



## AOA Critical Issues in Education

# Health Literacy Awareness Among Orthopaedic Surgery Residents

### A COERG Survey

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**Introduction:** Musculoskeletal health literacy (HL) is an emerging concept in orthopaedic patient care. Estimated rates of low musculoskeletal HL in patients surpass those of general HL. Studies in other specialties suggest that medical trainees are ill equipped to interact with low HL patients, often with detrimental patient outcomes. The purpose of this study was to (1) establish the current state of HL awareness among orthopaedic surgery trainees, (2) characterize the current state of HL training in orthopaedic surgery programs, and (3) evaluate the desire for formalized HL training among orthopaedic surgery trainees.

**Methods:** This study was endorsed by the Collaborative Orthopaedic Education Research Group board. A 17-item questionnaire was administered anonymously to orthopaedic residents through a secure online platform in the 2020 to 2021 academic year. All participation was voluntary.

**Results:** One hundred ninety-two residents (42%) from 19 orthopaedic programs completed the survey. Most residents felt “somewhat comfortable” with issues related to HL. Most residents reported no specific training in HL issues during residency (77.5%). Of the 43 residents (22.3%) who did receive formal training, most of these individuals felt that the training is effective (N = 42, 97.7%). Role playing/standardized patient encounters were reported as the most effective form of HL training. Residents felt it was somewhat important to receive formal HL training in residency (median = 4.0, interquartile range = 3.0-5.0), and there was a modest desire for formalized training (39%).

**Discussion:** This study is the first to characterize orthopaedic resident perceptions of HL issues in practice and training. Residents were somewhat confident in their understanding of HL concepts, and those who received formal training felt it was effective. However, there remains a low rate of formal orthopaedic resident training in HL issues, which may be an area for improvement in orthopaedic training paradigms.

All residents in this study gave informed consent to participate and the study was approved by the Institutional Review Board at Carolinas Medical Center.

The data that support the findings of this study are available from the corresponding author on reasonable request.

**Disclosure:** The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJSOA/A535>).

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## Introduction

Health literacy (HL) in medicine has become a topic of increasing interest in recent years. The US Department of Health and Human Services defines HL as “the degree to which people have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others”<sup>1</sup>. Musculoskeletal HL is a newer concept emerging as an important aspect of care for orthopaedic patients. Recent studies have shown that patients may have poorer HL in orthopaedic surgery because there is a need to understand unique terminology and more specialized medical concepts. Rosenbaum et al. reported that 69% of a patient population exhibited low musculoskeletal HL, compared with 48% with low general HL<sup>2</sup>. Another study found that orthopaedic surgery patients had the highest rates of inadequate HL among a group of surgical patients (60%)<sup>3</sup>. Overall, inadequate musculoskeletal HL rates range from 30% to 50% in the current literature<sup>2-10</sup>.

Learning to appropriately identify and treat patients with poor musculoskeletal HL is an essential endeavor for orthopaedic surgeons. Musculoskeletal complaints make up \$980 billion annually for treatment costs and lost wages in the United States<sup>11</sup>. Poor HL is estimated to cost the health care system \$106 to 238 billion in increased mortality, poorly controlled chronic medical conditions, preventable emergency department visits and hospital admissions, and delayed presentations<sup>12</sup>. In addition, poor HL affects outcomes, compliance, and quality of care for musculoskeletal patients<sup>6,8,13,14</sup>. For example, hand patients with poor HL ask fewer questions about their medical care<sup>14</sup> and have 20% shorter clinic visits<sup>8</sup> compared with patients with high HL. These studies did not evaluate patient outcomes but do establish differential abilities to obtain health-related information to make informed health care decisions.

Given this burgeoning recognition of the importance of learning how to communicate with low HL patients in orthopaedics, we were interested in the current state of musculoskeletal HL education across the country. Studies in the family medicine, OB/GYN, and internal medicine literature suggest that medical students and residents consistently overestimate patient HL levels, and programs have low rates of formal teaching on HL<sup>15-18</sup>. To the best of our knowledge, no corresponding study has been performed among orthopaedic surgery trainees, despite the increased recognition that musculoskeletal HL rates may be even lower than that of general medicine HL. The purpose of this study was (1) to establish the current state of HL awareness among orthopaedic surgery trainees, (2) to characterize the current state of HL training in orthopaedic surgery programs, and (3) to evaluate the desire for formalized HL training among orthopaedic surgery trainees.

