VIRTUAL HUMAN TECHNOLOGY: PATIENT DEMOGRAPHICS AND HEALTHCARE TRAINING FACTORS IN PAIN OBSERVATION AND TREATMENT RECOMMENDATIONS

By

LAURA DOVER WANDNER

A THESIS PRESENTED TO THE GRADUATE SCHOOL
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To my family who has inspired, encouraged, and supported me throughout my life

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LIST OF ABBREVIATIONS

ANCOVA	Analysis of covariance
ANOVA	Analysis of variance
AU	Action units
FACS	Facial action coding system
GLM	General linear model
HTs	Health-care trainees
VAS	Virtual analogue scale
VH	Virtual human

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Laura Dover Wandner

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Patients' sex, race, and age have been found to affect others' perception of their pain. However, the influence of these characteristics on treatment recommendations from lay persons and healthcare providers is understudied.

To address this issue, 75 undergraduates and 107 healthcare-trainees used a web-based delivery system to view video clips of virtual human (VH) patients presenting with different standardized levels of pain. Subjects then rated the VHs' pain intensity and recommended the amount of medical treatment the virtual humans should receive. Results indicated that compared to undergraduates, healthcare-trainees (HTs) perceived African Americans and older adults as having less pain, but were more willing to recommend medical treatment for these patients than were undergraduate participants. HTs and undergraduates rated female, African American, older, and high pain expressing adults as having greater pain intensity than male, Caucasian, younger, and lower pain expressing adults. Moreover, they also recommended that female, older, and high pain expressing adults receive more medical treatment than male, younger and lower pain expressing adults.

This study found that both the demographic characteristics of the VH and whether the participants were undergraduates or healthcare trainees influenced the ratings of pain assessment and treatment recommendations. The findings are consistent with the previous VH literature showing that VH characteristics are important cues in the perception and treatment of pain. However, this is the first study to identify differences in pain-related decisions between individuals who are pursuing healthcare careers and those who are not. Finally, not only does this study serve as further evidence for the validity and potential of VH technology, it also confirms prior research which has shown that biases regarding patient sex, race, and age can affect pain assessment and treatment.

CHAPTER 1
INTRODUCTION

Pain is the number one reason why individuals seek medical attention, and it is the number one cause of disability.[1] However, healthcare professionals find pain particularly challenging to assess and treat because pain is subjective.[2, 3] Because pharmacotherapy with analgesic medications is the cornerstone of pain management, overly conservative approaches to such medications may deny adequate pain relief to large numbers of patients. Also, since pain is subjective, healthcare professionals have to make clinical decisions about a patient's pain based on a combination of medically-related variables and the patient's self-report of pain; however, the assessment is ultimately inferential.[4] The subjective nature of pain lends itself to biases that can affect pain assessment, especially for healthcare professionals who have had less training about pain management.[5] Although there are a number of potential influences, the following three areas of patient demographics are explored to examine their effects on pain assessment: sex, race and age.

Gender

There has been an increased interest in sex and gender differences in pain. Women and men have been found to experience pain differently in both clinical and experimental pain assessment settings.[6, 7] Clinically, women are more likely to experience a number of health-related problems and rates of disability, and have higher rates of healthcare utilization than men.[7, 8] Experimental differences indicate that women have significantly lower thermal pain thresholds and tolerance than men.[8] In addition to these clinical and experimental differences, research suggests that social learning is a contributor to how women and men perceive pain. Research has found

that there tends to be greater differences in pain ratings between men and women in experimental pain studies than clinical pain studies.[7, 9] One study found that manipulating expectations alters differences between women and men experiencing experimental pain.[10] Similarly, the study found that when men and women were given gender-specific pain tolerance expectations, they did not differ in their tolerance, threshold, or pain rating.

