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The Influence of Health Care Professional Characteristics on Pain Management Decisions

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Abstract

Objective—Evidence suggests that patient characteristics such as sex, race, and age influence the pain management decisions of health care providers. Although this signifies that patient demographics may be important determinants of health care decisions, pain-related care also may be impacted by the personal characteristics of the health care practitioner. However, the extent to which health care provider characteristics affect pain management decisions is unclear, underscoring the need for further research in this area.

Methods—A total of 154 health care providers (77 physicians, 77 dentists) viewed video vignettes of virtual human (VH) patients varying in sex, race, and age. Practitioners provided computerized ratings of VH patients' pain intensity and unpleasantness, and also reported their willingness to prescribe non-opioid and opioid analgesics for each patient. Practitioner sex, race, age, and duration of professional experience were included as predictors to determine their impact on pain management decisions.

Results—When assessing and treating pain, practitioner sex, race, age, and duration of experience were all significantly associated with pain management decisions. Further, the role of these characteristics differed across VH patient sex, race, and age.

Conclusions—These findings suggest that pain assessment and treatment decisions may be impacted by the health care providers' demographic characteristics, effects which may contribute to pain management disparities. Future research is warranted to determine whether findings

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replicate in other health care disciplines and medical conditions, and identify other practitioner characteristics (e.g., culture) that may affect pain management decisions.

Keywords

Pain Management Disparities; Pain Treatment; Provider Characteristics; Gender; Race; Age; Experience

Introduction

Patient characteristics such as age, sex, and race have been shown to influence the pain management decisions of health care providers [1–5]. For example, older adults often have their pain undertreated and underidentified, relative to younger adults [6–8], and women as well as ethnic and racial minorities are more likely to receive less aggressive pain treatment (i.e., lower receipt of opioid analgesics) than their demographic counterparts [9–12]. However, most studies examining pain management disparities have involved retrospective chart reviews and traditional vignette designs to examine pain management decisions, an effect which may lead to low experimental control and decreased ecological validity. Despite this, other studies using more sophisticated empirical designs (i.e., photographs and videotapes of patients in pain) have documented similar patterns of disparities [13, 14]. For instance, in two separate studies by Hadjistavropoulos and colleagues, females [13], older adults [14], and unattractive individuals [13,14] were perceived as experiencing greater pain intensity and unpleasantness, as well as higher pain-related disability (compared with males, younger adults, and attractive persons). Although several explanations likely exist for these disparities, provider characteristics may be a potential factor accounting for inequities in pain management.

Interestingly, this has received little empirical investigation, despite some studies finding that physician age, sex, and years of experience are linked to pain treatment decisions. For instance, Hutchinson and colleagues [15] found that younger provider age was associated with higher opioid prescribing for noncancer chronic pain patients, while a study by Heins et al. [16] found that less experience (i.e., residency plus fewer than 3 years experience) was associated with double the likelihood of prescribing opioid analgesics in an emergency department. Evidence also suggests that male and female physicians engage in pain treatment differently, as three independent studies [17–19] have shown that male and female practitioners prescribe more analgesics to male and female patients, respectively. Further, a vignette study by Weisse and colleagues [18] observed that female practitioners prescribed higher doses of opioid analgesics to black patients, while men prescribed higher doses to white patients [18]. To our knowledge, we are unaware of any research examining the influence of practitioner race on pain assessment and treatment. Despite this, the aforementioned studies provide preliminary evidence that provider characteristics are an important determinant in pain management decisions. This information could have significant implications for clinical practice, as a better understanding of the impact of practitioner characteristics on pain management decisions may help to further elucidate pain treatment disparities, correct provider biases through educational training, and ultimately improve patient care.

The measurement of pain management disparities using virtual human (VH) technology provides a model for examining the influence of these characteristics on pain treatment decisions. One benefit of this technology is that patient features can be systematically manipulated to create high-fidelity variations in pain expression and demographic characteristics (i.e., sex, race, age). These characteristics are standardized, which ultimately removes bias associated with other confounding factors potentially accounting for pain management differences (e.g., interaction between patient/provider, socioeconomic status [SES]). Furthermore, virtual technology is easily accessible, therefore facilitating practitioner recruitment and identification of factors that influence pain management decisions. Results from our previous studies have found practitioner assessment and treatment decisions to be influenced by patient sex, race, and age [2,3,20–23]. Furthermore, type of medical profession differentially affects these decisions [22,24], as dentists have been found to rate pain higher and exhibit greater willingness to prescribe opioid analgesics to VH patients, relative to physicians [22,25]. Given this, it is conceivable that provider demographic characteristics also may influence pain management decisions.

The purpose of the current study is to examine the impact of health care providers' characteristics (i.e., sex, race, age, duration of experience) on pain management decisions using VH technology. Specifically, we examined the extent to which characteristics of physicians and dentists impacted ratings of pain intensity and unpleasantness, as well as prescription of non-opioid and opioid analgesics for VH patients. These two medical specialties were chosen as they represent disciplines integral to pain management practice. Based on findings from previous research [15–19], it was hypothesized that 1) health care providers of younger age and lower years of professional experience would have higher pain assessment (e.g., higher pain intensity ratings) and treatment (e.g., greater willingness to prescribe analgesic medication) ratings for VH patients; 2) pain assessment and treatment decisions for male and female patients would vary according to practitioner gender, with higher pain management ratings given to patients of the same sex; and 3) female practitioners would endorse higher pain management ratings for black VH patients, while male practitioners would have higher pain management ratings for white VH patients. No directional hypotheses were made for provider race given the lack of existing research in this area. This study extends previous literature by 1) recruiting a larger, more diverse sample of health care professionals (i.e., dentists, physicians); and 2) assessing multiple practitioner characteristics that prior research and theory suggest influence decision-making.

