Assessment and treatment recommendations for pediatric pain: the influence of patient race, patient gender, and provider pain-related attitudes

Megan M. Miller[a], Amy E. Williams[b], Tamika C.B. Zapolski[a], Kevin L. Rand[a], Adam T. Hirsh[a]

Institutional Affiliations

[a]Department of Psychology, Indiana University-Purdue University Indianapolis, 402 N. Blackford St. Indianapolis, Indiana 46202.

[b]Department of Psychiatry, Indiana University School of Medicine, Riley Hospital for Children, 705 Riley Hospital Dr. Indianapolis, Indiana 46202.

Corresponding Author

Adam T. Hirsh, PhD, Department of Psychology, LD124, 402 N. Blackford St., Indianapolis, IN 46202, Phone: (317)-274-6942 Fax: (317)-274-6756 Email: athirsh@iupui.edu

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Highlights

- Providers rated Black pediatric patients as more distressed by pain.
- Providers rated Black pediatric patients as experiencing more pain interference.
- Providers were more likely to recommended opioids to Black pediatric patients.
- Providers rated female pediatric patients as more distressed by pain.
- Providers did not recommend different pain treatments based on patient gender.

Abstract

Previous studies have documented that racial minorities and women receive poorer pain care than their demographic counterparts. Providers contribute to these disparities when their pain-related decision-making systematically varies across patient groups. Less is known about racial and gender disparities in children with pain or the extent to which providers contribute to these disparities. In a sample of 129 medical students (henceforth referred to as 'providers'), Virtual Human methodology and a pain-related version of the Implicit Association Test (IAT) were used to examine the effects of patient race/gender on providers' pain assessment/treatment decisions for pediatric chronic abdominal pain, as well as the moderating role of provider implicit pain-related race/gender attitudes. Findings indicated that providers rated Black patients as more distressed (mean difference [MD]=2.33, $p<.01$, SE=.71, 95% CI=.92, 3.73) and as experiencing more pain-related interference (MD=3.14, $p<.01$, SE=.76, 95% CI=1.63, 4.64) compared to White patients. Providers were more likely to recommend opioids for Black patients than White patients (MD=2.41, $p<.01$, SE=.58, 95% CI=1.05, 3.76). Female patients were perceived to be more distressed by their pain (MD=2.14, $p<.01$, SE=.79, 95% CI=.58, 3.70) than male patients, however there were no gender differences in treatment recommendations. IAT results indicated that providers held implicit attitudes that Black Americans (M=.19, SD=.29) and males (M=.38, SD=.29) were more pain-tolerant than their demographic counterparts; however, these implicit attitudes did not significantly moderate their pain assessment/treatment decisions. Future studies are needed to

elucidate specific paths through which the pain experience and care of children differ across racial and gender groups.

Perspective: Providers' pain assessment (i.e., pain distress/pain interference) and treatment (i.e., opioids) of pediatric pain differs across patient race and to a lesser extent, patient gender. This study represents a critical step in research on pain-related disparities in pediatric pain.

Keywords: race, gender, disparities, children, chronic pain, provider, decision-making

Introduction

Previous studies in adults have documented that racial minorities and women receive poorer pain care than their demographic counterparts[4,34,39,57,60]. Suboptimal pain care negatively impacts patient functioning and quality of life [6,12,47,49,51,58], particularly for racial minorities and females who already face numerous barriers to maintaining a high quality of life[6,12,47,49,51,58,]. Biological, psychological, and social factors contribute to disparities in pain care. Providers contribute to these disparities when their pain-related decision-making systematically varies across patient groups. Indeed, previous studies in adults demonstrated that providers' pain care decisions are often inappropriately influenced by patient race and gender[4,27,57].

In contrast to the literature in adults, less is known about pain disparities in children. Several pediatric studies have identified racial disparities in antibiotic prescribing[16], diagnostic imaging for abdominal pain[32], and specialist referrals[13,65]. Of the studies that have examined racial disparities in pediatric pain, the majority focused on acute pain (e.g., bone fractures, appendicitis)[17,22,45,36,44,47,53,67] with mixed results. Groenewald and colleagues[23] recently examined racial disparities in opioid prescriptions for outpatient visits, a context more likely to include chronic pain, finding that minority children were less likely to have their pain treated with opioids than White children.

Three important limitations constrain the conclusions that may be drawn from these studies. Foremost, the management of acute and chronic pain differs in ways that are relevant to disparities. Acute pain is typically straightforward and accompanied by objective evidence, whereas chronic pain is often more ambiguous. For example, chronic abdominal pain, a common complaint in children[37], often lacks objective evidence of organic pathology and, thus, can be difficult to diagnose and manage[10]. This is important because ambiguous situations are ripe for biased decision-making[9,28] – they increase cognitive load, which, in turn, leads to greater discriminatory behavior[7,8,57]. Secondly, with one exception (discussed below), these studies did not assess provider attitudes. This is an important omission given the powerful impact of attitudes on judgments and decision-making[21,63], specifically regarding healthcare[18,24,25,28,55]. Explicit attitudes are consciously held. Implicit attitudes occur without conscious awareness and are better predictors of discriminatory behavior[48]. The one study that did assess provider attitudes used written vignettes describing a pediatric post-surgical context. In this study, Sabin and colleagues[55] found that as providers' implicit pro-White bias increased, their opioid prescribing decreased for hypothetical African American patients but not for similar White patients. Thirdly, these studies used retrospective or text-based vignette methods, which have limited experimental control and ecological validity, respectively.