Research has also shown that people report significant differences in their pain expectations for others.[11] Researchers suggest that gender stereotypes influence both one's own pain ratings and one's perceptions of the pain experience of others.[12] Specifically, healthcare providers and healthcare trainees report differences in pain perception between men and women.[13, 14] Research also indicates that there are treatment disparities related to the patients' sex. For example, one study found that physicians under-medicated female patients with cancer pain relative to male patients.[15] Moreover, nurses have been shown to administer less analgesic medications to women than to men, and it also has been found that physicians prescribe less pain medications to women than to men following abdominal surgery.[16, 17]

Race/Ethnicity

It is also important to examine the racial/ethnic differences in the pain experience, especially as the demographics of the United States change. Ethnic differences in pain perception have been reported by a number of investigators for experimental and clinical pain.[18-21] Experimentally, African Americans and Hispanics have been shown to demonstrate lower pain tolerance, lower cold pressor pain tolerance, and to experience higher pain than Caucasians.[18, 19] Clinically, studies have found that African Americans report experiencing higher levels of pain with medical

conditions such as migraine headaches and post-operative pain.[20, 21] African Americans also reported higher levels of pain and disability than Caucasians in a multidisciplinary pain center.[18] It is also important to note that there are more robust differences in pain responses among individuals of different races in experimental studies than clinical studies, which suggests that social learning biases may be contributing to the problem. [19]

Research has also indicated that disparities in pain management among racial and ethnic minorities have been reported for a variety of pain conditions and treatment settings.[22] This suggests that African-American and Hispanic patients are more likely to have their pain undertreated compared to Caucasian patients.[22] For example, in one study, minority cancer patients were found to be more likely to have the severity of their pain underestimated by their physicians than Caucasian patients.[23] Another study found that doctors underestimated the pain severity of about 70% of African American patients and about 60% of Hispanic patients.[24] Inaccurate pain assessment and treatment for ethnic minorities can lead to delayed healing and unnecessary suffering. [25]

Age

Age is another important demographic factor to examine because pain is a common and significant problem for many older adults. Studies report that about 45% to 85% of older individuals indicate that they experience at least one current pain condition. [26-28] Although pain is common in older adults, it is often under-recognized compared to pain in younger adults. [29, 30] A contributor to this problem is that healthcare settings often do not regularly screen older adults for pain conditions. One study found that about 40% of elderly patients were ever screened for a pain condition.[31] Another

difficulty is that older adults have been found to under-report their pain experience relative to younger adults. [32]

Diagnosis of pain conditions is especially difficult in older adults because of the high rates of chronic and acute health conditions, especially musculoskeletal conditions such as arthritis, knee pain, back pain, cancer, and surgical procedures.[33,30] However, relatively little is known how patients' age influences health care providers' decisions about pain management. Preliminary data suggest that at least some healthcare professionals and healthcare trainees use age as a significant cue in determining the level of pain medication needed.[13, 34] Biases concerning the amount of pain experienced by older adults have important implications for the amount and quality of treatment older adults receive.[35]

Virtual Human Technology

Virtual human (VH) technology is a novel way of investigating differences in pain assessment. Three previous studies have used this technology to examine whether participants assess and would treat the pain of VHs – who differ by sex, race, age, and pain expression – differently.[14, 36] The advantage of using VH technology is that the facial features and pain expressions can be standardized without the biases of interest being present in the construction of the stimuli. VH technology may also increase the likelihood that a healthcare professional will report his/her perceptions and treatment opinions with less social desirability bias since the patient is not present.

Hirsh et al. (2009a) found that sex, race, age, and the expression of pain were prominent predictors of pain intensity and the recommendation for medical treatment in a sample of 75 undergraduates. When the VHs were either women or high pain

expressing adults, they were rated by participants as having higher pain intensity. The study also found that VHs who were female, older adults, and expressing higher pain were more likely to be recommended for medical treatment.

In Hirsh et al. (2009b), nurses who assessed the VH profiles indicated that they perceived female, African American, older, and higher pain expressing adults to be experiencing greater pain. Moreover, the nurses were more likely to suggest opioid treatment if the VH was female, African American, older, and expressing more pain.

Stutts, Hirsh, George, and Robinson (2010) assessed healthcare trainees (HTs) perception of VHs' pain. The authors found that HTs rated female, African American, older and high pain expressing VHs to have higher pain intensity ratings, higher pain unpleasantness, higher negative moods, worse coping, and as being more in need of medical help.

Although the previous work indicated that both laypersons and healthcare trainees (HTs) are influenced by patient demographic cues (i.e, age, race, sex, pain expression) when making pain-related decisions, it is not clear whether the influences of these cues are the same or different in these two groups. This question is best addressed by comparing the decision policies of laypersons and HTs in the same statistical analysis. If there is a difference between the decisions of laypersons and HTs, that difference might suggest that healthcare training or self-selection as a healthcare professional is related to different rates of cue use or potential bias in pain observation.