Methods

Participants

Participants consisted of 154 health care professionals (77 dentists, 77 physicians) and were recruited via U.S. mail. Inclusion criteria were 1) adult aged 18 years or older; and 2) practicing health care professional. Upon completion of the study, participants were compensated $50.

Questionnaires

Rating Scales—Participants provided computerized ratings of VH patients' 1) pain intensity ("no pain sensation" to "most intense pain imaginable"); and 2) pain unpleasantness ("not at all unpleasant" to "most unpleasant imaginable"). They also indicated their likelihood of administering 3) a non-opioid analgesic and 4) an opioid analgesic for each patient from "not at all likely" to "complete certainty." All responses were recorded on electronic 0–100 visual analog scales (VASs) by moving an indicator along the scale to indicate their rating.

Patient Vignettes

For each patient profile, health care professionals read a clinical vignette describing the patient as having low back or orofacial pain. To enhance the salience of each patient scenario, physicians read clinical vignettes pertaining to low back pain, while dentists read vignettes referring to orofacial pain.

Physician Vignette—Patient presents with lower back pain for the past year of greater than 1-year duration. Patient reports that the pain began after a work-related lifting incident. The pain is located in the lumbar region of the back. The pain limits patient's ability to move around freely. Patient reports no prior surgical treatments and has current prescriptions for anti-inflammatory and analgesic medications.

Dentist Vignette—The patient presents with pain in the mandibular (lower) left posterior teeth that started approximately 2 months ago. The patient reports having a "large filling" placed in the tooth 1 year ago. Medical history is nonsignificant. The pain is localized to the mandibular left first molar tooth. It was initially episodic and exacerbated by both cold but not warm liquids and food and was relieved somewhat by nonsteroidal anti-inflammatory drugs (NSAIDs). Approximately 2 weeks ago, warm food and liquids also began precipitating the pain and it persisted after the food or liquid was removed. For the past 2 days, the pain has become constant and NSAIDs fail to offer any relief.

VH Stimuli

Participants viewed 32 VH patient profiles (Figure 1), each consisting of a 20-second looped video. Virtual faces varied systematically by sex (male or female), race (white or black), age group (younger adult or older adult), and pain expression (high-pain or low-pain expression) cues. For instance, the following combination of cues serves as an example of a potential VH profile: VH patient who is male, black, of younger age, and exhibiting high-pain expression. Empirically validated facial expressions of pain were created based on the Facial Action Coding System [26] to differentiate low- and high-pain expressing VH patients (e.g., eye closure, nose wrinkling/upper lip raising, tightening of the orbital muscles, and brow lowering). Overall, 16 different combinations of profiles were created, with participants viewing each unique cue combination twice. This resulted in a total of 32 profile scenarios used in the current study. The order of profile presentation was randomized across participants to prevent order effects.

Procedure

This study was approved by the institutional review board at the University of Florida. As described previously [22], health care professionals were invited to participate by mail. Practitioners who expressed interest were directed to a secure website to complete the study. Participants provided informed consent before any information was gathered. Participants completed a demographic questionnaire assessing sex, race, age, state of practice, area of practice (i.e., medicine/dental), and years of professional experience. Participants then observed 32 unique VH patient profiles consisting of a text vignette, a video of a VH face displaying high-or low-pain behaviors, and separate VASs for recording of pain assessment and pain treatment ratings. After each participant viewed the video and vignette and recorded pain ratings, they were able to proceed to the next profile. No time limits were posed for observation of individual profiles and participants were not permitted to revisit previously completed VH profiles. Given that participants were able to differentiate between high- and low-pain expressing faces, only the high-pain expressing faces were used for the current analysis. Following study completion, participants were provided compensation.

Statistical Analysis

All analyses were performed using SPSS Version 22.0 (SPSS, Inc., Chicago, IL, USA). Descriptive analyses were conducted to summarize the demographic characteristics of the sample. Independent variables included practitioner sex, race, age, and duration of professional experience, while dependent variables included ratings of 1) pain intensity, 2) pain unpleasantness, 3) willingness to prescribe a non-opioid analgesic, and 4) willingness to prescribe an opioid analgesic. Type of professional (dentists vs physicians) was used as a covariate in all analyses due to differences among these groups in pain management ratings (data reported elsewhere) [22,24,25]. For practitioner sex, race, age, and duration of experience, a series of repeated measures analysis of covariance were conducted in separate models for each independent variable with VH sex (male vs female), race (white vs black), and age (younger adult vs older adult) as the within-subject variables. Practitioner sex (male vs female) and race (Caucasian vs non-Caucasian) were included as the between-subject factors, while age and duration of experience were included as continuous predictors. For significant interactions of continuous predictors, these variables were transformed into categorical predictors in order to ease interpretation of the interaction. For age, we selected two cut-points to characterize our health care provider age groups: younger-aged (18–34 years), middle-aged (35–59 years), and older-aged (60+ years). These classifications were chosen to keep our age groups consistent with previous studies [27–29]. These cut-points resulted in 37 practitioners in the younger-aged group (mean [M] = 30.8 years of age), 90 practitioners in the middle-aged group (M = 46.8 years of age), and 27 practitioners in the older-aged group (M = 66.4 years of age). For years of experience, two cutpoints were made based upon equal percentiles of cases and resulted in the following groups: 1) low years of experience; 2) moderate years of experience; and 3) high years of experience. These cut-points resulted in 52 practitioners in the low group (M = 2.8 years of experience), 50 practitioners in the moderate group (M = 14.5 years of experience), and 52 practitioners in the high group (M = 32.9 years of experience). Partial $\eta 2$ was reported as the effect size for F-tests and significance was set at $P \leq 0.05$.