## Methods

### Participant Recruitment

Following institutional review board approval, recruitment occurred in 2 phases. We first presented the study protocol to the Collaborative Orthopaedic Education Research Group (COERG) board who endorsed the project. The study was subsequently presented to the entire COERG group (100+

program directors from the United States), and those who were interested in participating in the study responded in accordance with a protocol approved by the institutional review board. In this phase, the geographic distribution of programs interested in participating was as follows: Northeast (6), Southeast (4), Midwest (7), Southwest (1), and West (1).

Participating program directors distributed the questionnaire to residents in their program. Consent was obtained electronically. All participation was optional, anonymous, and emphasized to have no impact on residency program performance.

### Questionnaire

We created a questionnaire to evaluate resident self-perceptions of HL awareness in orthopaedic patient encounters and orthopaedic residency training. The questionnaire comprised 18 to 20 questions depending on how study participants responded to the questions. These were a combination of Likert scale, yes/no, and multiple choice (Supplemental Appendix, <http://links.lww.com/JBJSOA/A536>). Questions evaluated resident perceptions of HL gaps in orthopaedic patients, communication ease with low HL patients, current state of HL training in residency, and desire for formalized training. Study data were collected and managed using Research Electronic Data Capture (REDCap) tools hosted at Atrium Health Musculoskeletal Institute<sup>19</sup>. REDCap is a secure, web-based application designed to support data capture for research studies, providing (1) an intuitive interface for validated data entry, (2) audit trails for tracking data manipulation and export procedures, (3) automated export procedures for seamless data downloads to common statistical packages, and (4) procedures for importing data from external sources.

### Statistical Analysis

Descriptive statistics (median and interquartile range [IQR], frequency, and percentages) were calculated to characterize the survey responses. Nonparametric testing with Kruskal-Wallis tests were used to determine whether there were any significant differences in responses across the different demographic groups. All statistical tests were 2-tailed, and *p* values less than 0.05 were considered statistically significant. SAS software version 9.4 was used for all analyses (SAS Institute).

## Results

Nineteen orthopaedic surgery programs with a total of 455 orthopaedic residents participated in the study (Table I). One hundred ninety-two residents (42%) completed the survey. One hundred sixty-five participants (85.5%) were male and 26 (13.5%) were female. One participant identified as nonbinary. A relatively even distribution of residents from different training levels completed the survey (24% post-graduate year (PGY)-1, 21% PGY-2, 18% PGY-3, 20% PGY-4, 17% PGY-5, and 1% PGY-6). A larger proportion of participants were in programs located in the Midwestern United States (*n* = 91, 47%), followed by the Northeast (*n* = 52, 27%) and Southeast (*n* = 37, 19%). No residents from the Western region participated in the study. Most residents reported training in academic programs (*n* = 120, 61%)

TABLE I Respondent Demographics

	N (%)
Sex	
Male	165 (85.5)
Female	26 (13.5)
Nonbinary	1 (0.5)
Year in training	
PGY-1	46 (23.8)
PGY-2	41 (21.2)
PGY-3	34 (17.6)
PGY-4	38 (19.7)
PGY-5	32 (16.6)
PGY-6	2 (1.0)
Program region	
Northeast (ME, MA, RI, CT, NH, VT, NY, PA, NJ, DE, MD)	52 (26.9)
Southeast (WV, VA, KY, TN, NC, SC, GA, AL, MS, AK, LA, FL)	37 (19.2)
Southwest (TX, OK, NM, AZ)	13 (6.7)
Midwest (OH, IN, MI, IL, MO, WI, MN, IA, KS, NE, SD, ND)	91 (47.2)
West (CA, CO, WY, MT, ID, WA, OR, UT, NV, AK, HI)	0 (0)
Primary training setting	
Community	72 (37.3)
Academic medical center (Public university)	59 (30.6)
Academic medical center (Private university)	47 (24.4)
Academic medical center (other)	14 (7.3)
Military	0 (0)
Other, please specify which institution	1 (0.5)
Type of community served	
Urban	99 (51.3)
Suburban	45 (23.3)
Rural	4 (2.1)
Urban and suburban	17 (8.8)
Urban, suburban, and rural	23 (11.9)
Suburban and rural	5 (2.6)

