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AN INVESTIGATION INTO PROVIDER COMMUNICATION AT UCF AND THE IMPACT  
OF HEALTH LITERACY ON TEACH-BACK OUTCOMES

by

SHREYA LAKSHMI ATMAKURI

A thesis submitted in partial fulfillment of the requirements  
for the Interdisciplinary Honors Thesis program in Human Communication  
in the Nicholson School of Communication and Mass Media  
and in the Burnett Honors College  
at the University of Central Florida  
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Thesis Chair: Dr. Ann Miller

## Abstract

The most important aspect of an encounter between a patient and his or her provider is the patient's ability to understand and implement the treatment plan and self-care instructions conferred by the provider. However, the literature in the field of patient-provider communication reveals that there is a noticeable gap in health literacy in certain patient populations that impairs their ability to understand pre-, during, and post-encounter paperwork, terminology, treatment plan, and critical self-care instructions. This has been shown to have detrimental consequences on patient health outcomes. The teach-back method, in which providers request patients to repeat key information discussed during the encounter in their own words, has been shown to successfully improve patient satisfaction, self-efficacy, and knowledge post-encounter. This paper seeks to investigate the impact of health literacy and teach-back on patient satisfaction, self-efficacy, and knowledge, and to determine the effect of a teach-back training intervention on the usage of teach-back during a patient-provider encounter.

A total of 88 patients and 11 providers participated in this study over the course of two semesters. A pre- and post-encounter questionnaire was provided to patients and a post-encounter questionnaire to providers. Data regarding teach-back instances during the encounter were obtained via transcripts of encounter audio recordings. Training was given to 17 providers between semesters, 11 of whom were participating in a larger study data collection, and pre- and post-training teach-back instances were compared. The data were coded and statistically analyzed.

The results were that there was a statistically significant relationship between health literacy and patient satisfaction as well as patient self-efficacy. Additionally, there was a significant relationship between teach-back and patient self-efficacy with an upward trend

observed on the knowledge measures post-teach-back. Teach-back interventional training was also seen to have a statistically significant impact on provider use of teach-back during the patient encounter. Additional research in this field observing fidelity of teach-back practice and observing impacts of teach-back on a separate non-student population could be beneficial in improving patient encounters.

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## Introduction

Two key components of any patient-physician encounter are communication and comprehension. The ability of a provider to clearly explain to their patients the state of their health and what measures must be taken to correct or continue it is important, as is the patient's ability to communicate to the provider any disparities between what was said and what was understood. When this communication is ineffective, patients can end up misinterpreting treatment plans and medical advice, leading to poor treatment adherence and health outcomes, and by extension, patient dissatisfaction. These and other communication issues can be considered by-products of low health literacy in patients. One tool that has been heavily tested to address such issues is teach-back.

This research investigated the extent to which health literacy in a population was associated with patient self-efficacy, patient understanding of diagnosis and treatment, and patient satisfaction post-encounter. The study additionally investigated how the effectiveness of the teach-back method as a tool to further patient comprehension was influenced by a patient's level of health literacy. Finally, it investigated the extent to which training healthcare professionals on the teach-back method improved or brought about use of teach-back during a medical encounter as well, thus increasing patient comprehension.

## Literature Review

### I. Health Literacy

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 & Institute of Medicine (U.S.), 2004, p.2). According to the National Action Plan to Improve Health Literacy brought forth by the U.S. Department of Health and Human Services (2010), when people receive accurate, easy-to-use health information about a health issue, they are better equipped to act toward protecting and promoting their own health and wellness. Unfortunately, patients are not necessarily information literate. For example, they may not know where to pursue medical information outside the clinic and even if they find it, they may not be able to properly assess the reliability of the information found. Patients can become confused between what course of action they should take based on information they located themselves on the internet versus what the provider recommends (Joseph, Fernandes, Hyers, & O’Brien, 2016). Adding to this is the fact that patients can find themselves lost when faced with complicated medical terminology in pre-encounter or discharge paperwork (Catalano, 2016) and when attempting to interpret dosage and medication labels (Backes & Kuo, 2012). In this way, low health literacy can cause difficulty complying with treatment plans.