Results

Participant Characteristics

A total of 154 health care professionals were recruited, including 77 physicians and 77 dentists. The average age of the health care providers was 46.4 years (standard deviation [SD] = 12.9), and the average years of professional experience was 16.8 (SD = 13.7). Approximately 60.4% of participants were male (93 males, 61 females), while 68.8% were Caucasian (106 Caucasians, 48 non-Caucasians). Of the 48 non-Caucasian participants, the following demographic characteristics were observed: 39.6% Asian, 20.8% black/African American, 22.9% Hispanic, and 16.7% identified as “Other” race.

Assessment of Pain

For ratings of pain intensity (Table 1) and pain unpleasantness (Table 2), there was a significant race (practitioner) × age (VH) interaction. Follow-up tests revealed that Caucasian providers rated pain intensity (Figure 2A) higher in younger adults ($P = 0.002$) relative to older adults, while non-Caucasian providers rated intensity higher in older adults ($P = 0.04$) when compared with younger-aged VH patients. A similar pattern was observed for pain unpleasantness (Figure 2B); Caucasian providers rated pain unpleasantness higher in younger adults ($P < 0.001$) relative to older adults; however, non-Caucasian practitioner’s pain unpleasantness ratings did not differ across patient age ($P = 0.14$).

There was also a significant age (practitioner)×sex (VH) interaction for pain unpleasantness (Table 3, Figure 2C). When age was classified into three groups ($F_{2, 150} = 3.40$, $P = 0.04$, $\eta p^2 = 0.04$), results revealed that both the younger ($P < 0.001$) and middle-aged ($P = 0.003$) practitioners rated females as having greater pain unpleasantness, relative to male patients. This difference was nonsignificant for the older-aged practitioners ($P = 0.21$). All other main effects and interactions for pain assessment across practitioner sex, race, age, and duration of experience were nonsignificant (P’s > 0.05).

Recommendations for Pain Treatment

For recommendation of non-opioid analgesic medication, there was a main effect of practitioner sex. In general, female practitioners were more likely to recommend treatment with non-opioid analgesics, as compared with male practitioners. However, this effect was qualified by a significant sex (practitioner) × race (VH) interaction (Table 4, Figure 3A). Analysis of simple main effects revealed that female practitioners rated themselves as more likely to recommend treatment with non-opioid analgesics to black patients ($P = 0.02$), relative to white patients; however, this difference was non-significant for male practitioners ($P = 0.13$).

For recommendation of opioid analgesics, there was a significant race (practitioner) × age (VH) interaction (Table 5, Figure 3B). While Caucasian providers rated themselves as more willing to prescribe opioid analgesics to younger adults than older-aged adults, results indicated that non-Caucasians were more willing to prescribe opioid analgesics to older adults, relative to younger VH patients. However, analysis of simple main effects tests revealed that differences in pain management across patient age were only evident among

Caucasian practitioners (Caucasian: $P = 0.005$, non-Caucasian: $P = 0.36$). There was also a significant age (practitioner)× sex (VH) interaction for recommendation of opioid analgesics (Table 6, Figure 3C). When age was classified into three groups, the interaction approached significance ($F_{2\ 150} = 2.72$, $P = 0.07$, $\eta_P^2 = 0.04$). In general, younger practitioners ($P = 0.001$) were more willing to prescribe opioid analgesics to female patients, relative to middle-aged ($P = 0.20$) and older-aged ($P = 0.66$) practitioners. Additionally, there was a significant experience (practitioner)× race (VH) interaction for recommendation of opioid analgesics (Table 6, Figure 3D). After experience was categorized into three groups ($F_{2\ 150} = 3.51$, $P = 0.03$, $\eta_P^2 = 0.05$), results revealed that practitioners with both moderate ($P = 0.001$) and high ($P < 0.001$) years of experience were more willing to prescribe opioid analgesics to black patients, relative to practitioners with the lowest years of professional experience ($P = 0.64$). All other main effects and interactions for pain treatment across practitioner sex, race, age, and duration of professional experiences were nonsignificant (P's > 0.05).

Discussion

Over the past decade, there has been considerable attention directed toward understanding the influence of patient characteristics on pain management, with a number of studies finding ethnic minorities and older adults at greater risk for substandard pain treatment. Women and men also receive differential pain management; however, the direction of this disparity is mixed and varies across studies [30]. Although the etiology of these disparities is unclear, practitioner demographic characteristics may be a contributing factor. Unfortunately, this has received little investigation, despite some studies suggesting that practitioner characteristics do influence pain management [15–19,31–33].

The current study extends previous literature by examining the extent to which practitioner characteristics (i.e., age, sex, race, duration of experience) impacted pain assessment and treatment decisions in physicians and dentists. Using VH technology, results indicated that demographic characteristics of the practitioner may play significant roles in pain management decisions. Several main findings were observed. First, when compared with male practitioners, we found that female practitioners were more likely to recommend pain treatment with non-opioid analgesics. Interestingly, this effect was greater for black (VH) patients. Although limited in number, other studies have examined the extent to which provider sex impacts pain management care. While one study found no differences in analgesic administration across provider sex [33], some have demonstrated that male and female practitioners prescribe more analgesics to patients of their same sex [17–19]. Our findings are in accordance with a previous vignette study finding that female practitioners prescribed higher doses of hydrocodone to black than to white patients [18]. Such findings support prior evidence that female practitioners may be more patient-centered in nature and responsive to cues of suffering, as compared with their male counterparts [34–36]. Therefore, it is plausible that women exhibit increased empathy toward individuals in pain, especially those who may be from disadvantaged backgrounds and are therefore at greater risk for undertreatment [18]. However, this interpretation is speculative and warrants further investigation.