The goal of this study was to contribute new knowledge about racial and gender disparities in pediatric chronic pain care, and the role the provider plays in these disparities. Specifically, we examined the effects of patient race and gender on medical students' (i.e., providers') pain assessment and treatment decisions for children with chronic abdominal pain. In terms of race, based on prior findings[17,44,47,50,53,57,61,62], we hypothesized that providers would under-evaluate Black patients' pain and be less likely to recommend pharmacological treatments to Black than White patients. In terms of gender, based on prior findings[31,33], we hypothesized that providers would under-evaluate female patients' pain and would be less likely to recommend pharmacological but more likely to recommend psychotherapy to female than male patients. We did not have specific hypotheses about race or gender differences in other treatment options. Additionally, we hypothesized that pain-related implicit attitudes would moderate these relationships, such that providers with stronger racial or gender pain-related attitudes would demonstrate larger race and gender differences in pain decision-making for patients. To address the limitations of prior studies, we used the Implicit Association Test (IAT) to assess providers' implicit attitudes and Virtual Human (VH) methodology that combines high-fidelity computer-simulated patients with text-based "medical record" information.

Methods

Participants

Medical students from U.S. medical training programs were recruited through email announcements to medical training programs and medical student organizations. Additionally, participants were encouraged to share the study announcement with peers who were also enrolled in medical school. Medical students were chosen because they engage in patient care, including pediatrics; receive training in pain management; and are more easily accessible than practicing physicians. Participants needed to be at least 18 years of age, enrolled as a medical student in an accredited medical school, and have not previously participated in a study using virtual human technology to investigate decision-making for pain.

Stimuli

Participants were presented with full-motion videos of 4 computer-simulated pediatric patients with chronic abdominal pain, which is common among children presenting to primary care[2]. A still-frame image of one patient is presented in Figure 1 — this image is for illustrative purposes and does not convey the richness of the full-motion videos used in the actual study (additional stimuli images in Appendix A). Patients varied by race (White or Black) and gender (Male or Female) but otherwise exhibited similar pain behaviors (i.e., holding stomach, furrowing eyebrows, squeezing eyes shut). Each patient was accompanied by a fully animated race-matched maternal caregiver. Animations were similar across caregivers (i.e., turning to look at child). Each patient was also accompanied by a text vignette (Figure 1), varying only in patient name, vital signs (all within normal ranges), and wording used to describe relevant medical and psychosocial factors.

Measures

Demographic and Clinical Experience Questionnaire. Participants self-reported demographic characteristics (i.e., race, gender, age) and clinical experiences (i.e., year in medical school, completion of a child-focused or pain-focused clinical rotation).

Pain assessment and treatment recommendations. Participants made pain assessment (distress, pain-related interference, patient reaction to pain) and treatment decisions (opioid analgesic, non-opioid analgesic, referral to pain specialist, referral for psychological therapy, referral to nutritionist, school accommodations) for 4 patients representing both races and genders using separate 100-point visual analog scales (VASs) similar to prior work[27,28]. For the assessment items, participants indicated the amount of distress/interference/overreaction they perceived the patients to be experiencing. For the treatment items, participants indicated their likelihood of using each treatment option for the patients.

Implicit Association Test. Participants' implicit attitudes about race/gender differences in pain were assessed using 2 separate IATs. The IAT measures the strength of automatic associations between 2 target concepts and an attribute[19]. Participants completed 2 versions of the IAT. One version assessed pain-related implicit attitudes about *race differences* in pain. The other version assessed pain-related implicit attitudes about *gender differences* in pain. Both versions specifically pertained to pain sensitivity and tolerance (Figure 2) given prior work suggesting these pain-specific attitudes are more relevant to pain care decisions than are general implicit attitudes about race and gender[28]. The IATs were pilot-tested for reliability and validity using established methods[19,20]. Participants completed two rounds of matching words or pictures into one of two categories; the categories switched after round one. For example, in the race IAT, round 1 might ask respondents to pair images of White American faces with pain-sensitive words, and images of Black American faces with pain-tolerant words (as depicted in the top panel of Figure 2). In this case, round 2 would switch the categories such that respondents had to pair White American faces with pain-tolerant words and Black American faces with pain-sensitive words. A similar pairing and switching scheme is used for the gender IAT (bottom panel of Figure 2). Scores for both versions of the IAT were calculated separately using the latencies in responding between rounds 1 and 2. Using metrics established by Greenwald and colleagues[20], IAT scores are interpreted as follows: no difference in pain-related attitudes between races/genders (absolute values 0 –.14), weak (absolute values .14 –.34), moderate (absolute values .35 –.64), or strong (absolute values .65 and above) association between the group [Black Americans (+)/White Americans (-) or Male (+)/Female (-)] and pain-tolerance.

Procedure

Participants completed the study online through the Qualtrics platform. Participants provided informed consent and demographic information, viewed computer-simulated pediatric patients presenting with chronic abdominal pain, completed two versions of the IAT, and completed questionnaires. To minimize order effects, pain decisions (assessment and treatment), the two versions of the IAT, and the questionnaires were counter-balanced across participants. In addition, within the pain decisions portion of the study, patient vignettes were presented in random order. The study took approximately 1 hour to complete, and participants were compensated with an electronic $30 Amazon.com gift card. The study was approved by the university's institutional review board.

Power Analysis

The target sample size was based on several criteria including effect size, power, and probability of making a Type I error. Studies in the adult chronic pain literature have found effect sizes ranging from Cohen's d equivalent of .09 to .93 for relationships similar to those examined in the current study [27,28,29,30]. Given the lack of relevant prior studies examining disparities in children with chronic pain, calculations were based on detecting a medium size effect (equivalent to a d=0.50) with 0.8 power and constraining the probability of making a Type I error to 5%. One hundred and twenty nine participants completed the study. Using G*Power, it was determined that with 129 participants and effect sizes (partial η_p^2) ranging from .01 to .09 for the primary analyses, the study was adequately powered (values ranging from .77 to 1.00).

Analytic Plan

Data were evaluated for normality and assumptions of statistical tests. Descriptive statistics were computed to characterize the sample. The relationship between patient race/gender and participants' pain assessment and treatment ratings was evaluated using 2 (patient race) x 2 (patient gender) repeated measures ANOVAs (RMANOVA). Both main and interaction effects were examined and interpreted as significant at $p <$ 0.05.

