

Using Virtual Human Technology to Provide Immediate Feedback About Participants' Use of Demographic Cues and Knowledge of Their Cue Use

Laura D. Wandner,^{*} Janelle E. Letzen,^{*} Calia A. Torres,[†] Benjamin Lok,[‡] and Michael E. Robinson^{*}

^{*}Department of Clinical and Health Psychology, University of Florida, Gainesville, Florida.

[†]Department of Psychology, The University of Alabama, Tuscaloosa, Alabama.

[‡]Department of Computer & Information Science & Engineering, University of Florida, Gainesville, Florida.

Abstract: Demographic characteristics have been found to influence pain management decisions, but limited focus has been placed on participants' reactions to feedback about their use of sex, race, or age to make these decisions. The present study aimed to examine the effects of providing feedback about the use of demographic cues to participants making pain management decisions. Participants (N = 107) viewed 32 virtual human patients with standardized levels of pain and provided ratings for virtual humans' pain intensity and their treatment decisions. Real-time lens model idiographic analyses determined participants' decision policies based on cues used. Participants were subsequently informed about cue use and completed feedback questions. Frequency analyses were conducted on responses to these questions. Between 7.4 and 89.4% of participants indicated awareness of their use of demographic or pain expression cues. Of those individuals, 26.9 to 55.5% believed this awareness would change their future clinical decisions, and 66.6 to 75.9% endorsed that their attitudes affect their imagined clinical practice. Between 66.6 and 79.1% of participants who used cues reported willingness to complete an online tutorial about pain across demographic groups. This study was novel because it provided participants feedback about their cue use. Most participants who used cues indicated willingness to participate in an online intervention, suggesting this technology's utility for modifying biases.

Perspective: This is the first study to make individuals aware of whether a virtual human's sex, race, or age influences their decision making. Findings suggest that a majority of the individuals who were made aware of their use of demographic cues would be willing to participate in an online intervention.

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Key words: Virtual human technology, sex, race, age, feedback, cues.

Although pain is among the most common reasons individuals seek medical attention,⁷ pain assessment and treatment can be difficult. Self-reports of pain remain the criterion standard for pain assessment; however, clinicians and laypeople often rely on their own judgments to make pain management decisions.¹²

Research has shown that health care providers have stereotypes or biases based on a patient's demographic characteristics that influence their pain management decisions.^{2,3,5,10,11,15,17} However, there is limited research that experimentally examines the use of demographic characteristics to make pain management decisions, and even fewer studies that inform people of their use of demographic characteristics. In order to minimize disparities in pain management, it is important for individuals to be aware of their explicit and implicit biases/cue use and their influence on clinical decision making.^{1,8}

Discrepancies in the pain management decisions related to sex, race, and age have been demonstrated through the use of virtual human (VH) technology.^{8,16,18}

Received April 26, 2014; Revised July 22, 2014; Accepted August 3, 2014.

This research was funded by the National Institute of Dental and Craniofacial Research through a grant (R01DE013208) to M.E.R.

The authors have no conflict of interest to declare.

Address reprint requests to Michael E. Robinson, PhD, University of Florida, 101 South Newell Dr, Rm 3151, P.O. Box 100165, Gainesville, FL 32610-9165. E-mail: merobin@ufl.edu

1526-5900/\$36.00

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<http://dx.doi.org/10.1016/j.jpain.2014.08.001>

The advantage of using VH technology and VH patients to evaluate pain management decisions is that it is a standardized, experimentally controlled approach that assesses whether an individual uses demographic cues in his or her pain decision making. Another advantage of VH technology is that the participants can be provided immediate feedback on their pain management decisions. Previous studies have found that participants rated the VH faces as depicting realistic facial expressions and having high visual fidelity.⁹ In this study the participants were able to immediately learn whether they were using demographic characteristics to make their pain management decisions.