Second, differences in pain management decisions across patient age emerged for practitioner race. Specifically, non-Caucasian practitioners were more likely to rate pain higher in older as compared with younger-aged (VH) patients. The role of practitioner race in the management of pain has largely been unexplored, which may be due to discordance between the number of minority and nonminority medical providers in practice. Overall, these preliminary findings suggest that the race of the provider may influence how they manage pain across various patient age groups. There are a number of studies documenting inequities in pain treatment according to patient age. For instance, older adults often face multiple treatment barriers, including lower recognition of their pain symptoms and greater receipt of suboptimal pain treatment [37,38]. Results from the current study could imply that while ethnic minority practitioners may be more attentive to these issues in older adults, this does not appear to impact their treatment of pain in this population. We also observed that Caucasian practitioners rated pain and unpleasantness higher in younger (VH) patients and were more likely to recommend opioid medications to this age group, relative to their older counterparts. One hypothesis for this outcome is that Caucasian practitioners may perceive younger adults as less able to endure pain, thus leading to a greater sensitivity for the suffering in this group. However, given the lack of empirical data to support this and the small sample of ethnic minority practitioners in the current study (N = 48), these results should be interpreted with caution until there is evidence they are replicable.

Third, differences across provider age and duration of experience also emerged for pain assessment and treatment decisions. In particular, younger- and middle-aged practitioners rated pain unpleasantness higher in female (VH) patients, while younger practitioners were more willing to recommend opioid analgesics to this group. These findings align with another study by Hutchinson and colleagues [15], which found that younger-aged providers were more likely to prescribe opioids to patients with persistent noncancer pain. Evidence suggests that females are more emotionally expressive than males [39], and are at greater risk for having their pain attributed to a psychological cause [40]. This may partially explain why practitioners rated pain unpleasantness (affective component of pain) higher in females, as this suggests others may view this group as more willing to engage affective processes during the experience of pain. These findings also indicate that younger practitioners may readily consider psychological factors in relation to pain in women, and thus be more attentive to these issues in consideration of treatment. Interestingly, our findings also suggest that practitioners with moderate and high years of experience in practice are more willing to recommend treatment with opioids, but only to black (VH) patients. These findings run contrary to a previous study finding that less experience was a significant predictor of greater prescription of analgesic medication [16], but is consistent with more recent research indicating that having a higher level of experience (i.e., attending physician vs trainee and nurse practitioner) was associated with greater administration of opioid analgesics in the emergency department [19]. One hypothesis for our results is that practitioners with a higher length of professional experience may have increased awareness of racial disparities in medical care, an effect which may heighten responsiveness toward optimal treatment of ethnic minority patients. However, it is important to note that these findings conflict with results observed for provider age, as one might expect similar effects between the two demographics. Although it is unclear why this divergence exists, our findings suggest that

age and duration of experience are not interchangeable constructs. Future studies should consider the independent influence of these factors on pain management decisions and further clarify potential discordance between age and experience.

Taken together, these findings challenge the notion that treatment disparities are chiefly impacted by patient demographics, and suggest that practitioner demographics also may independently influence pain management decisions. Although it is unclear why certain provider characteristics may be better predictors of pain assessment and treatment than others, it is evident that this is an area that warrants further inquiry. This underscores the need for future empirical investigations that identify provider characteristics that have a strong predictive role in health care delivery, and to explicate the mechanisms underlying noted effects.

Study Limitations and Strengths

This study has some limitations that constrain interpretability of the findings. First, we did not collect information regarding the degree of formal pain education for our practitioners; therefore, it is unclear whether this factor impacted pain management decisions. Second, the study only included two medical disciplines and thus may not generalize to other health care specialties. Third, it is possible that other practitioner characteristics (e.g., cultural background, practice setting) are equally important to pain management decisions. Relatedly, other patient factors that were not represented in the current study (e.g., patient SES) may interact with provider characteristics to impact pain management decisions. For instance, two recent studies found that health care providers rated pain lower [41] and perceived a patient's pain as less credible [41,42] when there was a lack of medical evidence for the pain. These findings also varied across provider gender, with evidence of pathology having a larger effect on male providers [42]. Hence, future studies should examine other provider and patient characteristics that interact to impact pain-related care across patient groups. Finally, although it is likely that our methodology maximized the representativeness of this analog study, it is possible that our results may not generalize to a natural clinical setting.

Despite these limitations, several study strengths merit acknowledgment. First, this study addresses shortcomings of previous studies by assessing multiple demographic characteristics that may influence pain-related decisions. Additionally, nearly a third of our sample consisted of ethnic minority practitioners. Whereas most studies have largely ignored the effect of provider race on pain management practices and/or primarily recruited Caucasian practitioners, we recruited a more representative sample of racially diverse health care providers. Third, we used patient vignettes that are salient to the health care provider (i.e., facial pain for dentists, back pain for physicians) and depicted pain-related situations commonly observed in clinical settings. Lastly, we controlled for potential confounding factors by using VH technology that standardized patient images and vignettes. This allowed us to hold patient demographics (i.e., sex, race, age) constant and reduce the effect of other extraneous variables. Controlling for these confounds is less possible with other research designs, such as retrospective chart reviews.