If patient characteristics – sex, race, age, or pain expression – influence healthcare professionals in assessing or treating a patient, it could adversely affect the patient's health outcome.[14, 16, 23, 31, 37] Healthcare professionals not only treat patients,

but they also serve as models and educators for future generations of healthcare professionals. Thus, the current study examines whether healthcare trainees – physical therapy, nursing, medical, and dental students – use patient race, sex and age cues differently than do undergraduate students when making judgments about pain. The results of such analyses may ultimately lead to education efforts aimed at reducing biases among providers and the general public and improved patient care.

CHAPTER 2
METHOD

Participants

Participants included 75 undergraduate students and 107 healthcare trainees (HTs) from the University of Florida. The undergraduate population consisted of 53 women and 22 men and included 62 Caucasians and 13 African Americans. The average age of the undergraduate students was 21.01 years, with an age range of 18-28 years. The HT group consisted of 34 physical therapy students, 30 nursing students, 25 medical students, and 18 dental students. The HT population was made up of 83 women and 24 men and included 74 Caucasians, 10 Hispanics, 13 Asians, 3 African Americans, 6 “Others”, and 1 participant who did not identify his/her race. The average age of the sample was 24.62 years, with an age range of 19-48 years. All participants were compensated $15 for their participation.

Procedure

This study was approved by the University of Florida Institutional Review Board. The study used a web-based delivery model. After giving consent electronically, participants completed a demographic questionnaire and then viewed the VH videos and read the VH vital signs and clinical vignette. The participants viewed each video for 20 seconds. For each VH video, participants read a clinical vignette either about a VH with chronic lower back pain (HTs) or a VH with abdominal pain (undergraduate students) and viewed the vital signs of each VH video.

The VHs were created with the *People Putty* software program that has been used in previous studies.[14, 36] The VHs had four personal characteristics that were systematically manipulated: sex (male, female), race (Caucasian, African American),

age (young adult, older adult), and pain expression (low, high). The VH expressed pain through facial expressions that were coded based on the Facial Action Coding System (FACS).[38] The FACS is based on facial muscle movements and distinguishes 44 different action units (AUs). However, an abbreviated version of FACS was used in this study. The study focused on 4 AUs that represent the core features of pain expression (brow lowering, tightening of the orbital muscles surrounding the eye, nose wrinkling/upper lip raising, and eye closure).[14, 36, 39, 40] Figures 2-1 and 2-2 are examples of two of the VH faces that was used in this study.

To control for order effects, VH videos were presented randomly. The participants were required to complete one VH video before viewing the next one. Also, they were not permitted to revisit a completed VH video. The participants read a set of instructions that provided information on how to answer the pain assessment and treatment ratings using the Visual Analogue Scales (VASs). The participants rated each VH on two VASs on a 1-100 scale (anchored at “no pain” to “most intense pain sensation possible”). The first VAS was “Please rate the pain intensity that the patient is experiencing in the video.” The VAS range was from “no pain” to “most intense pain sensation possible.” The second VAS was “Likelihood of recommending medical treatment for the patient in the video.” The VAS range was from “not at all likely” to “completely likely.”

A total of 16 unique scenarios were created to represent all possible cue combinations. The undergraduate students viewed all 16 VH videos. The HTs observed 32 VH videos where they observed each cue combination twice. In order for the data to be comparable, only the first VH video of the pair was used; thus, only 16

VH videos were included in the study. The undergraduate students and the HTs viewed the same 16 VH videos and clinical vignettes. The study took approximately 1-1 ½ hours for the participants to complete. The participants were then debriefed regarding the concept of the study.

Statistical Analyses

All data analyses were performed using SPSS for Windows (Version 17). Descriptive statistics were conducted to summarize the demographic and background characteristics of the sample. Because the two groups differed significantly by age (3.6 years), r = .459, *p*=.000, correlations between age and the key dependent variables were conducted. These correlations were used to determine if assumptions of covariance analyses were met to include age as a covariate. Analysis of Variance (ANOVA), under the General Linear Model (GLM) was performed to examine the group differences (undergraduate students vs. HTs) in the rating of two dimensions of pain (pain intensity and the recommendation for medical help) as a function of the VHs' personal characteristics (sex, race, age, and pain expression). Where appropriate, age was used as a covariate to control for group differences in age. This study consists of a secondary analysis of the data from two previous dissertations conducted at the Center for Pain Research and Behavioral Health at the University of Florida; however, the aims of the current study are distinct and the questions addressed were not previously investigated in the prior work.