Due to the within-subjects design of this study, moderation analyses were conducted using the MEMORE SPSS macro[42], which assesses moderation using methods suggested by Judd and colleagues[35] for testing interactions in within-subject designs. The difference scores between the within-subjects variables are calculated and regressed onto the between-subjects variable. The MEMORE SPSS macro extends Judd and colleagues' approach by providing methods to probe the interaction in within-subjects/repeated-measures designs. Moderation is supported when the moderator significantly predicts the difference score between the two instances of the within-subject variable. All variables, with the exception of patient gender and race, were analyzed in continuous form.

Results

One hundred and thirty-five participants (henceforth referred to as 'providers') were recruited given available funding. Six providers did not complete the entire study and were excluded from the analyses, yielding a final sample of 129 providers. Sample descriptives are summarized in Table 1. The sample was majority male (55.8%), White (64.3%), and not Hispanic or Latinx (94.6%), with an average age of approximately 25 years (SD=2.3). Participating providers were attending medical schools in the Midwest (n=51), Northeast (n=47), and South (n=31) regions of the United States.

Study variables were evaluated for normality. Primary analyses were run with and without outliers, as well as with and without log-transformed variables to evaluate any change in results indicated by the non-normal variables. Neither elimination of outliers nor transformation of non-normal variables changed the results, therefore, the full dataset was used for all analyses.

Zero-order correlations between study variables are reported in Tables 2 & 3. As a whole, the sample demonstrated a weak implicit association between Black (vs. White) American and pain-tolerant (M=.19, SD=.29) and a moderate implicit association between male (vs. female) and pain-tolerant (M=.38, SD=.29). Implicit race and gender pain-related attitudes did not significantly differ across provider race or sex (all *ps* > 0.05). Mean ratings for pain assessment and treatment recommendations by race and gender category are reported in Table 4.

Relationship of Patient Race and Patient Gender to Pain Assessment and Treatment

Pain Assessment

Statistical values for the RMANOVAs are reported in Table 5. A significant main effect of patient race on pain-related distress (Figure 3) indicated that providers rated Black patients as more distressed by their pain than White patients (mean difference [MD]=2.33, $p<.01$, SE=.71, 95% CI=.92, 3.73). A significant main effect of patient gender on pain-related distress (Figure 3) indicated that providers rated female patients as more distressed by their pain than male patients (MD=2.14, $p<.01$, SE=.79, 95% CI=.58, 3.70).

A significant main effect of patient race on pain-related interference (Figure 4) indicated that providers rated the pain as more interfering for Black patients than White patients (MD=3.14, $p<.01$, SE=.76, 95% CI=1.63, 4.64). Pain-related interference ratings did not significantly differ between male and female patients.

Ratings of patients' reaction to pain did not significantly differ by patient race or gender. Interactions between patient race and gender were not supported for any of the pain assessment outcomes.

Treatment Recommendations

A significant main effect of patient race on opioids (Figure 5) indicated that providers were more likely to recommend opioids for Black patients than White patients (MD=2.41, $p<.01$, SE=.58, 95% CI=1.05, 3.76). Main effects of race on recommendations for non-opioid medication, referral to a pain specialist or gastroenterologist, psychological therapy, nutritionist, and school accommodations were not supported. Of note, a main effect of patient race on providers' recommendation for referral to a pain specialist or gastroenterologist trended towards significance (p=.051) indicating that providers were more likely to recommend pain specialist or gastroenterologist for Black patients than White patients (MD=1.73, $p=.05$, SE=.87, 95% CI=.004, 3.45).

Additionally, main effects of patient gender on recommendations for opioids, non-opioid medication, referral to a pain specialist or gastroenterologist, psychotherapy, nutritionist, and school accommodations were not found. None of the patient race X patient gender interactions were significant.

Implicit Pain-related Attitudes as Moderator

Implicit pain-related attitudes about race did not predict race differences for any of the pain assessment or treatment outcomes (all $ps>.05$), thus suggesting that providers' implicit attitudes about race differences in pain do not moderate the relationships between patient race and receipt of pain care. Similarly, implicit pain-related attitudes about gender did not predict gender differences for any of the pain assessment or treatment outcomes (all $ps>.05$), thus suggesting that providers' implicit attitudes about gender differences in pain do not moderate the relationships between patient gender and pain care.

Post-hoc Analyses: Distress Ratings as a Mediator

Recent research suggests that providers' assessment of patients' pain (e.g., exaggeration) may mediate racial differences in treatment recommendations [52]. Given that the current sample rated Black patients as more distressed and as having more pain-related interference, pain-related distress and interference were explored as mediators in the relationship between patient race and provider opioid recommendations. Analyses were conducted using MEMORE SPSS macro [43], which uses similar statistical methods (i.e., bootstrapping method) as PROCESS [26] but allows for within-subject variables. Neither race differences in pain-related distress nor pain-related interference significantly mediated the relationship between race and opioid recommendations (all $p>.05$, 0 included in all 95% C.I.), suggesting that some unmeasured variable(s) accounts for the race difference in opioid recommendations observed in the current study.

Discussion

Providers rated Black (vs. White) and female (vs. male) children as experiencing more pain-related distress. Providers rated Black (vs. White) children as experiencing more pain-related interference and were more likely to recommend opioids for their abdominal pain. Providers' implicit pain-related racial/gender attitudes did not moderate the relationship between child race/gender and providers' pain care decisions.

Black children were perceived to be more distressed, have more pain-related interference, and were more likely to be recommended opioids than White children. Some studies in adults have found similar results, with Black patients' pain rated as more unpleasant and more likely to warrant opioids[27], although it is important to note the large clinical literature indicating Black adults are less likely to receive opioids and other pain treatments than White adults[44,50,57,61,62]. The few studies on pediatric pain found Black children are less or equally likely to receive opioids as White children[17,47,53]. One explanation for these disparate findings is that current medical students are more knowledgeable about pain disparities than past cohorts. The National Academy of Medicine[33,57], popular press[15,38], and medical organizations (e.g., American Medical Association) have drawn attention to this issue in recent years. Regardless of the race difference, overall, the likelihood of recommending opioids for any of the patients was relatively low. This may reflect the shift in clinical and public opinion due to extensive coverage of the opioid crisis in scientific and media outlets. It may also be related to recent increases in pain management content in medical school curricula, although considerable education deficits remain[56].