Implications and Future Directions

There is considerable evidence documenting the influence of patient demographic features on pain management decisions among medical professionals [43]. In fact, using VH technology, our laboratory has consistently demonstrated that sex, race, and age of the patient impact pain-related care [1,2,21–24,44,45], effects which are observed to differ across health care providers [22,24]. Although several reasons may impact existing disparities (e.g., medical evidence, patient SES), the current study suggests that health care provider characteristics may be an important determinant of pain-associated judgments. The implications of this are profound given that medical physicians and dentists are chief providers of pain management care. Indeed, pain is one of the leading reasons patients seek medical services, and evidence suggests that both primary care physicians and dentists are among the top prescribers of narcotic analgesics [46]. Because chronic pain represents one of the most prevalent and cost-prohibitive health care conditions [47], identifying the role that practitioner characteristics has on pain management decisions is critical given that health care providers often see thousands of patients throughout their careers. Increasing awareness of these factors in medical/dental curricula and developing intervention programs may be fundamental toward reducing treatment-related biases.

Although efforts have been made over recent years to augment formal pain education in medical programs, this area requires continued development. Further identification of practitioner variables that contribute to inadequate pain management may allow for the development of strategies specifically designed to optimize patient care. Although it is premature to conclude that interventions aimed at improving pain management should be tailored to various practitioner demographic groups (e.g., sex, race, age), this concept is an interesting area of inquiry that requires further investigation. Additionally, it may be necessary to clarify why certain practitioner characteristics impact pain management in order to fully address treatment-related disparities.

Conclusions

In sum, the current study suggests that physician and dentist characteristics, such as sex, race, age, and duration of experience, influence pain assessment and treatment decisions. Future research is needed to clarify the role that health care provider characteristics have on pain decision-making, as well as determine whether results replicate in other health care specialties and medical conditions. Such work may ultimately inform education and intervention programs to eliminate pain management disparities.

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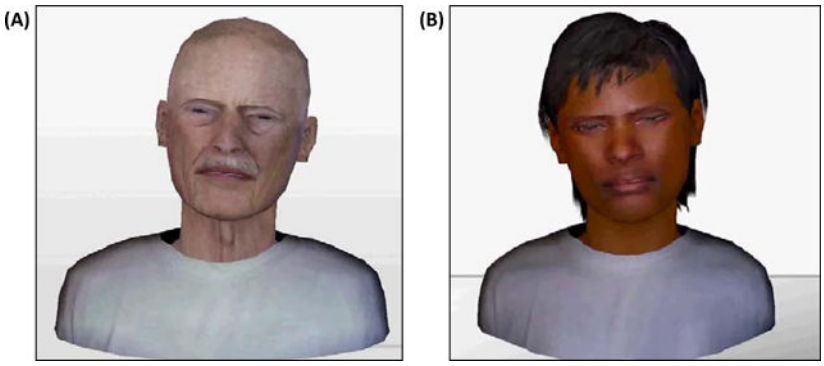

Figure 1.

Still-frame of virtual human cues. Male sex, white race, older age (A); female sex, black race, younger age (B). [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

