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Patient race and opioid misuse history influence provider risk perceptions for future opioid-related problems.

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Abstract

In response to the dual public health crises of chronic pain and opioid use, providers have become more vigilant about assessing patients for risk of opioid-related problems. Little is known about how providers are making these risk assessments. Given previous studies indicating that Black patients are at increased risk for suboptimal pain care, which may be related to stereotypes about drug abuse, the current study examined how patient race and previous opioid misuse behaviors impact providers' risk assessments for future prescription opioid-related problems. Physician residents and fellows (N=135) viewed videos and read vignettes about 8 virtual patients with chronic pain who varied by race (Black/White) and history of prescription opioid misuse (absent/present). Providers rated patients' risk for future prescription opioid-related adverse events, misuse/abuse, addiction, and diversion, and also completed measures of implicit racial attitudes and explicit beliefs about race differences in pain. Two significant interactions emerged indicating that Black patients were perceived to be at greater risk for future adverse events (when previous misuse was absent) and diversion (when previous misuse was present). Significant main effects indicated that Black patients and patients with previous misuse were perceived to be at greater risk for future misuse/abuse of prescription opioids, and that patients with previous misuse were perceived to be at greater risk of addiction. These findings suggest that racial minorities and patients with a history of prescription opioid misuse are particularly vulnerable to any unintended consequences of efforts to stem the dual public health crises of chronic pain and opioid use.

Editor's note.

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Keywords

pain; opioids; risk; race; misuse

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Introduction

An extensive body of research indicates that Black patients are at increased risk for suboptimal pain care (Anderson, Green, & Payne, 2009; Green et al., 2003; Meghani, Byun, & Gallagher, 2012). The negative consequences of unrelieved pain can be dire, affecting multiple aspects of an individual's biological, psychological, and social functioning (Burke, Mathias, & Denson, 2015; Institute of Medicine and the Committee on Advancing Pain Research, 2011; McCarberg, Nicholson, Todd, Palmer, & Penles, 2008). These consequences are amplified in Black patients, who are already disproportionately burdened by other biopsychosocial hardships (Williams & Jackson, 2005). It is in this context that racial disparities in pain have been elevated to a pressing public health concern (Institute of Medicine, 2003; Institute of Medicine and the Committee on Advancing Pain Research, 2011).

Much of the prior research on pain treatment disparities focused on opioid medications, reflecting the fact that opioid pharmacotherapy for chronic pain was standard care at that time (Kroenke & Cheville, 2017; Meghani, Byun, & Gallagher, 2012). The preponderance of evidence indicated that providers were less likely to prescribe and administer opioids to Black than White patients with pain (Meghani, Byum, & Gallagher, 2012), and this disparity was interpreted to mean that Black patients were receiving less optimal care. Given the prevailing beliefs regarding opioid safety at the time, the extent to which the disparity reflects provider perceptions of patient risk has not been a major focus of this work. With recent attention to the opioid crisis among medical providers, policy makers, and the public at large, along with new evidence that questions the comparative effectiveness of opioids for chronic pain, clinical practice patterns have seen a dramatic shift in a relatively short period of time (Dowell, Haegerich, & Chou, 2016; Guy Jr et al., 2017; Krebs et al., 2018). Not only are providers more hesitant to prescribe opioids for chronic pain, they are also more carefully assessing patients for risk of developing opioid-related problems (Dowell et al., 2016). Given this changing landscape, it is critical to determine how providers are making these risk assessments and the extent to which disparities manifest in this context.

Two patient-level factors may be particularly relevant to providers' perceptions of risk for future opioid-related problems: race and previous misuse behaviors. As noted above, racial disparities are prevalent in pain care, with Black patients being especially likely to be under-treated for pain (Anderson, Green, & Payne, 2009; Green et al., 2003; Meghani, Byun, & Gallagher, 2012). These disparities have been observed across clinical settings and pain types, and they manifest for a range of treatments including opioid and non-opioid modalities (Carey & Garrett, 2003; Meghani et al., 2012; Taylor et al., 2005). A possible contributor to these treatment disparities is the widely held stereotype – among providers and the general public – that Black people are more likely to abuse drugs (Moskowitz, Stone, & Childs, 2012; Sigelman & Tuch, 1997; Welch, 2007). This stereotype stands in contrast to the evidence that Black people have lower rates of prescription opioid use disorders than White people (Han, Compton, Jones, & Cai, 2015). Drug abuse and addiction, particularly involving opioids, is highly stigmatized in society at large (Barry, McGinty, Pescosolido, & Goldman, 2014). This stigma even impacts patient care, limiting the

availability and delivery of evidence-based treatments and discouraging patients from seeking them (Olsen & Sharfstein, 2014). That is not to say that drug use (historical and/or concurrent) is clinically irrelevant. Indeed, in the context of opioid therapy, clinical guidelines and risk assessment tools emphasize previous misuse behaviors as a critical factor in judging patient risk for future opioid-related problems (Butler, Budman, Fernandez, & Jamison, 2004; Dowell et al., 2016; Webster & Webster, 2005). What is unclear is how providers make these risk assessments and how they might differ across patient groups. Collectively, these prior findings provide a strong rationale for examining how patient race and previous opioid misuse (independently and together) impact providers' risk assessments in the context of opioid therapy for chronic pain.