A data analysis conducted by the National Center for Education Statistics on statistics collected from the National Assessment of Adult Literacy in 2003 shows that in an evenly distributed demographic representative of the U.S. adult population, only 12% had proficient health literacy. Fifty three percent had intermediate health literacy with an additional 22% at basic health literacy and 15% at below basic or proficient health literacy (Kutner, Greenberg, Jin,



& Paulsen, 2006). The group was also asked to self-report their state of health. A majority of those who had ranked at proficient and intermediate levels of health literacy reported good to excellent levels of health, whereas those who had tested as basic and below basic health literacy reported health levels ranging from fair to poor. Health literacy, therefore, correlates with health. In a systematic review of 86 studies investigating health outcomes associated with health literacy, Berkman et al. (2007) found that lower literacy was associated with “increased emergency department and hospital use, breast cancer [due to decreased tendency to undergo mammograms], and lower influenza immunization.” (Berkman et al., 2007, p.52). There was also evidence revealing a direct correlation between lower health literacy and poorer ability to implement treatment plans, including inability to accurately interpret accompanying instructions or messages, which inevitably also leads to poorer quality of life and ability to prevent or recover from disease (Batista et al., 2017; Berkman et al., 2007; Zheng et al., 2018). In fact, a meta-analysis of 61 studies investigating the role of health literacy in diabetes patients found that higher health literacy was positively correlated with implementation of healthy lifestyle changes and “self-care activities”, as well as better management of blood sugar levels, further underscoring the role that health literacy has on one’s medical fitness (Marciano et al., 2019, p.1014).

Although there is no single factor contributing to the prevalence of low health literacy, people low in health literacy often fall under the bracket of vulnerable populations, which include but are not limited to: older adults, immigrant populations, minority populations, and low-income populations, as well as female patients (Health Literacy, n.d.; Stømer et al., 2019; Rebeiro et al., 2018). It can be inferred that since limited health literacy is linked to limited education, factors like a lack of educational opportunity, limited income, learning disabilities,

and limited reading ability could be underlying reasons for low health literacy (Health Literacy, n.d.; Shaharudin et al., 2020; Hamid Joveini et al., 2019).

## II. College Students and Health Literacy

College students are in a transition period between moving into their independent lives while still somewhat being dependent on their parents or guardians. Many are making their first move away from home and are in the position of having to manage their own finances, lifestyle, and even health for the first time (Mulye et al., 2009). When they have one-on-one encounters with providers by themselves for the first time, they often have to fill out paperwork replete with complicated medical jargon that leaves them guessing and confused. Filling out personal health history for the first time and having to think about medication history, allergies, vaccinations, etc. as well as insurance details (or lack thereof) can add to the confusion and stress that comes with establishing oneself as a patient for the first time with no guidance (Mulye et al., 2009; Sukys et al., 2017). Additionally, many universities have a large number of international students who might be health literate in their own country but not in the United States. This is especially the case when English is not their first language. American culture and social standards are different compared to what they might be accustomed to in their home countries, thus the skillsets and cultural contexts of incoming patients with diverse cultural backgrounds must be taken into consideration (Health Literacy, n.d.; Rudd, 2010; Zheng et al., 2020). It is vital that students are health literate in order to navigate these provider encounters and the complicated paperwork for them to reap the proper benefits from their health care rather than being overwhelmed and lost.

A 2018 study that was done on a population of 228 college students revealed that “74% [of the students] use the internet to find health information over any other source”. This speaks to

the idea that despite the disparity seen in the level of e-health literacy, defined as a subset of health literacy that looks at a person's ability to locate, use, and evaluate health information on the internet (Stellefson et al., 2011), this demographic does display a great interest in health topics, at least as it pertains to their individual health needs (Basch, MacLean, Romero, & Ethan, 2018). Unfortunately, recent literature does reveal that an increasing number of students are entering college without the proper skills to understand and utilize the health information they encounter. Studies such as those conducted by Ivanitskaya et al. (2012) and Stellefson et al. (2011) reveal that college students, despite their high educational attainments and enthusiasm toward using the internet as a tool, are lacking when it comes to being able to conduct advanced information searches on the internet and in distinguishing between articles that are trustworthy versus those that are not. Thus, some college students are likely to be lacking in e-health literacy.