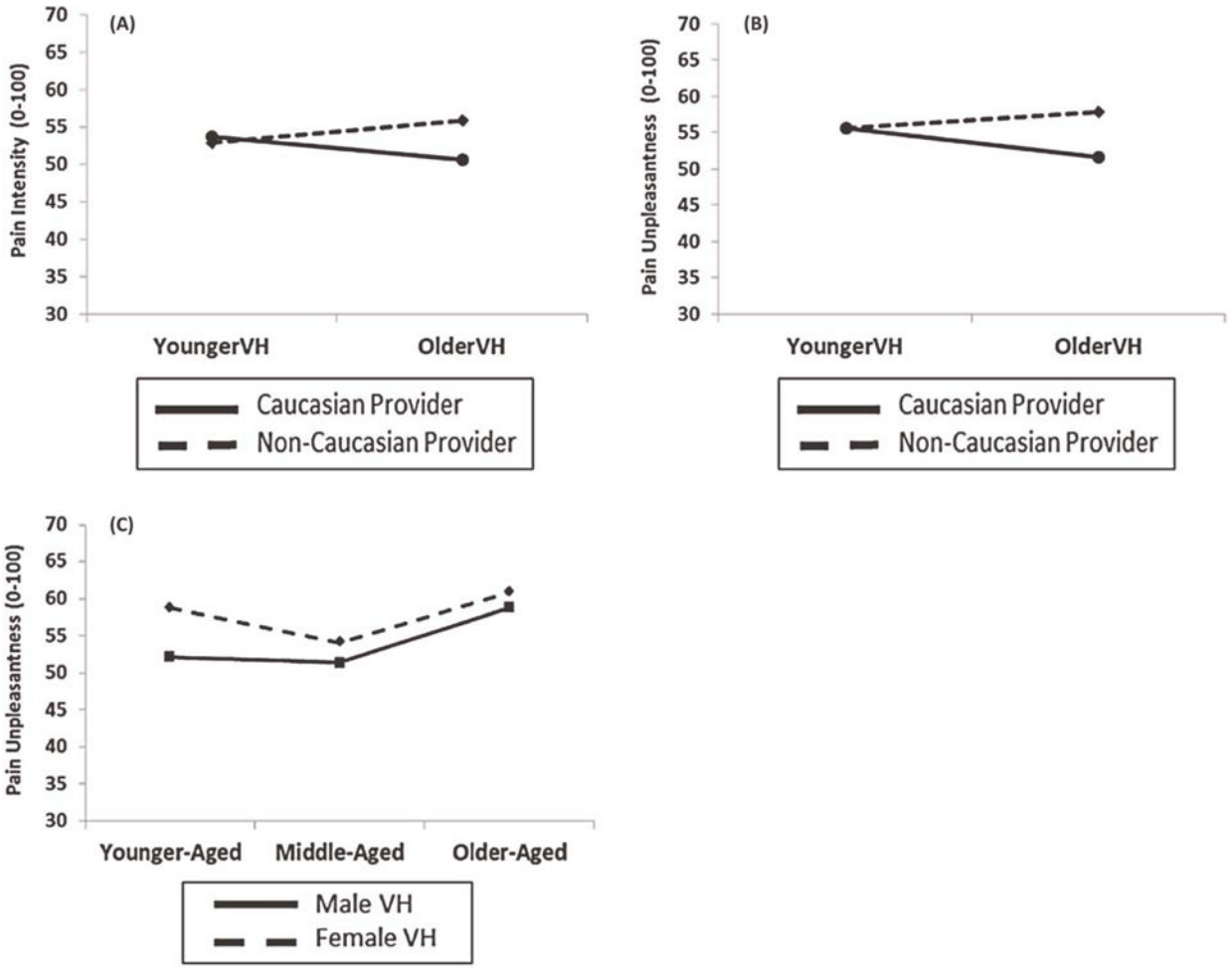

Figure 2.

Ratings of pain assessment. (A) Caucasian practitioners rated pain intensity higher in younger virtual human (VH) adults, while non-Caucasian providers rated pain intensity higher in older VH adults. (B) Caucasian practitioners rated pain unpleasantness higher in younger VH adults. (C) Younger and middle-aged practitioners rated VH females as having higher pain unpleasantness.

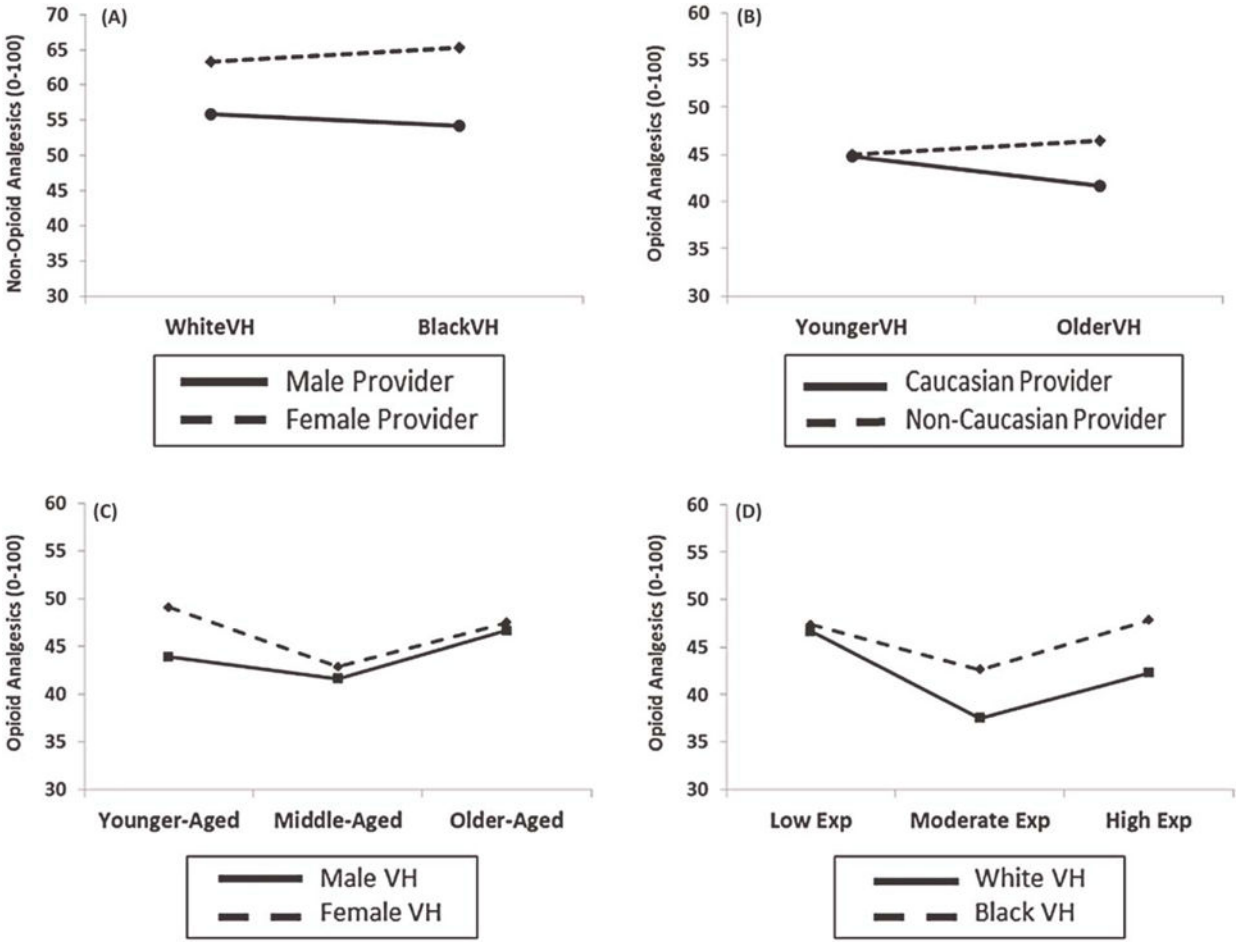

Figure 3.