Figure 2-1. Young, Caucasian, female, high pain

Figure 2-2. Old, Black, male, low pain

CHAPTER 3
RESULTS

Correlation of Age and VHs' Personal Characteristics

A correlation was conducted to examine the association between pain intensity rating and participant age. The correlation was modest but statistically significant, r = -.156, *p* <.05. Therefore, participant age was used as a covariate in the ANOVA model for pain intensity rating. A correlation was also conducted to examine the association between medical recommendation ratings and participant age. Since the correlation was not significant (r = .005, *p* < .95), age was not used as a covariate in the ANOVA model for recommending medical help.

Pain Intensity Ratings

VH Group

The results of the ANOVA on pain intensity ratings indicated a main effect for participant group. Collapsed across the 4 VH cues (sex, race, age, and pain expression), undergraduate student participants gave significantly higher pain intensity ratings to VH patients than did HT participants [$F(1,180) = 4.81$, $p<.05$, partial $\eta^2=.03$].

VH Sex

A main effect for VH sex also emerged, with female VHs perceived as experiencing more pain than male VHs [$F(1,180)= 22.35$, $p<.001$, partial $\eta^2=.11$]. The interaction of patient sex and participant group was not significant for ratings of pain intensity (F=.004, p>.05, partial $\eta^2=.000$).

VH Race

A significant main effect for patient race was also found, with African American VHs rated as experiencing more pain intensity than the Caucasian VHs [$F(1,180)$ =

9.36, $p<.01$, partial $\eta^2=.05$]. The results also identified a significant race-by-group interaction [$F(1,180) = 13.11$, $p<.001$, partial $\eta^2=.07$]. Specifically, compared to HTs, undergraduate participants gave higher pain intensity ratings to African American VHs than to Caucasian VHs. Figure 3-1 displays the significant race-by-group interaction for pain intensity ratings.

VH Age

Similarly, a main effect for patient age also emerged. The pain intensity of older VHs was rated significantly higher than that of younger VHs [F (1,180) = 36.53, $p<.001$, partial $\eta^2=.17$]. A significant age-by-group interaction was also found; compared to HTs, the undergraduate participants rated the pain of older VHs as significantly more intense than that of younger VHs [F (1,180) = 21.60, $p<.001$, partial $\eta^2= .11$]. Figure 3-2 displays the significant age-by-group interaction for pain intensity ratings.

VH Pain Expression

A main effect for the VH pain expression was also found. As expected, VHs with a high pain expression were rated as having higher pain intensity than those with a low pain expression [F (1,180) = 519.95, $p<.001$, partial $\eta^2=.74$]. The expression-by-group interaction was not significant ($F=.05$, $p>.05$, partial $\eta^2= .00$).

Age Covariate

As noted above, participant age was significantly, albeit modestly, correlated with pain intensity ratings. The results of the Analysis of Covariance (ANCOVA) were essentially the same as those above and indicated that age was not a significant factor in the model. For this reason, the ANCOVA results were not included in my master's thesis and are only considered in the discussion.

Healthcare Recommendations

Participant Group

The results of the ANOVA on recommendations for medical help ratings indicated no main effects for participant group. Collapsed across the 4 VH cues (sex, race, age, and pain expression) there were no group differences [$F(1,180) = 1.26$. $p>.05$, partial $\eta^2=.01$].

VH Sex

There was a main effect of VH sex in the recommendation for medical help. Female VHs received significantly higher recommendation ratings than male VHs [$F(1,180) = 2.32$. $p<.05$, partial $\eta^2=.01$]. The interaction of patient sex and participant group was not significant for ratings of recommending medical help ($F=2.01$, $p>.05$, partial $\eta^2=.01$).

VH Race

There was no main effect of VH race in the recommendation for medical help, [$F(1,180) =6.277$, $p<.01$,partial $\eta^2=.03$]. There was a significant interaction between VH race and participant group. A larger race effect was seen for HTs than for undergraduates. [$F(1,180) =6.277$, $p<.01$,partial $\eta^2=.03$], such that HTs more frequently recommended the African American VHs for more medical help than the Caucasian VHs. Figure 3-3 displays the race-by-group interaction for healthcare recommendations.