Another aspect to consider is students' proficiency in health numeracy. Health numeracy, as per Netemeyer et al. (2019), is based on a patient's ability to understand, interpret, and calculate quantitative information in the context of healthcare. This concept is synonymous with quantitative literacy which is defined by the Mathematical Association of America as "the ability to understand and use numbers and data analyses in everyday life" (Madison & Steen, n.d., p.4). A study done by the American Institutes for Research reveals that 20% of college students who had completed four-year degrees and 30% of those who had completed two-year degrees had only the most basic of quantitative literacy skills (Baer, Cook, & Baldi, n.d.). Lacking basic numeracy skills can make it difficult for patients to understand things like instructions on medication dosing or how to monitor their blood pressure or insulin levels such that they remain within the normal range, making it difficult for them to take care of themselves after leaving the

doctor's office and can thus lead to negative health outcomes (Rothman, Montori, Cherrington, & Pignone, 2008). The same study by the American Institutes for Research elucidates statistics on the health literature comprehension levels of American college graduates as well, placing more than 75% of two-year college graduates and 50% of four-year college graduates at a below proficient comprehension level (Baer, Cook, & Baldi, n.d.). Such low levels of comprehension in college students can end up being an additional hurdle to their ability to understand health information, the risks associated with a treatment plan or lack thereof, and other preventative measures.

It is important that students obtain and utilize correct health information, preferably from verified and reliable sources such as medical providers, and thereby maintain good health, boost personal quality of life and “ensure the health and well-being of a nation” as a whole (Ickes & Cottrell, 2010). Findings in a study determining the correlation between health behaviors, health literacy, and self-efficacy in college students with chronic conditions suggest that a high level of health literacy and self-efficacy may be significant for health and wellness maintenance behaviors in college students (Barsell, Everhart, Miadich, & Trujillo, 2018). This is further bolstered by the results of a study performed on 399 college students for the purpose of determining their overall level of health, which showed that close to 90% of the student population acknowledged the importance of health literacy and expressed an interest in educating themselves if their level of health literacy was considered inadequate literacy (Ickes & Cottrell, 2010). However, it is also primarily the duty of the provider to inform and educate his or her patient about the health literacy surrounding treatment and self-care - there must be efforts made from the provider side and from the patient side for the patient to walk away from the encounter

fully aware of how to take care of themselves and how to ask for further information and aid should he or she need it.

### III. The Teach-Back Method

The teach-back method is one way that providers ensure that information is effectively conveyed to patients, regardless of their level of health literacy. According to the Agency for Healthcare Research and Quality under the U.S. Department of Health and Human Services, this method involves “asking patients to state in their own words what they need to know or do about their health” (Use the Teach-Back Method, n.d., p.1) to check understanding of how much of the provider’s instructions they understood. Should the patient express any inconsistencies with what was discussed during the encounter, the provider will then correct the patient and ask him or her to repeat the instructions again. This process repeats itself until the patient fully understands what he or she needs to do post-appointment. The expectation from teach-back is that it will “improve patient understanding and adherence, decrease call backs and cancelled appointments, and improve patient satisfaction and outcomes” (Use the Teach-Back Method, n.d., p.1).

#### *Teach-Back and Patient Satisfaction*

The general consensus over a wide range of literature reveals that teach-back usually has positive outcomes with improvement in patient satisfaction post-medical encounter. In fact, a systemic review analyzing 26 different articles detailing the use and impact of teach-back on patients 18 years or older shows that the teach-back method has been associated with positive effects on “patient satisfaction, patient perceptions and acknowledgements, post-discharge readmissions, [and] disease self-management and knowledge” (Yen & Leasure, n.d., p.4). For

example, a study conducted with patients in a cardiac acute/progressive care unit measured their results on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey both four months prior to teach-back intervention and four months after teach-back intervention. The results showed an increase in patient satisfaction scores from 79% to 96%, a statistic that was considered “clinically significant” and a reflection of increased patient communication regarding discharge information and medication (Kelly & Putney, 2015, p.2). However, data presented by Griffey et al. (2015) reveals that gains in comprehension and satisfaction attributable to a teach-back intervention in patients being discharged from an emergency department declined over time. It should be noted that this study depended on patient self-report of teach-back and the researchers note that without observation, interactions that take place in a “busy clinical setting” cannot be properly evaluated on efficiency of teach-back (Griffey et al., 2015, p.10).