Ratings of pain treatment. (A) Female practitioners were more likely to recommend treatment with non-opioid analgesics; however, this effect was stronger for black virtual human (VH) patients. (B) Caucasian practitioners were more willing to prescribe opioid analgesics to younger VH adults. (C) Younger practitioners were more willing to prescribe opioid analgesics to female VH patients. (D) Practitioners with moderate and high years of professional experience were more willing to prescribe opioid analgesics to black VH patients. Exp = experience.

Table 1

Ratings of pain intensity across practitioner sex and race

	Provider	VH	M	SD	*F*	*P*	η_p^2
Sex	Female		50.82	20.25	1.31	0.26	0.01
	Male		54.32	18.70			
Sex × sexVH	Female	FemaleVH	52.28	20.87	0.04	0.85	0.00
	Female	MaleVH	49.37	20.46			
	Male	FemaleVH	55.65	19.19			
	Male	MaleVH	52.99	19.03			
Sex × raceVH	Female	WhiteVH	49.23	20.34	0.00	0.97	0.00
	Female	BlackVH	52.42	20.98			
	Male	WhiteVH	52.70	18.68			
	Male	BlackVH	55.94	19.90			
Sex × ageVH	Female	YoungerVH	51.27	21.14	0.07	0.80	0.00
	Female	OlderVH	50.38	21.06			
	Male	YoungerVH	54.99	19.69			
	Male	OlderVH	53.66	19.21			
Race	Caucasian		52.25	19.77	0.45	0.50	0.00
	Non-Caucasian		54.45	18.73			
Race × sexVH	Caucasian	FemaleVH	53.67	20.03	0.04	0.85	0.00
	Caucasian	MaleVH	50.83	20.30			
	Non-Caucasian	FemaleVH	55.74	19.91			
	Non-Caucasian	MaleVH	53.17	18.41			
Race × raceVH	Caucasian	WhiteVH	50.70	19.69	0.05	0.82	0.00
	Caucasian	BlackVH	53.80	20.67			
	Non-Caucasian	WhiteVH	52.72	19.00			
	Non-Caucasian	BlackVH	56.19	19.97			
Race × ageVH	Caucasian	YoungerVH	53.78	20.59	11.81	0.001	0.07
	Caucasian	OlderVH	50.72	20.20			
	Non-Caucasian	YoungerVH	52.94	19.76			
	Non-Caucasian	OlderVH	55.97	19.53			

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Degrees of freedom were 1, 151 for all main effects and interactions.

M = mean; SD = standard deviation; VH = virtual human.

Table 2

Ratings of pain unpleasantness across practitioner sex and race

	Provider	VH	M	SD	*F*	*P*	η_p^2
Sex	Female		52.72	19.44	1.10	0.30	0.01
	Male		55.87	18.53			
Sex × sexVH	Female	FemaleVH	55.08	20.57	2.11	0.15	0.01
	Female	MaleVH	50.36	19.33			
	Male	FemaleVH	57.23	19.37			
	Male	MaleVH	54.51	18.56			
Sex × raceVH	Female	WhiteVH	51.03	19.84	0.65	0.42	0.00
	Female	BlackVH	54.41	20.84			
	Male	WhiteVH	53.56	18.35			
	Male	BlackVH	58.18	19.86			
Sex × ageVH	Female	YoungerVH	53.20	20.54	1.17	0.28	0.01
	Female	OlderVH	52.25	20.07			
	Male	YoungerVH	57.28	19.59			
	Male	OlderVH	54.46	19.00			
Race	Caucasian		53.63	19.42	0.98	0.32	0.01
	Non-Caucasian		56.82	18.04			
Race × sexVH	Caucasian	FemaleVH	55.28	19.71	0.21	0.65	0.00
	Caucasian	MaleVH	51.98	19.94			
	Non-Caucasian	FemaleVH	58.81	20.38			
	Non-Caucasian	MaleVH	54.83	16.80			
Race × raceVH	Caucasian	WhiteVH	51.58	19.59	0.01	0.94	0.00
	Caucasian	BlackVH	55.67	20.25			
	Non-Caucasian	WhiteVH	54.71	17.74			
	Non-Caucasian	BlackVH	58.92	19.63			
Race × ageVH	Caucasian	YoungerVH	55.63	20.25	12.09	0.001	0.07
	Caucasian	OlderVH	51.62	19.76			
	Non-Caucasian	YoungerVH	55.72	19.77			
	Non-Caucasian	OlderVH	57.92	18.44			

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Degrees of freedom were 1, 151 for all main effects and interactions.

M = mean; SD = standard deviation; VH = virtual human.

Table 3

Ratings of pain intensity and pain unpleasantness across practitioner age and duration of experience

	F	*P*	η_p^2
Pain intensity ratings			
Age	2.10	0.15	0.01
Age × sexVH	1.33	0.25	0.01
Age × raceVH	0.23	0.64	0.00
Age × ageVH	0.36	0.55	0.00
Experience	0.76	0.39	0.00
Experience × sexVH	0.78	0.38	0.00
Experience × raceVH	0.40	0.53	0.00
Experience × ageVH	1.76	0.19	0.01
Pain unpleasantness ratings			
Age	1.60	0.21	0.01
Age × sexVH	3.76	0.05	0.02
Age × raceVH	0.29	0.59	0.00
Age × ageVH	0.06	0.80	0.00
Experience	0.31	0.58	0.00
Experience × sexVH	2.69	0.10	0.02
Experience × raceVH	1.93	0.17	0.01
Experience × ageVH	1.15	0.29	0.01

Degrees of freedom were 1, 151 for all main effects and interactions.