affiliated with public universities, private universities, and other institutions. Seventy-two residents (37%) reported training in community programs. Finally, a small majority of residents reported serving urban patient communities ( $n = 99, 51.3\%$ ); 45 residents (23%) reported serving suburban communities, 4 residents (2.1%) reported serving rural communities, and the remaining residents ( $n = 45, 23\%$ ) reported serving a combination of these 3 community types.

#### *Current State of Health Literacy Awareness Among Orthopaedic Surgery Trainees*

Overall, residents report fair to high levels of comfort with understanding HL concepts (median = 4.0, IQR = 4.0-5.0), with assessing HL levels in patients (median = 4.0, IQR = 3.0-

4.0), and with interacting with low HL patients (median = 4.0, IQR = 3.0-5.0; Table II). As a group, residents feel that HL is a somewhat important issue in orthopaedics (median = 4.0, IQR = 3.0-5.0), and there is some desire for formal HL training in residency (median = 4.0, IQR = 3.0-5.0).

Residents identified not having enough time in patient encounters (65% of respondents) as the greatest barrier to communicating effectively with low HL patients (Fig. 1). To a lesser extent, they reported not knowing how to accurately identify patients with low HL (25%), not knowing effective communication techniques (29%), and not being able to build rapport with low HL patients (26%) as barriers to effective communication with patients. Not knowing simple terminology was perceived as the least obstructive factor (10% of respondents) to communicating effectively with low HL patients.

To that end, residents were asked how often they vary their vocabulary to match the perceived HL level of the patient. Most residents reported that they “often” do so ( $N = 112, 58\%$ ), 45 residents (23%) reported “always” doing so, and 34 residents (18%) reported “sometimes” doing so. No residents (0%) reported “never,” and only 1 resident (0.5%) reported “rarely” tailoring their vocabulary. These perceptions only differed by the type of community served, with residents treating both suburban and rural communities reporting slightly less frequent changes to vocabulary based on perceived patient HL level (median = 3.0 vs. median = 4.0 for all other community types,  $p < 0.03$ ).

Residents were also asked how frequently they used 1 of 2 synonymous medical terms, one simpler and one more complex, in a typical patient encounter (Table III). In general, residents reported more frequently using the simpler medical term (e.g., “broken bone” vs. “fracture”).

#### *Current State of Health Literacy Training Among Orthopaedic Surgery Training Programs*

Most residents reported no specific training in HL issues during residency ( $N = 148, 77.7\%$ ; Fig. 2). Of the 43 residents (22.3%) who do receive formal training, most of these individuals felt that the training is effective ( $N = 42, 97.7\%$ ). Only 1 person felt that formal training was ineffective but did not provide feedback on why.

Didactic lectures ( $N = 31, 72.1\%$ ) and faculty shadowing/modeling with discussions ( $N = 30, 69.8\%$ ) were the most used training tactics. Role play/standardized patient encounters were less frequently used ( $N = 8, 18.6\%$ ). However, role play/standardized patient encounters were felt to be the most effective form of HL training, with 100% ( $N = 8$ ) of residents who received this training modality reporting it as helpful. 77.4% ( $N = 24$ ) of residents who received didactic lectures found these to be helpful, and 83.3% ( $N = 23$ ) of residents who were exposed to faculty shadowing/modeling found this modality to be helpful.

Residents were also asked about their perceptions of faculty interactions with low HL patients in the clinic setting (i.e., not during formal training sessions). Most residents perceived their faculty to be somewhat aware of HL issues ( $N = 84, 43.5\%$ ), as reflected in the quality of their interactions with patients. Few residents considered their faculty to be very ( $N =$

TABLE II Orthopaedic Resident Perceptions About HL*		
	Median	IQR*
As a medical provider, how comfortable do you feel with concepts related to HL?	4.0	4.0-5.0
As a medical provider, how comfortable are you assessing HL in your patients?	4.0	3.0-4.0
How comfortable do you feel about interacting with patients with low HL levels?	4.0	3.0-5.0
How much do you perceive HL to be an issue in orthopaedic surgery?	4.0	3.0-5.0
How important do you think it is for orthopaedic surgery residents to be trained in HL awareness?	4.0	3.0-5.0

\*HL = health literacy, and IQR = interquartile range.