One must also consider important differences between the current and past studies in pediatrics. First, unlike prior studies, the current study examined race differences in chronic, as opposed to acute, pain care. We expected the chronic and non-specific nature of abdominal pain would increase the likelihood of biased decision-making against Black children. However, the vignette description of the chronic nature of the pain may have had the opposite effect, giving providers evidence that the pain was recurrent and interfering with the child's life, and therefore more legitimate than a patient presenting to the ER with acute pain. Relatedly, the presence of an engaged and attentive caregiver may have communicated legitimacy about the child's complaints. Caregiver presence is not accounted for in clinical studies using ED data[17,47,53,67] or may not have been signaled in vignette studies[22,55]. A second difference between current and past studies concerns age. Previous studies included wide age ranges (e.g., 9-11[22], 0-18[67], 0-21[17]) whereas the virtual patients herein were all 12 years old – this is important because pain assessment (i.e., behavioral, physiological, and self-report measures) varies with age [5,11]. Pain treatment is also age-dependent. Though clinical guidelines affirm the use of opioids and NSAIDS for pediatric chronic pain[5], provider comfort with these treatments may depend on child age. Indeed, metabolic, respiratory, and other considerations vary across the developmental spectrum[5].

We also found that female children were rated as more distressed than male children; however, unlike Black children, they were not given differential treatment recommendations. This finding echoes the adult literature that suggests women are at risk for having their pain discounted or misattributed to psychological causes[31,33]. The overall sample demonstrated a moderate implicit attitude that men are more pain-tolerant and women are more pain-sensitive. Although pain sensitivity and distress are not synonymous, taken together, these findings suggest that providers' stereotypical beliefs about women's increased sensitivity to pain[54,64,66] and emotional reaction to pain are salient for female patients of a relatively young age. Another potentially relevant factor concerns differences in pain socialization. Girls in pain receive more comfort from others, which may be partly driven by girls displaying more pain behaviors than boys[14]. This difference in socialization may be detrimental to girls. When girls and boys present with equivalent pain behaviors, as in our study, the assumption may be that girls are in less “real” pain than boys and instead are merely more distressed by it.

Providers demonstrated implicit attitudes that Black (vs. White) Americans and males (vs. females) are more pain-tolerant; however, these attitudes were not consistently associated with pain care decisions, nor did they moderate the relationship between child race/gender and provider decisions. The only other published study on this relationship used the general Race IAT (which uses “good” vs. “bad” words as opposed to “pain sensitive” vs. “pain tolerant” words used herein) and found providers with high implicit pro-White bias were less likely to recommend opioids for African American children than were providers with low bias[55]. The divergence in results suggests that general implicit race attitudes and implicit pain-related racial attitudes have different relationships to pain assessment/treatment decisions. Additionally, the general and pain-related versions of the race IAT use pictures of adults, whereas providers in the current study made decisions for pediatric patients. This age difference may help explain the lack of association between implicit pain-related attitudes and pain management decisions. However, given differences in methodology and the small number of studies, results should be interpreted with caution. Previous studies have found people hold *explicit* race- and gender-stereotyped beliefs about pain tolerance[54,64,66]. Ours is the first to demonstrate people hold similar *implicit* associations. Findings are mixed regarding explicit pain-related beliefs influencing one’s own pain tolerance. Gender-stereotyped pain beliefs did explain sex differences in pain tolerance in one laboratory-based study[64]. Similar findings have not been reported for race-stereotyped pain beliefs, although this is an area of ongoing study[41]. Together with the current results, the extant literature suggests that explicit and implicit race- and gender-stereotyped beliefs may influence one’s own pain experience but not the perception of pain in others. However, these tentative conclusions require further investigation given the infancy of the literature and variation in patient age across studies.

To our knowledge, this is the first study using experimental methodology, via computer-simulated patients, to investigate racial/gender disparities in pediatric chronic pain. The patient videos showed dynamic pain behaviors, thereby communicating important pain-related information to those in the social environment and enhancing the realism of the “clinical encounter.” Additionally, this study controlled for caregiver presence and involvement (e.g., reaction to child’s pain, information provided) – in previous studies using retrospective clinical data, these factors likely varied across clinical encounters and the gender, race, and age of the child[40]. By using virtual patients, the effect of child race/gender on provider decisions was isolated from other, potentially influential contextual factors, such as caregiver presence/involvement. Nevertheless, the standardization of caregiver involvement may reduce the ecological validity of the results. In future studies, systematic examination of the effects of child versus parent factors, as well as their interaction, on providers’ decision-making will help clarify the most appropriate targets for intervention.

Several study limitations should be noted. First, because medical students have less experience treating pain and/or children, these results may not generalize to licensed physicians. Secondly, virtual patients presented on a computer, which is different from real-life clinical care. Among other differences, participants had unbounded time to assess and treat each child, which does not reflect the time pressures of a clinical environment – this is important because time pressure can increase activation of implicit attitudes[8]. In addition, the clinical relevance of our findings is not entirely clear, although the effect sizes for patient race and gender were in the medium and small range, respectively. Regardless, we consider it striking that any systematic race and gender differences emerged in a study that controlled for other putatively – some might say *more* – important factors (e.g., caregiver behavior, patient/caregiver preference). Lastly, participants could not ask clarifying questions about the pain complaint. Details gained from additional questioning could have influenced their pain care decisions.