VH = virtual human.

Table 4

Recommendation of non-opioid analgesics across practitioner sex and race

	Provider	VH	M	SD	*F*	*P*	η_P^2
Sex	Female		64.34	29.45	3.69	0.05	0.02
	Male		55.13	31.94			
Sex × sexVH	Female	FemaleVH	64.50	29.80	0.06	0.81	0.00
	Female	MaleVH	64.18	29.89			
	Male	FemaleVH	55.47	32.30			
	Male	MaleVH	54.78	32.21			
Sex × raceVH	Female	WhiteVH	63.30	29.96	5.22	0.02	0.03
	Female	BlackVH	65.35	29.48			
	Male	WhiteVH	55.94	31.93			
	Male	BlackVH	54.31	32.82			
Sex × ageVH	Female	YoungerVH	64.33	29.89	0.94	0.34	0.01
	Female	OlderVH	64.35	29.96			
	Male	YoungerVH	54.30	32.86			
	Male	OlderVH	55.95	31.81			
Race	Caucasian		60.46	32.96	1.09	0.30	0.01
	Non-Caucasian		55.05	27.90			
Race × sexVH	Caucasian	FemaleVH	60.69	33.34	0.03	0.86	0.00
	Caucasian	MaleVH	60.24	33.11			
	Non-Caucasian	FemaleVH	55.42	28.09			
	Non-Caucasian	MaleVH	54.68	28.75			
Race × raceVH	Caucasian	WhiteVH	60.60	33.23	0.03	0.87	0.00
	Caucasian	BlackVH	60.32	33.42			
	Non-Caucasian	WhiteVH	55.04	27.26			
	Non-Caucasian	BlackVH	55.06	29.32			
Race × ageVH	Caucasian	YoungerVH	60.39	33.71	2.40	0.12	0.02
	Caucasian	OlderVH	60.53	32.76			
	Non-Caucasian	YoungerVH	53.59	28.72			
	Non-Caucasian	OlderVH	56.52	28.59			

Degrees of freedom were 1, 151 for all main effects and interactions.

M = mean; SD = standard deviation; VH = virtual human.

Table 5

Recommendation of opioid analgesics across practitioner sex and race

	Provider	VH	M	SD	*F*	*P*	η_P^2
Sex	Female		44.47	27.47	0.03	0.87	0.00
	Male		43.82	25.22			
Sex × sexVH	Female	FemaleVH	45.26	27.81	0.33	0.56	0.00
	Female	MaleVH	43.69	27.90			
	Male	FemaleVH	45.05	26.65			
	Male	MaleVH	42.59	24.59			
Sex × raceVH	Female	WhiteVH	43.03	27.67	0.69	0.41	0.01
	Female	BlackVH	45.92	27.89			
	Male	WhiteVH	41.67	24.79			
	Male	BlackVH	45.98	26.89			
Sex × ageVH	Female	YoungerVH	44.87	27.62	0.57	0.45	0.00
	Female	OlderVH	44.08	28.70			
	Male	YoungerVH	44.92	26.84			
	Male	OlderVH	42.72	24.81			
Race	Caucasian		43.31	27.21	0.34	0.56	0.00
	Non-Caucasian		45.79	23.52			
Race × sexVH	Caucasian	FemaleVH	44.02	27.78	1.75	0.19	0.01
	Caucasian	MaleVH	42.59	27.32			
	Non-Caucasian	FemaleVH	47.59	25.58			
	Non-Caucasian	MaleVH	43.99	27.47			
Race × raceVH	Caucasian	WhiteVH	41.37	27.33	0.04	0.84	0.00
	Caucasian	BlackVH	45.24	27.93			
	Non-Caucasian	WhiteVH	44.05	22.57			
	Non-Caucasian	BlackVH	47.54	25.79			
Race × ageVH	Caucasian	YoungerVH	44.84	28.43	5.37	0.02	0.03
	Caucasian	OlderVH	41.77	26.97			
	Non-Caucasian	YoungerVH	45.05	23.78			
	Non-Caucasian	OlderVH	46.54	25.11			

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Degrees of freedom were 1, 151 for all main effects and interactions.

M = mean; SD = standard deviation; VH = virtual human.

Table 6

Recommendation of non-opioid and opioid analgesics across practitioner age and duration of experience

	F	*P*	η_p^2
Non-opioid recommendation			
Age	0.38	0.54	0.00
Age × sexVH	0.34	0.56	0.00
Age × raceVH	0.57	0.45	0.00
Age × ageVH	1.77	0.19	0.01
Experience	0.20	0.65	0.00
Experience × sexVH	0.00	0.96	0.00
Experience × raceVH	0.08	0.78	0.00
Experience × ageVH	0.71	0.40	0.00
Opioid recommendation			
Age	0.00	0.99	0.00
Age × sexVH	4.86	0.03	0.03
Age × raceVH	1.85	0.18	0.01
Age × ageVH	0.53	0.47	0.00
Experience	0.19	0.67	0.00
Experience × sexVH	1.28	0.26	0.01
Experience × raceVH	3.90	0.05	0.03
Experience × ageVH	2.08	0.15	0.01

Degrees of freedom were 1, 151 for all main effects and interactions.

VH = virtual human.