### *Teach-Back and Patient Self-Efficacy*

There is evidence that teach-back has positive associations with patient self-efficacy as well. A meta-analysis conducted by Ha Dinh et al. (2016) evaluating the effects of the teach-back method in patients suffering from a range of chronic illnesses analyzed 12 studies, of which two had statistically significant improvements of self-efficacy post-teach-back. The first study was conducted on patients ranging from ages 30-80 years, all suffering from heart failure. These patients were given teach-back intervention and underwent a one-hour long educational program about their condition and long-term care. The results of a survey measuring self-efficacy, administered before and after teach-back and education, were compared and found to show improvement in self-efficacy among the patients. The second study was conducted on

chronically asthmatic adult patients who were divided into a control and an intervention group, the former of which received written instructions as to the use of their inhalers whereas the latter received written instructions in conjunction with teach-back and visual demonstration of inhaler use. Comparing the results of a survey conducted before and after the information was presented to both groups, there was an observable increase in self-efficacy among the intervention group that had undergone teach-back as opposed to the control group (Ha Dinh, Bonner, Clark, Ramsbotham, & Hines, 2016).

### *Teach-back and Patient Knowledge*

There is also evidence that shows teach-back has an impact on patient knowledge. A study conducted by Chander et al. (2019) on 13-21-year-old patients who had undergone kidney transplantation is worth noting for its commentary on teach-back affecting patient knowledge. A modified digital media teach-back program was used to educate the patients as to the general medical regimen in youth patients with kidney transplants, especially due to the fact that most of these young patients were reportedly below grade level in school. The program revealed that through the use of this teach-back system, patients displayed improvement in functional health literacy and an increase in knowledge and purpose of medications. In another study by Chukwuocha (2018), a sample of chronically hypertensive patients were given face-to-face teach-back educational sessions supplemented by an informative session provided by the American Heart Association. The results of this intervention showed that there was not only a measured improvement in level of health literacy, but that it led to an increase in patient knowledge with respect to healthy practice, evidenced by the fact that more than “50% of the participants” met the HEDIS healthy BP guidelines post-intervention when none of the

participants had done so initially (Chukwuocha, 2018, p.38). It should be noted that teach-back, while effective on its own, is increased in its usefulness upon being combined with other interventional programs.

While the teach-back technique has proven to have positive associations with patient health-related variables, there is still the question of how effective training administered to health care personnel regarding teach-back is in increasing use of teach-back. Despite the dearth of literature regarding provider teach-back at the time of this study, a notable systematic review of 20 different teach-back studies conducted by Talevski et al. (2020) describes “95% of [said] studies” to have boasted teach-back as being effective over a “broad range” of patients, with said patients walking away with improved knowledge regarding diagnosis, enhanced recall of treatment plan, and medication adherence (Talevski et al., 2020, p.13). Unfortunately, further research in the area describes training of nursing staff rather than providers. In one study, two similar medical units that were part of a 361-bed community hospital were each designated to be either part of a control group or an experimental group. The nurses who were under the experimental group were provided a one-hour teaching session on the use of teach-back while the control group received no such training. Based on the results of the HCAHPS survey administered to patients of the two units before and after teach-back training, it was seen that the scores trended positively in both the experimental and control group. Nonetheless, there was an observable increase in the use of teach-back in the experimental group and support for the method among the nurses who had undergone training (Centrella-Nigro & Alexander, 2017). Another study, this one conducted by Holman et al. (2019), aimed to determine the impact of a 10-20-minute interventional program on the use of teach-back on acute care nurses. The results show that post-intervention, there was an overall increase in the use of the different aspects of



teach-back, especially “re-explaining” information when patients are unable to express what was taught (Holman, Weed, & Kelley, 2019, p.2). The sample size of this study was regrettably small, about 20 nurses had participated, diminishing the generalizability of the results.

In light of this literature, this study poses the following research questions about use of teach-back in a college student population.

RQ1: How is health literacy related to; a) patient satisfaction, b) patient self-efficacy, and c) patient knowledge post-encounter?

RQ2: How is use of teach-back related to; a) patient satisfaction, b) patient self-efficacy, and c) patient knowledge post-encounter?