VH Age

Results also indicate a main effect for VH age in participants' recommendations for medical help, [$F(1,180) = 38.92$, $p<.001$, partial $\eta^2=.18$]; older VHs received significantly higher recommendation ratings than did younger VHs. A significant

interaction between age and group was also indicated, [$F(1,180) = 9.03$, $p<.01$, partial $\eta^2=.05$]. HTs more often recommended medical treatment for the older VHs than did undergraduate participants. Figure 3-4 displays the age-by-group interaction for healthcare recommendations.

VH Pain Expression

Finally, there was a significant main effect for the VH pain expression, such that VHs expressing a high level of pain were more often recommended for medical treatment than VHs with a low pain expression [$F(1,180) = 357.43$, $p<.001$, partial $\eta^2=.67$]. The expression-by-group interaction was not significant ($F=9.03$, $p>.05$, partial $\eta^2= .05$).

Detailed results of the analyses discussed above are presented in Table 1.

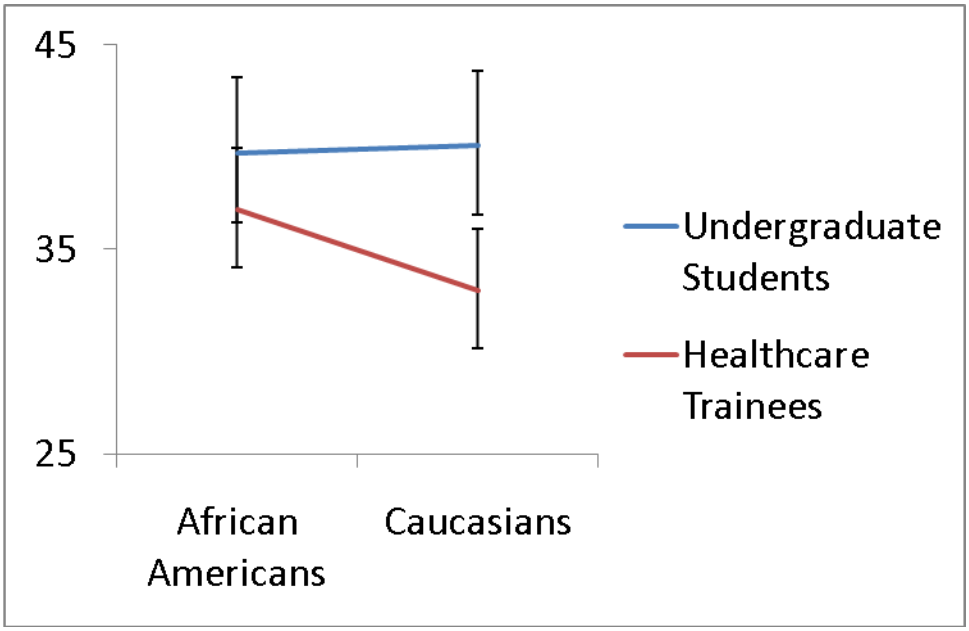

Figure 3-1. Race-by-group interaction for pain intensity ratings

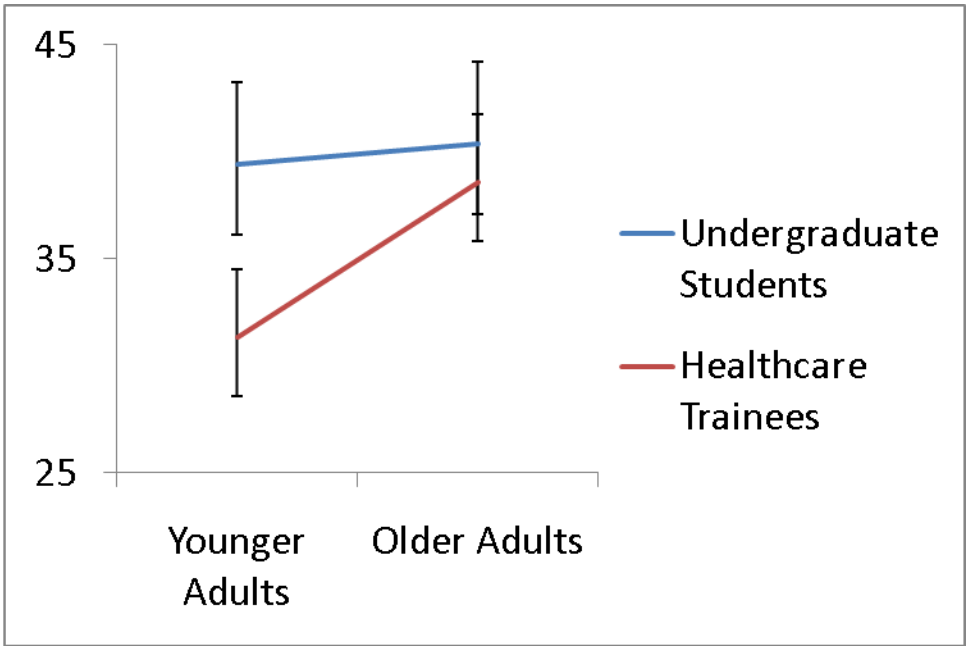

Figure 3-2. Age-by-group interaction for pain intensity ratings

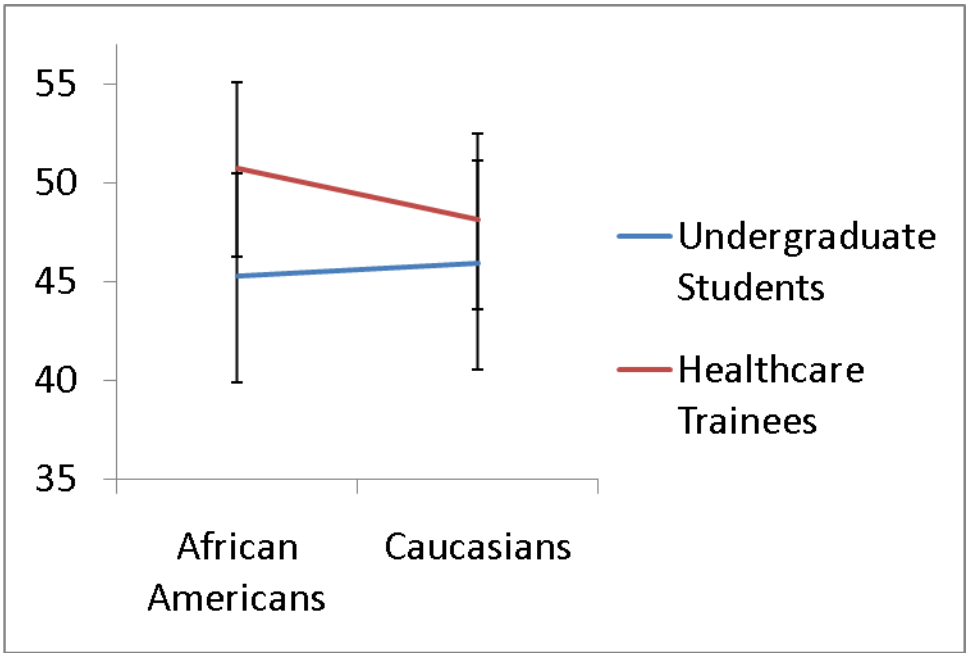

Figure 3-3. Race-by-group interaction for healthcare recommendations

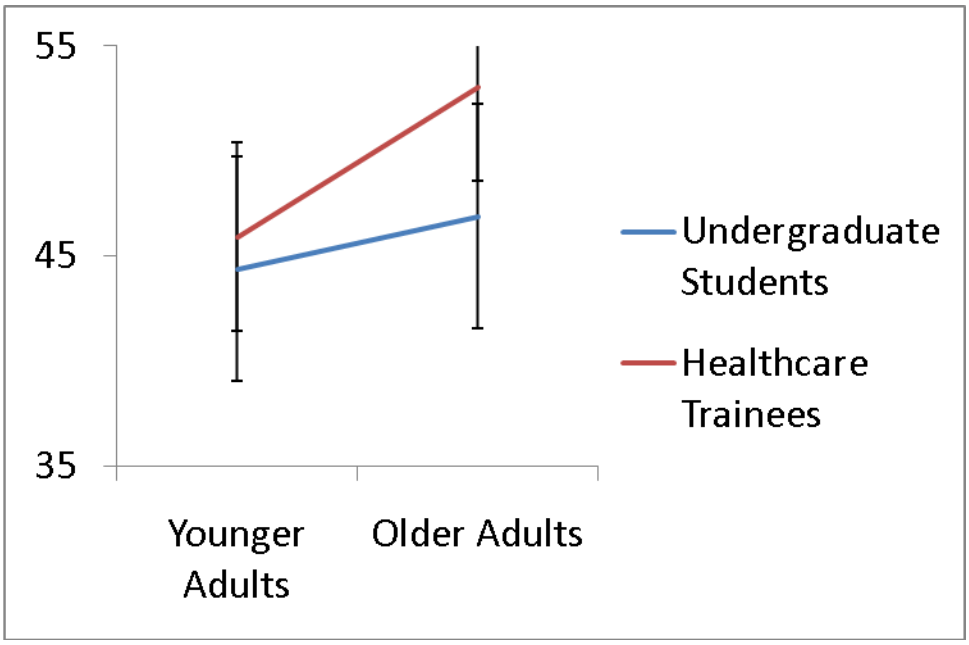

Figure 3-4. Age-by-group interaction for healthcare recommendations

Table 3-1. Means (M) and standard deviations (SD) of pain intensity and recommendation for medical help

	Pain Intensity				Recommend Medical Help			
	Undergraduate Students		Healthcare Trainees		Undergraduate Students		Healthcare Trainees	
	N=75		N=107		N=75		N=107	
	M	SD	M	SD	M	SD	M	SD
Sex								
Men	38.65	14.53	33.74	15.78	44.06	21.16	48.79	25.00