Many pediatric pain conditions (e.g. sickle cell[1], fibromyalgia[3]) persist into adulthood. Children who receive inequitable pain care may ultimately suffer a lifetime of physical, emotional, and social consequences. This study represents a critical step in research on disparities in pediatric pain. Future studies should investigate the impact of provider implicit racial/gender attitudes on pain care across child age, as the salience of racial or gender stereotypes may vary with age. Additionally, characteristics of the pain diagnosis (e.g., ambiguity, treatment guidelines) may influence providers’ decision-making across racial and gender groups. Another important question to consider is how parental factors influence provider decision-making. How parents react to children’s pain (worry vs. disinterest) and/or parents’ treatment preferences may influence provider recommendations[40] – these effects might differ across parent race and gender. Lastly, a related subject would be investigating more subtle disparities in pain care, including differential patient engagement. Previous research found physicians engage Black children less often and ask them fewer questions than White children[59]. This differential engagement may influence patients’ health agency as children and adults, which may have long-term consequences for patients with chronic conditions. Assessing providers’ attentional biases and if they vary by patient demographics may provide a clearer picture of what contextual information contributes most to biased decision-making. Identifying these differences can lead to targeted interventions to reduce inequalities in the pediatric pain experience.

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Figure 1. Still Image of Child Virtual Human Stimuli

Figure 2. Pain-related Race/Gender IAT

Figure 3. Main Effect of Race and Gender on Distress Ratings

Figure 4. Main Effect of Race on Pain Interference Ratings

Figure 5. Main Effect of Race on Opioid Recommendations

Appendix A

Study Stimuli

Note: Participant viewed and made treatment ratings for one virtual patient of each category (i.e., White male child).

White Male Child

White Female Child

Black Male Child

Black Female Child

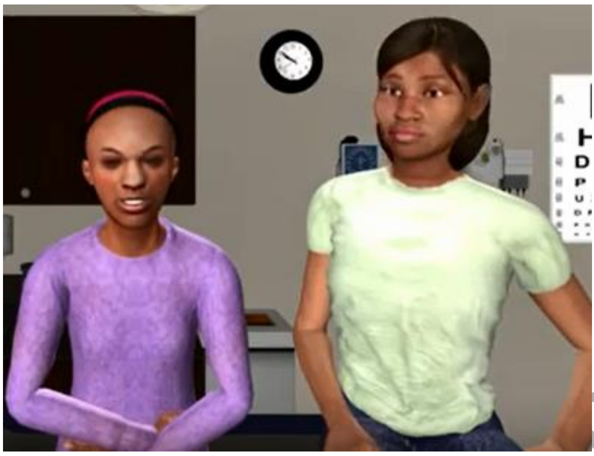
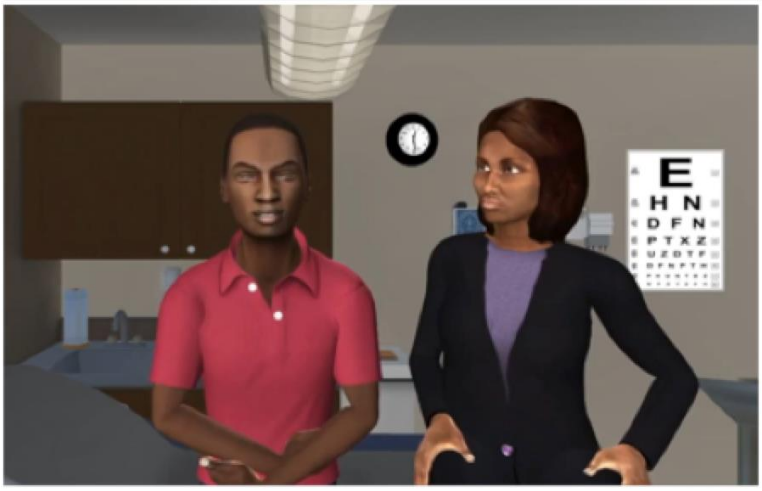


Figure 1. Still-image of Child Virtual Human Stimuli

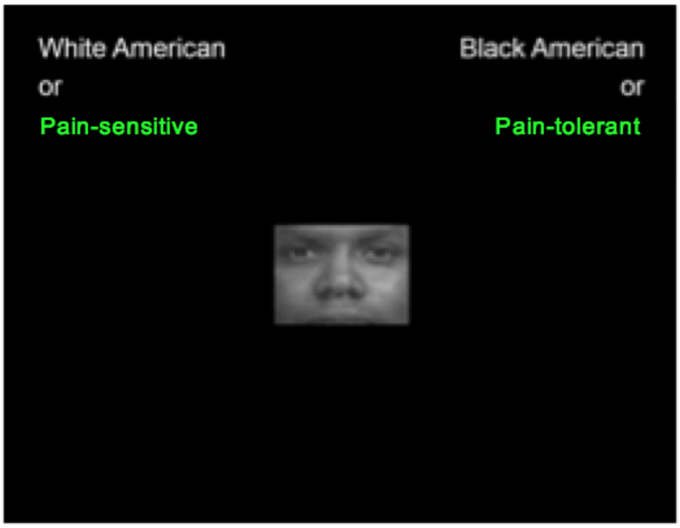
Height	Weight	Temperature	Blood Pressure	Heart Rate	Respiratory Rate	Mental Status
5 ft. 0 in.	105 lbs.	99.1	119/78	73 bpm	14 rpm	A/O X 4



Vignette: Alex is a 12-year-old boy presenting to your office with chronic abdominal pain. He states his most recent pain symptoms started yesterday at school but notes that he has been experiencing abdominal pain for the past 8 months. The pain is noted to be sharp and throbbing. He rates his usual chronic pain as 5 out of 10 on average, but rates his current pain as 8 out of 10. Alex states that due to his pain he has missed several days of school over the past month. He also reports problems sleeping and feeling tired during the school day. Alex's mother reports having him use a heating pad and take over-the-counter acetaminophen, but neither has been helpful in relieving his pain.

Figure 2. Pain-related Race/Gender IAT

Pain-related Race IAT



Pain-related Gender IAT

Note: Participants were asked to pair images of White American faces with pain-sensitive words, and images of Black American faces with pain-tolerant words (top panel). Similarly, participants were asked to pair female names with pain-sensitive words, and male names with pain-tolerant words (bottom panel). The categories would then switch (e.g., pain-sensitive with Black American faces [male names], pain-tolerant with White American faces [female names]) for the second round.