RQ3: How does an incoming patient’s health literacy level influence the extent to which teach-back is associated with; a) high patient satisfaction, b) patient self-efficacy, and c) patient knowledge post encounter?

RQ4: How will an interventional program on teach-back affect the frequency of its use by medical providers post-intervention?

## Methods

This study about the relationship between communicative health literacy and the teach-back method is part of a larger interdisciplinary study about teach-back being conducted in conjunction with the University of Central Florida Student Health Services (SHS); Dr. Ann Millerand, of the Nicholson School of Communication and Media; and Dr. Richard Zraick, of the School of Communication Sciences and Disorders. Data collection and analysis were conducted by a six-person research team including Dr. Miller, two second year students from the University of Central Florida College of Medicine, one graduate student and one undergraduate student affiliated with University of Central Florida's Nicholson School of Communication and Media, and myself. This was a mixed-methods study investigating patient-provider communication and the use of teach-back. Medical encounters were audio recorded, transcribed, and analyzed. Additionally, patients and providers filled out post-encounter questionnaires, and patients also filled out pre-encounter questionnaires. This study has been approved by the university's Institutional Review Board.

### Sample

This study aimed to obtain usable data from 40 patient participants per semester over the course of two semesters. An extra 10 participants per semester were built-in to the study in the event that patients withdrew/denied consent or if other unforeseen complications arose. Data were collected from encounters in the Health Center's Gold, Green, Blue and International Health pods. Visits pertaining to sexually transmitted infection, victim services/sexual assault, substance use disorders, or mental health were excluded. Based on the type of scheduled appointment, the nurses participating in the study were able to determine in advance whether it

qualified for inclusion or not. If a scheduled encounter resulted in unanticipated discussion of one or more of these topics, that appointment was replaced by another randomly selected time slot. Patients under the age of 18 were excluded as well.

## Procedure

The research officer for Student Health Services approached each provider individually, explaining that the unit was collaborating with faculty to conduct a study about patient-provider communication. Out of the 20 providers approached for participation, 11 agreed to participate. Providers' consent was obtained face-to-face by the research officer. Among provider specializations, five were physician assistants, four were primary care physicians, and two were in sport's medicine. The number of patient participants that were assigned to each provider was proportionate to the number of appointments each provider would take in a day. As a result, providers who would see a large number of patients in a day were recorded more often than providers who had administrative and other duties in addition to seeing patients.

Patients were recruited by the lead nurses in each pod who had been trained in recruitment and study method, using a script provided by the research team. Student consent was collected face-to-face when patients showed up for their appointment at the time slot designated for study inclusion at the health center. The nurses then explained to patients the purpose of the study and told them that their participation was completely voluntary. Patients were encouraged to ask questions before agreeing to participate. They were assured that they may change their minds about participation at any time during the study. Nurses informed them about the study process, including that the encounter would be audio recorded. If patients agreed to participate, they received the consent and HIPAA forms to be read and signed.

Each nurse was equipped with a numbered, collated packet of materials that they had for each appointment which included all the study instrumentation as well. Upon collecting consent from patients, nurses gave patients a half-page questionnaire to fill out prior to their encounter. The nurses additionally audio recorded the packet ID number for each appointment on a tabletop recording device and placed said device in the medical examination room prior to the patient's entry. The entirety of the medical encounter was recorded, and the nurses collected the recording device post-encounter. At this time, they handed the provider the 'provider post-encounter questionnaire' from the packet and the provider self-administered it. The nurses then administered the 'student post-encounter questionnaire' to the student and recorded their answers.

This process took place over the course of the fall semester of 2019. A training in teach-back was offered to providers in January 2020. The teach-back training involved a one-hour voluntary face-to-face training program over the lunch hour. Content included presentation of key elements of teach-back with video examples of the technique in practice, large group discussion, and practice of the technique in pairs. Then the process described in the previous two paragraphs was conducted again so as to compare findings. Providers were contacted again prior to post-training data collection that was conducted Spring 2020 to ensure their continued participation. Patients in the spring semester were an entirely different sample.

Audio files were uploaded to behind the firewall of the Student Health Center for security purposes. Members of the research team transcribed the audio recordings on site, removing any identifiable information and retaining only the participant number assigned by the research team. Audio files were transcribed word for word with the total number of transcribed pages being 757.