Targeting participants' use of cues in pain decision making could result in better quality of care for patients. It is also important to know how individuals making clinical decisions would respond to such feedback about their cues. There is a dearth of information about whether individuals are aware of their own use of cues in pain decision making and how awareness of their use of cues would affect their imagined clinical practice. The purpose of this study was to examine to what extent individuals making pain assessment and treatment decisions were aware of their use of demographic cues and how becoming aware of it would influence their likelihood to participate in an intervention to modify their use of cues. Overall, this project was used to establish the possibility of using VH technology and environment for their potential to alter use of cues in making decisions about pain management.

Method

Participants

Participants consisted of 107 undergraduate students (mean age = 23.9 years, standard deviation = 7.6 years; 59 female) from the University of Florida. Race breakdown across participants showed that the study included individuals from the following backgrounds: Caucasian (62%), Asian (19%), African American (9%), or "other race" (10%). Ethnically, the sample was predominantly non-Hispanic (86%). Participants were recruited via study announcements posted throughout the University of Florida campus. Inclusion criteria for the study were 1) age 18 years or older at the time of the study and 2) currently enrolled at the University of Florida. Compensation for participating in the 1.5-hour online study was through a \$15 gift card.

Procedure

This study was approved by the University of Florida Institutional Review Board in Gainesville, FL. Prior to enrollment, all participants completed an informed consent form. Interested participants received a password to a secure, password-protected website and were asked to complete a demographic questionnaire. Participants then viewed 32 empirically validated VH profiles, each consisting of a 20-second looped video of a VH face, a clinical vignette of a patient with low

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back pain, and vital signs.¹⁴ Each VH face displayed a different combination of demographic characteristics such as sex (male or female), race (Caucasian or African American), age (young or old), and pain expression (high or low). Each combination of the VH faces was displayed twice, although the exact same VH faces were not used, in order to average the results to get a composite pain assessment and treatment score for each combination of VH faces. Figures 1 and 2 show still frame images of VH faces displaying high and low pain. Subsequently, participants answered pain assessment and treatment questionnaires.

A lens model was employed to determine how individuals use environmental cues when making pain management decisions.^{4,6} Empirical applications of this model typically consist of using cue-containing profiles that are presented to a study participant, who is then asked to make decisions. The lens model captures not only the use of cues by the participants as a group (nomothetic analyses) but also the individual participants' use of cues in making decisions (idiographic analyses).

Based on the participants' responses to questions regarding VHs' pain intensity and participants' likelihood to administer opioid analgesics, idiographic analyses were conducted that involved calculating automatic regressions to capture whether sex, race, age, or pain expression of VHs influenced participants' pain management decisions. Participants who used demographic cues to make pain assessment and treatment recommendations were informed of their use of cues. For example, a participant who used race in making pain assessment and treatment decisions was presented with the following revelation: "You rate that Caucasians have lower pain intensity than African Americans. You are less likely to administer opioid analgesics to Caucasians than African Americans."

Following the revelation of use of cues, participants were asked questions related to awareness of their response patterns and the influence of this feedback

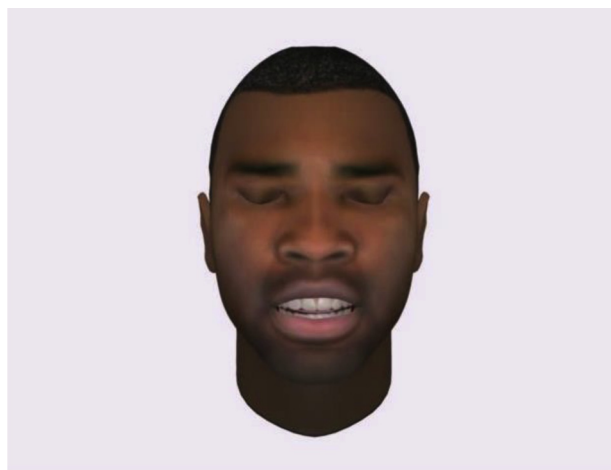


Figure 1. Example of a young, African American male VH displaying a "high" pain expression.

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