Figure 3. Main Effect of Race and Gender on Distress Ratings

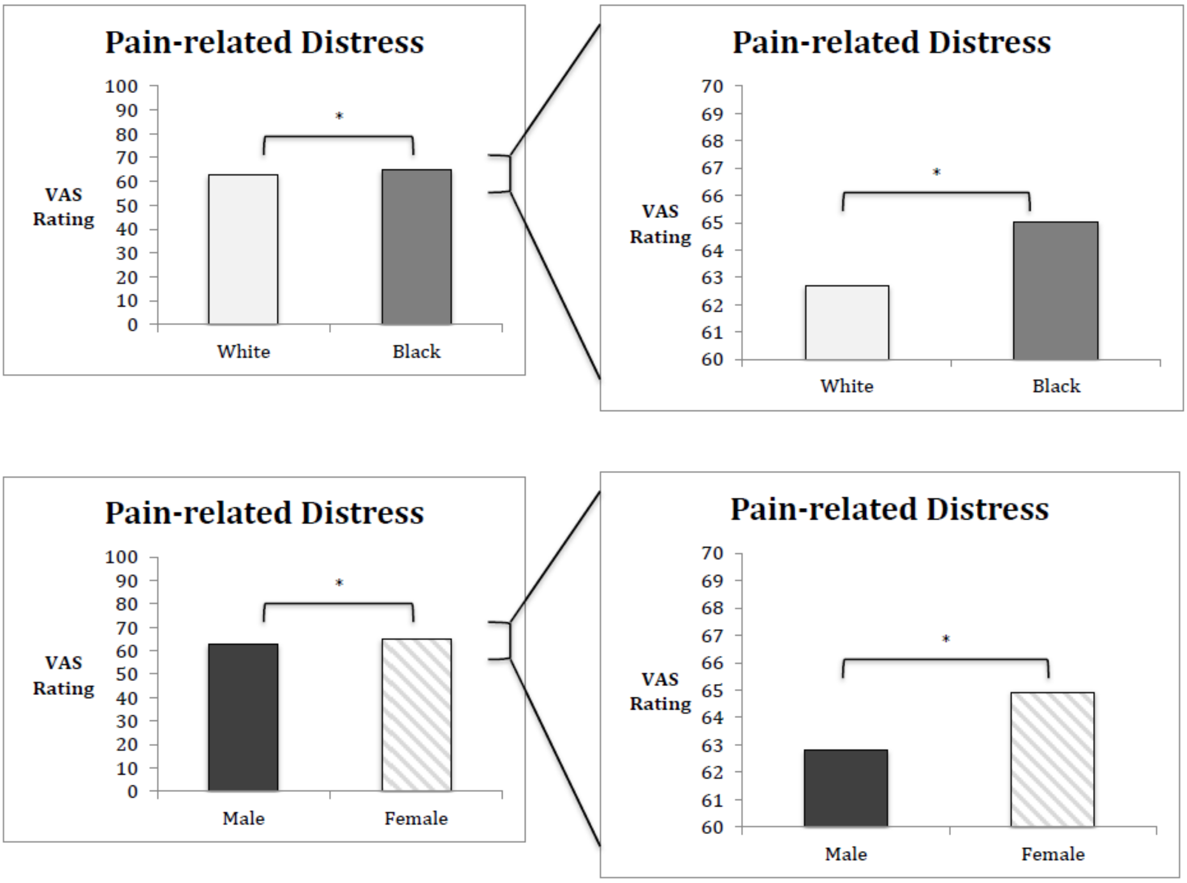


Figure 4. Main Effect of Race on Pain Interference Ratings

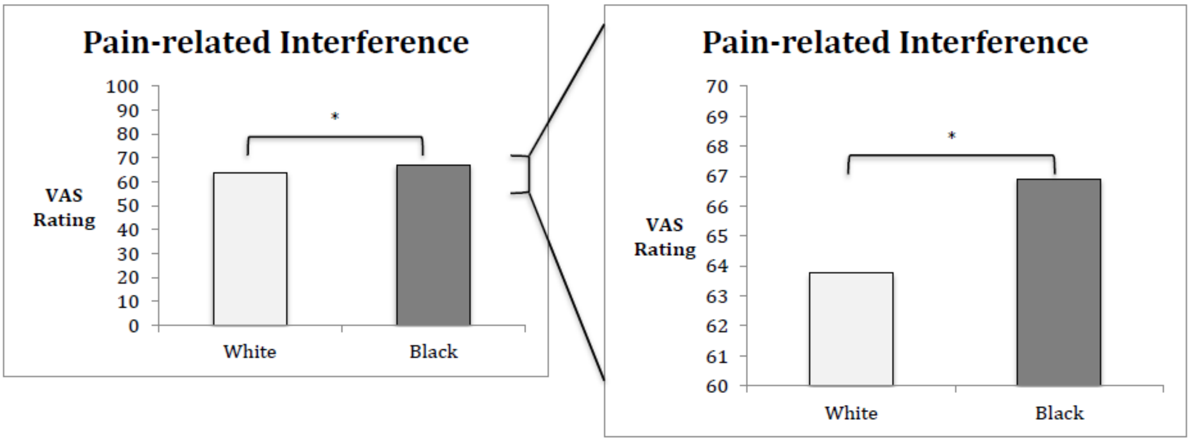


Figure 5. Main Effect of Race on Opioid Recommendations

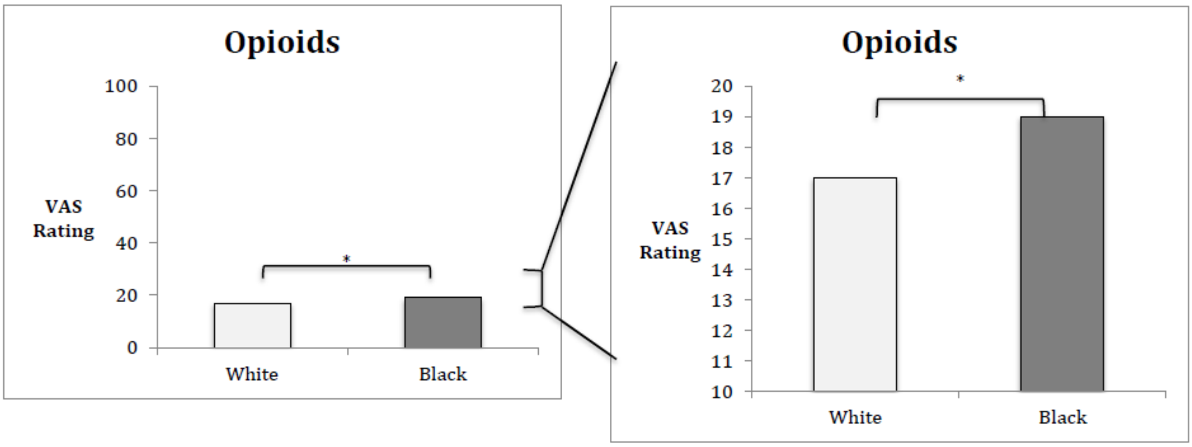


Table 1. Sample Demographic Characteristics

N=129	M (SD) / n (%)
Age	25.0 (2.3)
Sex	
Male	72 (55.8)
Female	57 (44.2)
Race	
White	83 (64.3)
Black or African-American	12 (9.3)
Asian	27 (20.9)
Multi-racial	7 (5.4)
Ethnicity	
Not Hispanic or Latinx	122 (94.6)
Hispanic or Latinx	7 (5.4)
Years of Medical School Completed	
Less than a year	41 (31.8)
First Year	11 (8.5)
Second Year	23 (17.8)
Third Year	30 (23.3)
Fourth Year	23 (17.8)
Fifth Year	1 (.8)

Table 2. Zero-order Correlations Among Race Variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Provider Sex	-	-	-																				
2. Provider Age	24.96	2.26	.12	-																			
3. Provider Race	-	-	.07	.22*	-																		
4. Race Pain IAT Score	.19	.29	-.02	.11	.10	-																	
5. Black Pt Distress	65.05	14.51	.01	.16	.07	-.01	-																
6. White Pt Distress	62.70	15.16	.04	.16	.03	-.06	.85**	-															
7. Black Pt Interference	66.75	15.55	-.07	.16	.10	.00	.73**	.67**	-														
8. White Pt Interference	63.76	15.94	-.08	.14	.12	-.07	.71**	.75**	.85**	-													
9. Black Pt Reaction to Pain	46.63	14.39	.13	.11	-.18*	.06	-.34**	-.30**	-.33**	-.31**	-												
10. White Pt Reaction to Pain	46.89	15.12	.15	.06	-.14	.05	-.27**	-.25**	-.28**	-.25**	.80**	-											