While researchers were transcribing, they noted the time stamp at which teach-back occurred if at all.

## Instrumentation

*Patient Pre-Appointment Questionnaire.* The pre-appointment questionnaire measured the patient's communicative health literacy, that is, the efficiency with which they were able to obtain and discuss information. We used the communicative subscale of the All Aspects of Health Literacy Scale (AAHLS) (Chinn & McCarthy, 2013). The scale consists of Likert-type items. Students responded on a 5-point scale with *1 = never*, *2 = rarely*, *3 = sometimes*, *4 = sometimes*, or *5 = rarely*. The items are “When I talk to a doctor or a nurse, I give them all the information they need to help me,” “When I talk to a doctor or nurse, I ask all the questions I need to ask”, and “When I talk to a doctor or nurse, I make sure they explain anything I do not understand add other items”. Cronbach's alpha for all three items in this scale were below the acceptable threshold, at 0.63. When one item was dropped from the scale, the reliability score rose to 0.73.

*Provider Post-Appointment Questionnaire.* Providers were asked to respond to four Likert-type scales inquiring on their perception on how well the patient seemed to understand the diagnosis, how well the patient understood the treatment prescribed, and how satisfied they were overall and will be asked to respond on a 5-point scale with *1 = never*, *2 = rarely*, *3 = sometimes*, *4 = sometimes*, or *5 = rarely*. They were also asked on their perception about how the patient might have felt about the information provided to them about their condition during the encounter. They were asked to answer by circling one of the following: “*Too little information*,” “*About the right amount*,” or “*Too much information*”. Providers were then asked

to answer open-ended questions about what the diagnosis was for the patient, what instructions were given to them about their condition, and why it was important for the patient to do.

*Patient Post-Appointment Questionnaire.* The first four questions on the patient-post appointment paralleled those on the provider post-appointment questionnaire. The next question then defined what teach-back is and the patient was asked whether the provider had conducted teach-back during the appointment. Patients were required to respond “*Yes*” or “*No*”. The last three questions paralleled the topics of the open-ended questions in the post-provider questionnaire about the treatment of and reasoning behind the diagnosis, but in the patient-post appointment questionnaire nurses asked patients to explain their answers to each question in their own words while the nurses rated them. The nurses rated patient responses as either “*Very inaccurate,*” “*Somewhat accurate,*” or “*Very accurate*” based on a rubric developed by the research team in conjunction with the nurse manager at the health center.

*Transcript Coding.* My thesis supervisor and I each individually coded for the presence or lack thereof of teach-back in each of the transcripts. Upon comparison of coding, 4 out of 88 transcripts were coded differently. Disagreements were resolved via discussion between the two coders.

## Results

### Descriptive Statistics

A total of 95 patient visits were recorded. Among these, five of the files were either inaudible or not completely recorded and could not be transcribed. Another two were removed from the study by providers when patients began to raise issues of women's health, behavioral health, or other topics outside of the parameters of the study. A total of 88 audio transcripts were usable for coding. The frequency of varying health concerns of the incoming patient participants is presented in Table 1.

*Table 1*

#### Presenting Health Concerns of Patients

Health Concern	Frequency
Respiratory, flu-like symptoms, asthma, sinus/ear congestion	52
Misc. (Conjunctivitis, MVA, digestive, screening)	21
Injuries, joint problems, trauma	16
Dermatology	7

Note: Some patients wanted to discuss multiple health concerns, so totals do not add up to 88.

### Research Questions

Research question one, which asked about the association between health literacy and patient satisfaction, self-efficacy, and knowledge post-encounter was evaluated using Pearson's bivariate correlations. See Table 2 for results. As indicated in the table, there was a statistically

significant correlation between health literacy and patient satisfaction as well as health literacy and patient confidence.

*Table 2*

Pearson's Bivariate Correlations Data

	Health Literacy	Overall Knowledge	How satisfied were you with the appointment?	How confident are you that you can follow the instructions the provider gave you for your treatment?
Health Literacy	1			
Overall Knowledge	-.068	1		
How satisfied were you with the appointment?	0.250*	-0.016	1	
How confident are you that you can follow the instructions the provider gave you for your treatment?	0.278**	-0.016	-0.063	1

\*. Correlation is significant at the 0.05 level (2-tailed).

