSI)	1	41	2.886178861788618	.504065450432564	.078721797632128
	2	56	2.857142857142857	.598970979068464	.080040863867669
Scale 3 (AMH)	1	41	2.790243902439024	.529058067724508	.082624988694053
	2	56	2.828571428571430	.577680089421719	.077195749063465
Scale 4 (SS)	1	41	3.132	.5415	.0846
	2	56	3.082	.4999	.0668
Scale 5 (CA)	1	41	2.536585365853658	.535609978230884	.083648225205392
	2	56	2.544642857142857	.580256884446925	.077540087782760
Scale 6 (AE)	1	41	3.629268292682927	.805681048070210	.125826240159480
	2	56	3.500000000000001	.790856842579329	.105682690961345
Scale 7 (NHS)	1	41	3.548780487804879	.808156254176946	.126212802408618

	2	56	3.517857142857142	.70972933482823 5	.09484157172393 6
Scale 8 (FHI)	1	41	3.619512195121951	.59633024080417 1	.09313113703432 6
	2	56	3.682142857142858	1.3010635010506 73	.17386192354886 5
Scale 9 (UHI)	1	41	3.673170731707317	.66446384034193 4	.10377181758515 0
	2	56	3.560714285714285	.66433249381440 2	.08877516366980 8

Table 4 shows the score averages between the 41 females and 56 males who were surveyed. There was no significant difference in scores by gender in any of the 9 scales. The mean scores of each gender per scale were very close, meaning that gender is not a disparity for health literacy of high school students in this study.

Discussion

The current level of health literacy among high school students in this study demonstrates a need for additional support and education to better evaluate health materials. Since this Northwest Arkansas study did not find any disparities, educational measures should be aimed at the entire student population. The HLQ provides information from 9 scales which create a health literacy profile for each student. These results can be averaged to create a health literacy profile of the school to supply the most insight when interpreting strengths and weaknesses in health literacy of the total student population. The lowest scores were on the scale concerning students' abilities to evaluate the accuracy of health information.

High school students need improvement in their ability to appraise health information (O'Dell, 2012). Since students get so many of their facts from the internet, it

is alarming that studies have concluded high-schoolers are unable to differentiate accurate from inaccurate websites (Kortum, Edwards, & Richards-Kortum, 2018). This is especially troubling since high school students are one of the most likely populations to utilize technology to self-diagnose and self-treat. The consequences of implementing inaccurate health information can jeopardize patient safety and lifelong health outcomes. With the abundance of conflicting messages on health advertised in the media, it is no surprise that the ability to appraise health information is a challenge for students. This is also the reason that more education should be given in high schools on how to differentiate poor sources and false information from those that are reliable and high quality.

Educating children and adolescents on health literacy, and specifically health information appraisal, should be done in a way that engages the students and encourages critical thinking. It's important for students to realize their own beliefs about health before they can further examine their established knowledge and evaluate the materials either supporting or contrasting their initial theories. It's also valuable to present students with multidimensional or contrasting health messages during teaching sessions to prepare them for assessing the validness of messages when they leave the classroom (Fairbrother, Curtis, & Goyder, 2016).

Limitations

The study had several limitations which should be considered. The most significant limitation faced in this study was the restricted sample size. The small

population of health students sampled delivered inconclusive results for the correlation of ethnicity to health literacy.

Another limitation of the study is that it is based on self-reported data, and therefore may have inaccurate data. The use of rating scales could have impacted study results due to students having diverse styles of responding to this type of questionnaire; some people frequent extreme answers such as ‘strongly agree’ or ‘strongly disagree’, while others stick to more impartial choices (Hoskin, 2012).

Despite the questionnaire being proven highly valid and reliable, the participants may have rushed through the questionnaire, interpreted statements differently, or not fully comprehended the questions. All surveys were given in English despite many students not speaking English as their first language. It is unknown if this affected the questionnaire results.

Social desirability bias may have also affected the results of this study because the participants knew the purpose of the study was to determine their health literacy. However, the investigators encouraged participants to respond honestly and reinforced the confidentiality of the results.

Lastly, the site of the sampling may have delivered results that don’t accurately reflect the health literacy or demographics of other Northwest Arkansas High Schools. The school used in this study had a higher number of Hispanic and Marshallese students than many other Northwest Arkansas schools. Further research on Health Literacy in other areas of Arkansas and other states should be done in the future to compare with this study.

Conclusions

Age, gender, and ethnicity were not shown to be positively correlated with students' health literacy scores in this study. Overall, students scored the lowest in their ability to evaluate the reliability of health information. The results from this study indicate that education is needed for high school students in appraising health information. Further research is necessary to fully understand the health literacy dynamics in Northwest Arkansas high school students. Determining the health literacy needs of high school students and how social determinants of health can affect health literacy is important in supporting and educating high school students. Future studies using the HLQ should implement larger sample sizes with a wider age range to get more accurate results on possible disparities.

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