Women	41.14	13.87	36.16	16.46	47.15	20.95	50.13	25.18
Race								
Caucasian	40.06	13.97	32.97	15.51	45.92	21.18	48.15	25.27
African American	39.73	14.46	36.93	17.07	45.29	20.72	50.76	24.15
Age								
Young	39.42	13.66	31.32	15.00	44.35	21.18	45.89	25.03
Old	40.37	14.91	38.59	17.89	46.85	20.94	53.03	24.74
Pain Intensity Cue								
Low Pain Intensity	25.94	14.8	21.26	14.65	31.94	23.99	37.91	26.65
High Pain Intensity	53.86	16.99	48.64	20.31	59.26	20.91	61.00	24.9

CHAPTER 4
DISCUSSION

Using VH technology, this study examined the question of whether undergraduate students and healthcare trainees (HTs) assess pain and suggest treatment differently. The overall results of this study demonstrate the ability of web-based VH scenarios to elicit and objectively measure sex, race, age, and pain expression influences on decisions about pain assessment and recommendations for treatment. In addition, the approach was sensitive to group differences between undergraduate students and healthcare trainees. Notably, this study also suggests the hypothesis that healthcare training, or self selection as a healthcare professional, is related to different rates of cue use, and potential bias in pain observation.

The current study found that the VHs' characteristics and education status (undergraduate vs. HT) influenced the ratings of pain intensity and recommendations for medical help. Compared to HTs, undergraduates rated both African American and older VHs as having higher pain, however, their recommendations for treatment ratings were *lower* for these same VHs. Also of interest is that undergraduates consistently rated the VHs' pain higher than did the HTs. However, the HTs consistently recommended more treatment for the VHs. This suggests that even though HTs might perceive their patients as having less pain, they nevertheless are more likely to recommend medical treatment for them. This could reflect a selection bias in terms of who pursues healthcare as a profession. Undergraduates might also be particularly sensitive to the pain of others because they are less often exposed to it and thus err on the side of caution. However, HTs might be more inured to the pain of others because they frequently encounter patients in pain during their professional training.[41] Some

research has shown that medical students do not accurately perceive what patients believe about their own health, including about their pain.[42] Even though undergraduates might be particularly responsive to pain in others, they might not feel it is their place or that they have the expertise to make recommendations about treatment. HTs, on the other hand, might feel more comfortable with giving such recommendations. Our results could also reflect HTs having more education than undergraduates on the best practices for pain management.

The validity of computer-generated pain expression was supported in this study. The participants were able to distinguish the level of pain expressed by the VH (low or high) when evaluating the VH's pain. If the pain level expressed by the VH videos had been too subtle, the inconsistencies in participants' pain intensity ratings across the two levels of pain expression would have yielded non-significant results. However, participants in the study consistently identified the VH videos intended to express high pain as having higher pain intensity and the VH videos intended to express low pain as having lower pain intensity. The HTs in the study also consistently reported that the vignettes and the VHs reflected accurate perceptions of what they see while they are working with patients.