3, 1.6%) or somewhat (N = 17, 8.8%) unaware of HL issues, and about 21% (N = 41) felt that their faculty were very aware of HL issues. These perceptions did not differ by resident sex, training level, program region, or program setting.

Finally, a large majority of residents reported not having any formal HL education before or outside of residency (N = 119, 61.7%). However, those who had formalized HL training primarily received it during medical school (N = 67, 91.8%; Table IV).

*Desire for Formal Health Literacy Training in Residency*

On a scale of 1 to 5 (1 = not at all and 5 = very), residents felt it was somewhat important to receive formal HL training in residency (Median = 4.0, IQR = 3.0-5.0), but as previously noted, only 22.4% report having this training (N = 43). There was a moderate desire for more training with 38.9% of residents (N = 75) saying that they would like their program to incorporate more education on HL issues in medicine (Fig. 3).

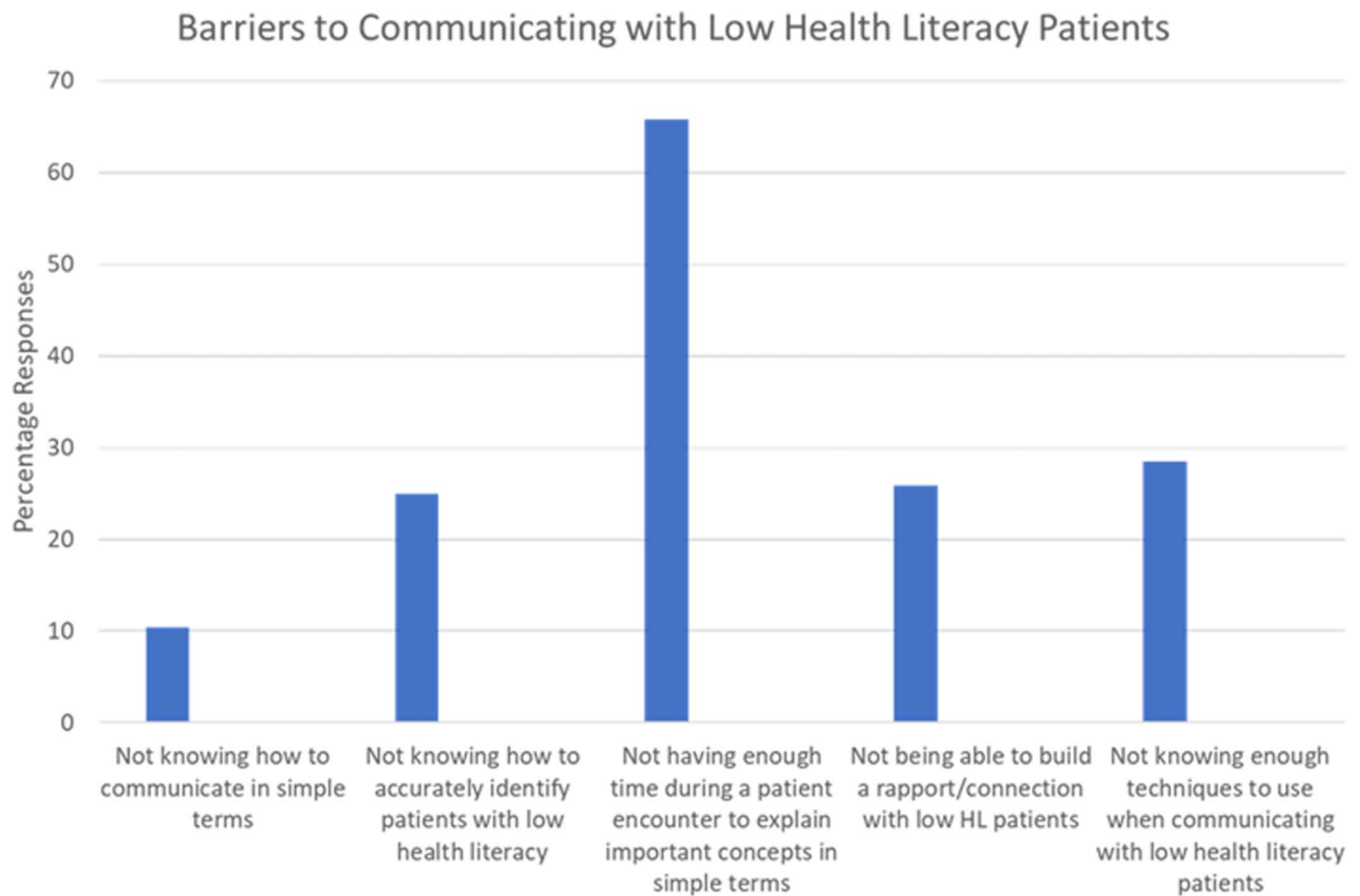


Fig. 1 Perceived barriers to communicating with low health literacy patients among orthopaedic surgery residents. Respondents were able to select more than one response. Data is presented as percentage of total responses.

**TABLE III** How Often Orthopaedic Residents Report Using Simple vs. Complex Medical Terms When Talking to Patients

In a Typical Clinical Encounter, Which of the Following Terms Are You More Likely to Use?	N (%)
“Fracture” vs. “Broken bone”	71 (36.8%)
	122 (63.2%)
“Nail” vs. “Metal rod”	45 (23.3%)
	148 (76.7%)
“Dysplasia” vs. “Malformation”	25 (13.0%)
	167 (87.0%)
“Congenital” vs. “Since birth”	44 (22.9%)
	148 (77.1%)
“Femur” vs. “Thigh bone”	78 (40.4%)
	115 (59.6%)
“Osteotomy” vs. “Cut in the bone”	11 (5.8%)
	180 (94.2%)