11. Black Pt Opioids	19.57	21.58	-.13	-.06	.00	-.02	.32**	.28**	.28**	.33**	-.29**	-.24**	-										
12. White Pt Opioids	17.02	21.03	-.14	-.08	-.01	.01	.30**	.28**	.29**	.34**	-.28**	-.24**	.93**	-									
13. Black Pt Non-opioids	78.78	21.03	-.12	-.10	-.05	.09	.17	.09	.10	.05	.01	.00	-.01	.02	-								
14. White Pt Non-opioids	78.26	21.19	-.19*	-.05	-.01	.05	.24**	.19*	.22*	.21*	.03	.01	.07	.08	.90**	-							
15. Black Pt Specialist	73.60	24.76	-.17	.05	-.11	-.05	.21*	.22*	.35**	.36**	-.27**	-.29**	.02	.02	.16	.19*	-						
16. White Pt Specialist	71.86	25.73	-.14	.04	-.18*	-.07	.26**	.30**	.37**	.40**	-.28**	-.32**	.09	.07	.16	.23**	.92**	-					
17. Black Pt Psychological Therapy	37.62	26.61	.20*	.21*	-.01	.00	-.18*	-.12	-.09	-.15	.25**	.19*	-.22*	-.24**	-.30**	-.26**	.01	.05	-				
18. White Pt Psychological Therapy	37.03	26.87	.21*	.21*	-.04	.00	-.19*	-.15	-.06	-.15	.25**	.18*	-.23**	-.23**	-.23**	-.20*	.04	.06	.93**	-			
19. Black Pt Nutritionist	47.98	28.53	-.07	.09	-.03	.00	.10	.08	.21*	.15	-.08	-.09	.11	.13	-.22*	-.16	.36**	.37**	.39**	.38**	-		
20. White Pt Nutritionist	47.66	28.99	-.01	.08	-.05	-.01	.14	.12	.25**	.18*	-.10	-.12	.12	.16	-.19*	-.13	.29**	.33**	.38**	.37**	.95**	-	
21. Black Pt School Accommodations	53.25	24.64	.14	.05	.17	.07	.12	.16	.23**	.30**	-.21*	-.20*	.33**	.35**	-.08	-.05	.18*	.22*	.10	.09	.27**	.26**	-
22. White Pt School Accommodations	51.88	24.45	.05	.07	.15	.02	.15	.23**	.27**	.35**	-.20*	-.15	.34**	.36**	-.09	-.05	.19*	.25**	.13	.08	.29**	.28**	.92**