This study has interesting implications for public health. Although the effect sizes for group differences were modest, the use of age, sex and race cues could still have a large impact on healthcare. Healthcare professionals typically see thousands of patients during the course of their careers. If the use of these cues reflects a bias toward one demographic group or another, patient outcomes could be adversely affected. Also, healthcare professionals frequently serve as mentors to HTs and may

communicate their biases to colleagues as well. Such informal “learning” experiences may be particularly influential given that HTs receive limited pain treatment education.[41, 42] Indeed, previous research has found that healthcare providers prescribe less pain medication to women, African Americans, and older patients. Since healthcare professionals see so many patients and share their information with mentees, potential biases in prescribing medication can affect a large number of patients.[15, 23, 24, 31] The results of this study suggest that health educators should increase their trainees’ awareness of the differences in pain reporting and perception that can affect the understanding of a patient’s pain experience.

Several study limitations should be considered. The participants were not asked an open-ended question as to what treatment they would suggest for the VHs, nor were they given the option of gathering additional information before recommending treatment. Differences could have emerged in the type of treatment recommended to VHs of different demographic characteristics. Also, the undergraduates and the HTs read slightly different vignettes. The vignettes could have influenced the participants’ pain ratings. Further, the participants who took part in the study were a relatively homogeneous population – young and educated. In addition, it is possible that participants were able to determine the intent of the study, and thus adjusted their responses in a socially-desirable manner. Finally, the representativeness of the VH videos and the scenarios presented has to be considered. However, in the pilot work, over 70% of participants indicated that the VH facial expressions were realistic, and 90% indicated that the clinical scenarios were reflective of real post-operative scenarios.[14]

Future research is warranted to examine the causal relationships between group membership (HTs vs. undergraduates) and cue ANCOVA use. First, there is an age difference between the HTs and the undergraduate participants. Preliminary evidence after examining the results of the 2 X 2 Mixed for the pain rating pain intensity suggests that the age of the evaluator influences the perception of an individual's pain. However, more in-depth research should be conducted to determine how, and to what extent, age affects the participants' perception of pain. Compelling hypotheses for the group differences include self-selection into a helping profession or the direct effects of training in healthcare. It is also possible that the demographic characteristics of the assessor interact with those of the patient to influence ratings. Second, future studies could be designed that investigate the role of these and other potential factors that might account for the observed differences in pain assessment and treatment ratings. Such studies might include longitudinal designs following first year students to practice or studies might include age-matched controls and healthcare providers. Third, the study results reflect that participants used age and race as cues. It is important to understand why those cues are used. Thus, additional research should be conducted to determine how and why race and age are used in the perception of others' pain. Currently there are no questionnaires that can be used to probe how and why people use age and race cues in the perception of pain. However, the Center of Pain Research and Behavioral Health is in the process of creating and validating such questionnaires. Finally, it is important to find a way to alter the biased cue use. One way to do this would be to use the VHs to create a training module for healthcare trainees that would help them explore their own biases in evaluating the pain of others.

Sensitizing healthcare trainees to the potential for bias in their assessments could help them minimize the effects of demographic cues in their pain evaluations which could help improve patient care and outcomes.

In summary, this study found that both the characteristics of the VH and the type of participants influenced ratings of pain assessment and treatment recommendations. The findings are consistent with the previous VH literature showing that age, race, sex, and pain intensity characteristics are important cues. However, this is the first study to identify differences in pain-related decisions between individuals who are pursuing healthcare careers and those who are not. Finally, not only does this study serve as further evidence for the validity and potential of VH technology, it also confirms prior research which has shown that biases regarding patient sex, race, and age can affect pain assessment and treatment.

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BIOGRAPHICAL SKETCH

Laura Wandner was born in Washington D.C.. Laura graduated summa cum laude from Connecticut College in May 2007 with a Bachelor of Arts in psychology and government. She is currently residing in Gainesville, Florida and is pursuing a doctorate in clinical and health psychology at the University of Florida.

Laura's research interests include examining people's perception of their own pain and the pain of others, as well as chronic illnesses. Laura is currently furthering her clinical training experience in various settings. Her clinical experience includes conducting psychological assessments of children, structured comprehensive assessments specific to populations of individuals with anxiety disorders, and a range of medical psychology assessments. Current volunteer experiences include providing free brief therapy at a local community center for residents of the community in need of psychological services. Laura's aspirations within the field of clinical health psychology include a career in a medical setting that involves both clinical and research opportunities.