**Discussion**

Our study suggests that orthopaedic surgery residents possess a high degree of self-confidence regarding understanding HL issues and interacting with patients of varying levels of HL. There was a moderate degree of self-reported comfort in identifying patients with inadequate HL. This finding is encour-

aging as the medical community seeks to shed more light on the impact of low HL on patient outcomes and the role that physicians may play in perpetuating low HL rates. We do interpret these survey findings with caution, however, as studies among other medical specialties suggest that medical trainees consistently overestimate patient HL levels as well their own abilities to interact with these patients<sup>15-18</sup>. We propose that additional studies should be performed incorporating objective behavioral data, perhaps in the form of recorded patient encounters, to evaluate whether this self-reported confidence is discordant with actual behavior.

Residents did not feel that they had a lack of knowledge about low HL, an inability to connect with patients or shift communication styles, or an inability to regularly use simple vocabulary. They primarily attributed lack of time during patient encounters as the main barrier to effective communication with low HL patients. Although this perception may be accurate, it is interesting that orthopaedic surgery residents do not find overuse of complex medical terminology to be an additional significant barrier, in fact ranking it as the lowest perceived barrier to communication. Most current orthopaedic literature on this subject identifies overly complex language as a key obstacle, with the readability of orthopaedic surgery patient education materials written well above the average American reading level (8-13th grades vs. 6-8th grades, respectively)<sup>20-25</sup>. We attempted to objectively characterize how frequently residents used easy to understand vocabulary in patient interactions, which was based on a recent study by Cosic et al.<sup>5</sup> This