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

Research questions two, which asked about the association between use of teach-back and patient satisfaction, self-efficacy, and knowledge post-encounter was evaluated using a series of five t-tests with presence of teach-back designated as the independent variable and patient satisfaction, self-efficacy, and knowledge post-encounter as dependent variables. Levene's tests indicated equal variance could be assumed for all dependent variables except self-efficacy. See Table 3 for results. A statistically significant relationship between presence of



teach-back and self-efficacy was observed in the data. The Cohen's *d* value for self-efficacy was 0.29, indicating the effect size was small. Additionally, it was observed that in all three areas of knowledge, there was a positive trend showing that in appointments in which providers used teach-back all knowledge scores were higher, although this trend was not statistically significant.

*Table 3*

Independent Samples T-Test Data

	Presence of teach-back in transcript?	<i>t</i>	df	<i>p</i>	N	Mean
How satisfied were you with the appointment?	Yes	-0.52	82	0.604	39	4.92
	No				45	4.96
How confident are you that you can follow the instructions the provider gave you for your treatment?	Yes	2.15	62.03	0.035	39	4.97
	No				45	4.84
Accuracy of patient knowledge about diagnosis	Yes	0.935	82	0.352	39	2.79
	No				45	2.69
Accuracy of patient knowledge about treatment	Yes	0.734	82	0.465	39	2.85
	No				45	2.78
Accuracy of patient knowledge about reason for treatment	Yes	1.183	89	0.240	39	2.85
	No				45	2.71

Research question three, which asks to what extent health literacy influences the relationship between teach-back and patient satisfaction, self-efficacy, and knowledge post-encounter was evaluated using a one-way ANCOVA with teach-back as the independent variable, self-efficacy as the dependent variable, and health literacy as a covariate. The results showed that health literacy did act as a covariate. However, the relationship between teach-back

and self-efficacy remained after accounting for impact of health literacy ( $F = 5.50$ ,  $df = 1, 81$ , and  $p = 0.021$ ).

Research question four, which inquired as to whether an interventional program on teach-back would affect the frequency of its use by medical providers post-intervention was analyzed by running a chi square test between pre- and post-training and in the presence or absence of teach-back. The results showed that the Pearson chi square = 35.34,  $df = 1$ , and  $p < .001$ . These results indicate that there was a strong impact of the interventional program on improving teach-back instances.

## Discussion

In response to the growing evidence regarding the impact of patient health literacy on patient ability to benefit from a medical encounter as well as the literature on the positive impacts of providers conducting teach-back to improve patient health literacy, this study sought to examine the implications of health literacy as well as the teach-back method on patient satisfaction, self-efficacy, and knowledge post-encounter. Additionally, the extent to which health literacy influences teach-back's impact on patient satisfaction, self-efficacy, and knowledge post-encounter was examined. The impact of an interventional teach-back training program on increasing provider use of teach-back was also analyzed.

Based on the results, it is evident that there is a significant relationship between health literacy and patient self-efficacy. This is important because increased patient self-efficacy means that patients are more likely to follow through with the treatment plan and critical self-care activities post-encounter (Austin et al., 2019). Resultantly, patients with increased self-efficacy are more likely to benefit from their treatment and reduce their risk of worsening acute conditions and/or control chronic conditions (Austin et al., 2019). Patients are also thus more likely to meet future follow-up appointments and commit to medication refills as instructed as they are more self-efficient and less susceptible to not taking control of their health (Austin et al., 2019). It is worth noting that though not significant, there was a positive trend toward knowledge of diagnosis, treatment, and rationale for treatment.

Additionally, based on the data presented in the chi square analysis, it is apparent that the interventional program was highly successful and that there is noticeable improvement in the use of teach-back by the providers who were trained at the UCF Student Health Services. This is important as it demonstrates that training of teach-back can be successfully implemented in the

practice, thus improving the quality of patient-provider encounters. This training can be extended to not only the providers, however, but to nursing, reception, and checkout staff as well. In this way, the patient is assured to leave the practice with minimal doubt or confusion.