*p<.05, **p<.01

Table 3. Zero-order Correlations Among Gender Variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Provider Sex	-	-	-																				
2. Provider Age	24.96	2.26	.12	-																			
3. Provider Race	-	-	.22*	.07	-																		
4. Gender Pain IAT Score	.38	.29	-.18*	-.08	-.05	-																	
5. Female Pt Distress	64.95	14.12	.22*	.03	.13	-.01	-																
6. Male Pt Distress	62.79	15.77	.11	.02	-.03	.02	.83**	-															
7. Female Pt Interference	66.09	15.42	.18*	-.10	.14	-.05	.78**	.67**	-														
8. Male Pt Interference	64.42	16.78	.12	-.05	.07	-.03	.67**	.67**	.77**	-													
9. Female Pt Pain Reaction	46.91	14.63	.09	.11	-.16	.08	-.31**	-.23*	-.32**	-.22*	-												
10. Male Pt Pain Reaction	46.61	15.22	.07	.17	-.15	.10	-.33**	-.27**	-.32**	-.28**	.75**	-											
11. Female Pt Opioids	18.49	21.24	-.05	-.17	.00	-.10	.26**	.31**	.26**	.30**	-.26**	-.27**	-										
12. Male Pt Opioids	18.10	21.17	-.10	-.11	-.01	-.08	.26**	.34**	.29**	.36**	-.24**	-.26**	.95**	-									
13. Female Pt Non-opioids	78.82	21.00	-.04	-.11	-.07	.10	.14	.23**	.16	.14	.01	.07	.03	.03	-								
14. Male Pt Non-opioids	78.22	21.36	-.11	-.19*	.02	.04	.11	.19*	.10	.16	-.04	.01	.05	.05	.89**	-							
15. Female Pt Specialist	72.71	25.08	.09	-.17	-.11	-.09	.25**	.21*	.33**	.38**	-.28**	-.28**	.04	.03	.20*	.17*	-						
16. Male Pt Specialist	72.76	25.61	-.01	-.14	-.18*	-.14	.23**	.28**	.28**	.45**	-.29**	-.30**	.06	.07	.18*	.19*	.91**	-					
17. Female Pt Psychological Therapy	36.78	26.85	.18*	.17*	.01	-.18*	-.14	-.15	-.11	-.06	.24**	.21*	-.21*	-.22*	-.22*	-.19*	.07	.08	-				
18. Male Pt Psychological Therapy	37.88	27.22	.23*	.23**	-.05	-.19*	-.17	-.17	-.12	-.15	.18*	.22*	-.24**	-.23**	-.26**	-.30**	-.01	.02	.89**	-			
19. Female Pt Nutritionist	48.47	29.16	0.05	-.05	-.05	-.15	.10	.10	.17	.20*	-.07	-.10	.12	.12	-.18*	-.18*	.33**	.30**	.37**	.35**	-		
20. Male Pt Nutritionist	47.17	28.36	0.13	-.03	-.03	-.16	.12	.11	.18*	.22*	-.10	-.11	.15	.13	-.16	-.17	.37**	.34**	.39**	.39**	.95**	-	
21. Female Pt School Accommodations	52.55	24.79	0.06	.07	.15	-.10	.17	.11	.30**	.28**	-.23**	-.16	.36**	.37**	-.05	-.07	.26**	.20*	.09	.07	.26**	.27**	-
22. Male Pt School Accommodations	52.59	24.63	0.07	.12	.17	-.16	.20*	.18*	.29**	.24**	-.21*	-.15	.32**	.33**	-.05	-.09	.22*	.16	.11	.12	.27**	.29**	.90**

*p<.05, **p<.01

Table 4. Mean Ratings Across Patient Race and Gender Categories

	Race Category	Female Patients Mean	Female Patients SD	Male Patients Mean	Male Patients SD
Distress					
	White	64.24	15.36	61.16	17.81
	Black	65.62	15.13	64.43	16.14
Interference					
	White	65.46	16.62	62.05	18.77
	Black	67.00	16.01	66.78	17.71
Reaction to Pain					
	White	46.14	16.61	47.64	17.31
	Black	47.45	14.91	45.58	16.74
Opioids					
	White	17.36	21.99	16.68	21.39
	Black	19.33	22.13	19.53	22.47
Non-opioids					
	White	78.46	23.16	78.05	22.80
	Black	79.16	21.94	78.38	22.14
Specialist					
	White	71.95	27.13	71.78	27.11
	Black	73.42	25.24	73.75	26.37
Psychological Therapy					
	White	36.13	27.84	37.93	28.84
	Black	36.78	27.09	37.83	27.26
Nutritionist					
	White	48.57	30.61	46.75	29.55
	Black	48.92	28.95	47.59	29.11
School Accommodations					
	White	51.18	26.15	52.59	25.87
	Black	54.27	25.43	52.59	25.38

Note: VAS range = 0 - 100

Table 5. RMANOVAs of the Effect of Patient Race/Gender on Pain Assessment and Treatment Recommendations

Outcome	Predictor	*df*	*F*	*p*	partial η_p^2
Pain-related distress					
	Race	**1,128**	**10.78**	**< 0.01**	**0.08**
	Gender	**1,128**	**7.40**	**< 0.01**	**0.01**
	Race x Gender	1,128	1.46	0.23	0.01
Pain-related interference					
	Race	**1,128**	**17.01**	**< 0.01**	**0.12**
	Gender	1,128	3.48	0.06	0.03
	Race x Gender	1,128	3.76	0.06	0.03
Reaction to Pain					
	Race	1,128	0.20	0.66	0.00
	Gender	1,128	0.04	0.84	0.00
	Race x Gender	1,128	3.76	0.06	0.03
Opioids					
	Race	**1,128**	**12.33**	**< 0.01**	**0.09**
	Gender	1,128	0.17	0.68	0.00
	Race x Gender	1,128	0.33	0.57	0.00
Non-opioids					
	Race	1,128	0.40	0.53	0.00
	Gender	1,128	0.47	0.50	0.00
	Race x Gender	1,128	0.03	0.86	0.00
Specialist					
	Race	1,128	3.94	0.05	0.03
	Gender	1,128	0.01	0.93	0.00
	Race x Gender	1,128	0.07	0.80	0.00
Psychological Therapy					
	Race	1,128	0.10	0.76	0.00
	Gender	1,128	1.62	0.21	0.01
	Race x Gender	1,128	0.23	0.64	0.00
Nutritionist					
	Race	1,128	0.53	0.47	0.00
	Gender	1,128	3.76	0.06	0.03
	Race x Gender	1,128	0.07	0.79	0.00
School Accommodations					
	Race	1,128	3.37	0.07	0.03
	Gender	1,128	0.02	0.89	0.00
	Race x Gender	1,128	2.86	0.09	0.02

Note: Bolded result indicates statistically significant