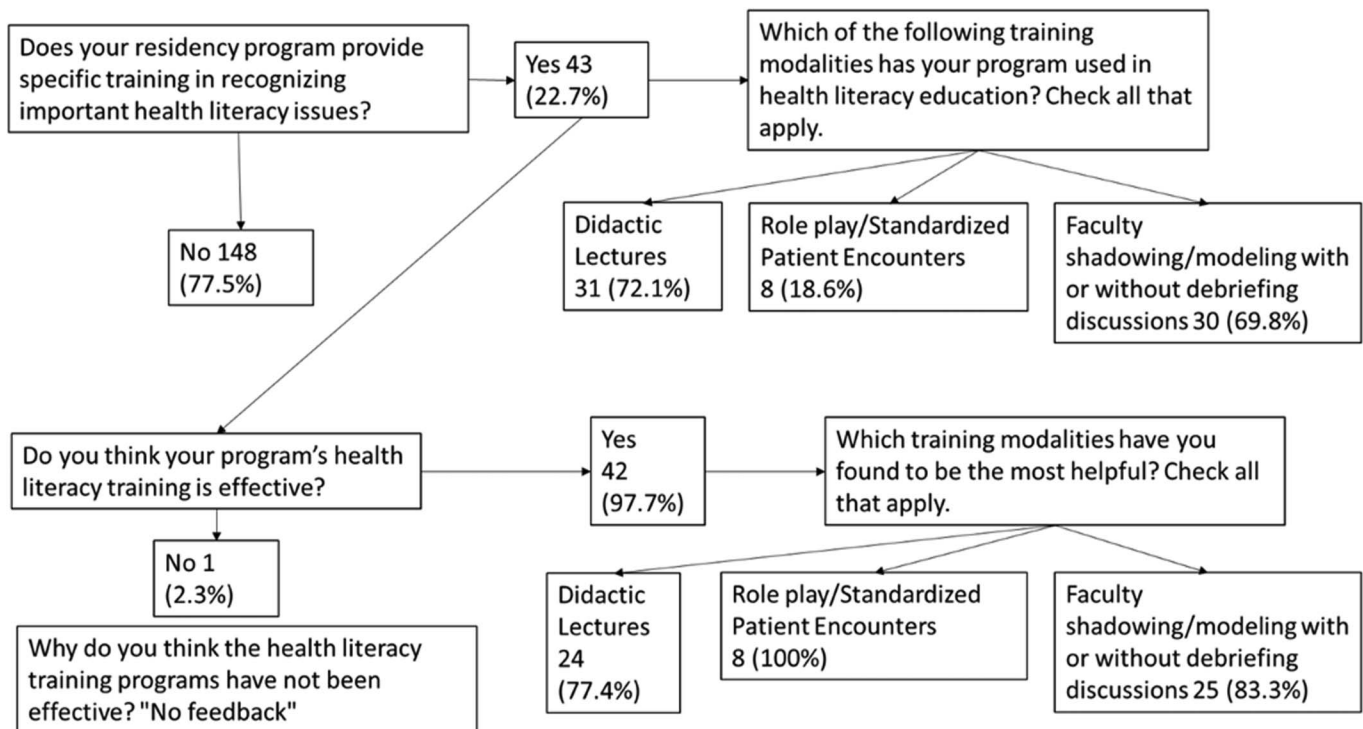


Fig. 2

Flowchart illustrating resident experiences with formal health literacy training in orthopaedic surgery residency programs. For nonbinary survey questions, respondents were allowed to select more than one answer.

TABLE IV Where Orthopaedic Residents Have Received HL Training Outside of Residency	
If You Received HL Education Outside of Your Residency Program, Where Did This Take Place? Check All That Apply	N (%)
Life experience	43 (58.9)
Self-taught/personal interest	24 (32.9)
Primary education (before college)	8 (11.0)
College	19 (26.0)
Medical school	67 (91.8)

HL = health literacy.

study showed that only 20% of an orthopaedic patient population could correctly define the term “fracture” on a multiple-choice test with 50% of patients also incorrectly reporting that a fracture is “not as bad as a broken bone.” In our study, residents consistently reported using the simpler medical description when choosing between a simple and complex term (e.g., fracture vs. broken bone; congenital vs. since birth). These findings not only may suggest that this rising generation of orthopaedic surgeons is more socially aware of the needs of their patients but also may reflect an element of recall or social desirability bias and thus inconsistency in the reported findings compared with actual behavior. This latter interpretation would be consistent with studies in other medical fields, which report that medical professionals tend to overestimate how well they use plain language during patient interactions<sup>17,26</sup>. Here again, a valuable avenue for future study would be to corroborate these self-report findings with observed clinical behavior.