Despite the encouraging results of this study, it was limited by several factors. Though we were able to listen to audio recordings of patient-provider encounters and work off the transcripts produced from those recordings, we were unable to follow through with each of the patients that participated in this study post-encounter to monitor for retention and implication of the treatment plan as one indication of successful teach-back. Additionally, the data reflects an apparent ceiling effect. This is due to the fact that the numbers indicate that patients, on average, were very satisfied, had good knowledge, and were very confident. In a normal population, these outcomes are highly unlikely, but it must be kept in mind that the ceiling effect was likely caused by the fact that our patient population for this study was almost entirely college students who use Student Health Services. As a result, the number of associations found between the impact of health literacy and teach-back on patient outcomes was likely limited, however these results are definitely good news for the UCF Student Health Services department.

In the future, further research should look to examine whether or not teach-back is being conducted with fidelity to the best practices, a factor that was not analyzed in this study. Additionally, this study could be replicated with a more diverse population to eliminate the ceiling effect and obtain clearer associations between health literacy, teach-back, and patient outcomes.

Appendix A  
Patient Pre-Appointment Questionnaire

**Patient Pre-Appointment Questionnaire**

Please answer the following questions about your GENERAL experiences talking to health care providers. Please indicate your response by circling “never,” “rarely,” “sometimes,” “often,” or “always.”

When I talk to a doctor or nurse, I give them all the Information they need to help me.	Never	Rarely	Some-times	Often	Always
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When I talk to a doctor or nurse, I ask the questions I need to ask.	Never	Rarely	Some-times	Often	Always
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When I talk to a doctor or nurse, I make sure they explain Anything I do not understand.	Never	Rarely	Some-Times	Often	Always
--	-------	--------	------------	-------	--------

Thank you!

## Appendix B

### Provider Post-Appointment Questionnaire



### Provider Post-Appointment Questionnaire

Please answer the following questions on a scale of 1 to 5 with 1 = not at all to 5 = very much.

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. How well did the patient seem to understand the diagnosis?  | 1 | 2 | 3 | 4 | 5 |
| 2. How well did the patient seem to understand the treatment prescribed?   | 1 | 2 | 3 | 4 | 5 |
| 3. How satisfied did the patient seem to be with the visit overall?  | 1 | 2 | 3 | 4 | 5 |
| 4. Which do you think most accurately describes the way the patient felt about how much information they received about their condition? |   |   |   |   |   |

Too little information

About the right amount

Too much information

Please describe in some detail the following aspects of the patient's appointment:

5. What was your diagnosis for this patient?
6. What instructions did you give the patient about what to do about their condition?
7. Why is this important for the patient to do?



## Appendix C

### Patient Post-Appointment Questionnaire



### Patient Post-Appointment Questionnaire

Read the following to the patient.

Now we want to ask you a few questions about how your appointment went. Please respond to each question on a scale of 1 to 5, with 1 meaning “not at all” to 5 meaning “very much so.”

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. Did the provider explain things in a way you could understand?   | 1 | 2 | 3 | 4 | 5 |
| 2. How satisfied were you with the appointment?   | 1 | 2 | 3 | 4 | 5 |
| 3. How confident are you that you can follow the Instructions the provider gave you for your Treatment?           | 1 | 2 | 3 | 4 | 5 |
| 4. Which most accurately describes the way you feel about how much information you received about your condition? |   |   |   |   |   |

Too little information

About the right amount

Too much information

5. Did the provider check your understanding of what he or she was saying by asking you to explain it back to them? I am talking about doing something more than asking, “Do you understand?” It would be saying something like, “OK just so I can be sure I did a good job of explaining, would you mind paraphrasing what I’ve explained.”
- \_\_\_\_\_ Yes                      \_\_\_\_\_ No

Please tell me what the provider told you was wrong with you. [nurse, please mark accuracy on scale below by comparing to provider’s notes.]

Very Inaccurate

Somewhat Accurate

Very Accurate

Please tell me what the provider said you should do about it. [nurse, please mark accuracy on scale below by comparing to provider’s notes.]

Very Inaccurate

Somewhat Accurate

Very Accurate

Please tell me why the provider said it is important for you to do that. [nurse, please mark accuracy on scale below by comparing to provider’s notes.]

Very Inaccurate

Somewhat Accurate

Very Accurate

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