Despite the self-reported confidence of the resident sample in our study, there remains room for improvement

for providing continuing education or formal HL training throughout orthopaedic surgery residency. Only 22% of residents surveyed report formal HL training in residency. This percentage is certainly lower than the rate reported for internal medicine and family medicine residencies (43% and 42%)<sup>15,27</sup>. However, one encouraging finding from our study is that about 40% of residents surveyed want more formalized training. One could argue that this desire is the first step toward generating a cultural shift in orthopaedic surgery training paradigms. In addition, the residents who currently receive formal training feel very much (98%) that it is effective in improving their communication and awareness skills regarding HL. These findings suggest that if residency programs were to implement a HL curriculum, orthopaedic surgery residents and thus their patients would likely benefit. Our study suggests that role play and standardized patient encounters will be the most successful teaching modalities but should be supplemented with faculty modeling and didactic lectures. Modalities that have shown success in other studies are training in the use of plain language communication and the teach back method as well as videotaping patient encounters followed by feedback sessions.<sup>28,29</sup>

Our study had several limitations. First, this study was a descriptive study based on self-reported assessment of addressing HL in practice. This study design is at high risk for recall and social desirability bias, so we are limited in our conclusions based on the data. Similarly, our recruitment methods limited participation to those residents who are enrolled in programs within a specific research collaborative, and the program directors who were most interested in this subject matter elected to participate in the study. This process may have skewed our findings toward reporting higher familiarity with HL topics and higher rates of formal HL training than is the population norm among orthopaedic surgery programs. We also had lower rates of participation and, therefore, representation from training programs on

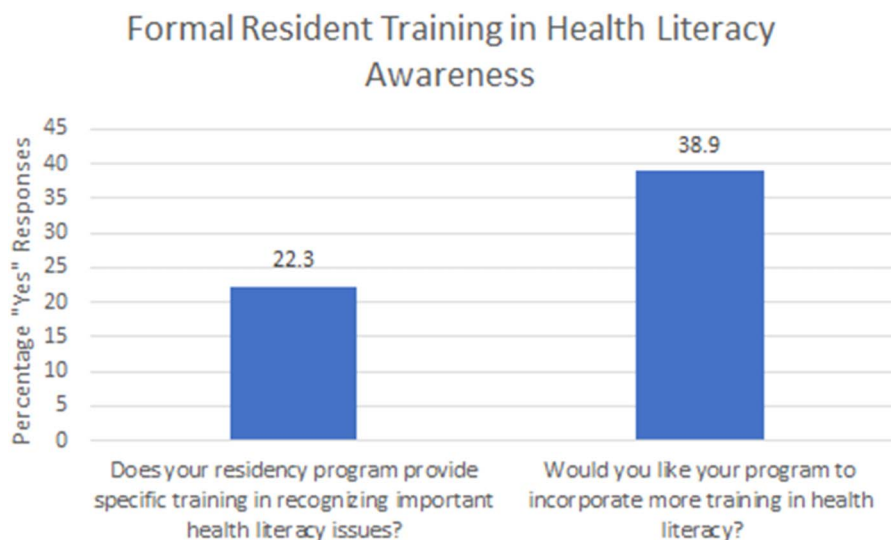



Fig. 3 Orthopaedic resident responses regarding formal health literacy training. Findings reflect a greater proportion of residents who want more health literacy training compared with those who currently have access to it.

the West Coast and in the Southwest, which further limit the generalizability of our findings. Despite these limitations for overall representation, we had a 42% response rate from orthopaedic residents sampled in the study, which is comparable to participation rates obtained in other medical specialties (Ali et al., 2014; Coleman et al., 2016). Future research efforts should aim to incorporate perspectives from a greater proportion of trainees, perhaps through a larger orthopaedic governing body, as well as expand on this current study with the use of objective behavioral data.

Ultimately, this study represents a first effort to characterize the current state of perceived competency and training in HL concepts within orthopaedic surgery. We know as a medical community that acknowledging gaps in musculoskeletal HL will become an integral aspect of delivering quality patient care and improving patient outcomes. We should therefore invest our efforts in training the future generation of orthopaedic surgeons to accurately identify patients at risk of low HL and equip them with strategies to communicate effectively with these patients.

## Appendix

 Supporting material provided by the authors is posted with the online version of this article as a data supplement at [jbjs.org \(http://links.lww.com/JBJSOA/A536\)](http://links.lww.com/JBJSOA/A536). This content was not copy-edited or verified by JBJS. ■

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