We tested two primary hypotheses in this study. First, we hypothesized that providers would perceive Black patients (race main effect) and patients with previous opioid misuse behaviors (misuse main effect) to be at greater risk for future prescription opioid-related problems compared to White patients and patients without previous opioid misuse behaviors, respectively. Second, we hypothesized that providers would perceive Black patients with previous opioid misuse behaviors (race X misuse interaction) to be at the greatest risk for future opioid-related problems. In addition to testing these hypotheses, we explored the extent to which providers' racial attitudes and beliefs impacted their risk assessments.

Methods

Participant Recruitment

Physician residents and fellows were recruited from academic training programs across the USA. Eleven programs, representing each of the 4 major geographical regions of the country (Northeast, Midwest, South, and West), were contacted. Study announcements were emailed to program administrators, who distributed them via internal listservs. Snowball sampling also occurred throughout the study. Interested parties contacted the research team by email or phone. Upon contact, additional information was provided, and potential participants were screened for eligibility. Inclusion criteria were: 18 years of age or older, enrolled in a medical residency or fellowship program, able to read and write in English, and access to a personal computer with high-speed internet. Participants who met these criteria were given access to the online study.

Design and Procedures

This study used a lens model design that allowed for the examination of how environmental cues affected participants' risk perceptions (Wigton, 1996). The lens model is an analogue method to examine decision-making. Inherent to this model is the assumption that individuals make decisions by attending to and weighing available information (cues) (Cooksey, 1996). Lens model studies typically present a series of profiles that contain cues that participants may use to make decisions. Each profile contains a unique combination of cues. The two cues of interest in the current study – patient race and history of prescription opioid misuse – were systematically manipulated to create 4 unique patient profiles (2 levels of race X 2 levels of misuse history). Patients also varied by sex equally across the two cues,

but sex was not included in the analyses reported herein. All other patient characteristics were matched across profiles. Although 4 unique patients are sufficient to represent each cue combination, we doubled this to create 8 unique patients (each cue combination presented in duplicate), thus enhancing the reliability of the data and maximizing statistical power (Cooksey, 1996).

Upon accessing the study website, participants read and signed an informed consent document. They then completed a demographics questionnaire and measures assessing implicit preferences and explicit beliefs. Immediately prior to the central task involving risk perceptions, providers received the following on-screen instructions: *"Imagine that you recently accepted a position as a primary care provider in a large healthcare system. Your practice setting has instituted policies encouraging providers to wean and/or discontinue use of opioids for chronic pain, particularly for patients deemed "at risk" for misusing/abusing prescription opioids. In the following section, you will be presented a series of patients who are coming to you for the first time to establish primary care with you as their provider. After watching the video and reading the clinical summary of each patient, indicate your assessment and treatment decisions for that patient. Although you do not have access to all possible information about these patients, do your best to make decisions like you would in real life clinical practice. A list of common opioid analgesics is available on each page for your reference."*

For each patient, providers were presented a video and vignette. The process of creating and validating these stimuli has been described elsewhere (Hirsh et al., 2019). Briefly, the videos depicted computer-simulated Virtual Patients sitting in an outpatient primary care room. The patients demonstrated facial and body expressions of low back pain in 20-second looped videos. Half of the patients represented the White racial group and half represented the Black racial group. Manipulation of the misuse history cue was achieved in the vignettes that accompanied the patients. Half of the patients were described as having previously used a prescription opioid in a way other than prescribed. These vignettes contained a random sampling of two of the following "yellow flag" misuse behaviors, which the patient reports having engaged in on occasion: taking an extra dose, losing the prescription, running out early, using a friend or family member's medication, requesting early refill. The other half reported having always taken their opioid medication as prescribed. All other clinical data (e.g., vital signs, pain report, treatment history) varied slightly across vignettes to enhance realism and task engagement but were otherwise equivalent. Patient profiles were presented in random order. Providers received a gift card for participating. The Indiana University Institutional Review Board approved this study.

Measures

Demographic and Clinical Questionnaire—Participants were queried about their age, gender, and race. They also completed items about their current training program, clinical specialty, primary care experience, chronic pain care experience, education/training in chronic pain and opioid prescribing, and familiarity with 2016 CDC guidelines for prescribing opioids for chronic non-cancer pain (Dowell et al., 2016).

Race Implicit Association Test (IAT)—Implicit attitudes about race were measured with the Implicit Association Test (IAT) (Greenwald, McGhee, & Schwartz, 1998). Participants categorized – as quickly as possible without making errors – facial images as depicting a White or Black person and evaluative words as good or bad (e.g., "pleasure" is a good word and "awful" is a bad word). Separate computer keys were used to make these categorical judgments. In one trial, participants were instructed to use the same key to indicate a White face or good word and a different key to indicate a Black face or bad word. In a second (reverse) trial, participants were instructed to use the same key to indicate a White face or bad word and a different key to indicate a Black face or good word. Faster responses to the White/good + Black/bad pairing than to the White/bad + Black/good pairing indicated an implicit preference favoring White over Black people. Participants received a d score ranging from −2 to +2, with positive values indicating a preference for White people and negative values indicating a preference for Black people (Greenwald, Nosek, & Banaji, 2003). A common rule of thumb is that values of 0.15–0.34 indicate slight preference, 0.35–0.64 moderate preference, and ≥0.65 strong preference (Greenwald et al., 2003; Project Implicit, n.d.).

Race/Ethnicity Expectations of Pain Questionnaire (REPQ)—Explicit stereotypical beliefs about race differences in pain were measured with the Race/Ethnicity Expectations of Pain Questionnaire (REPQ) (Wandner, Scipio, Hirsh, Torres, & Robinson, 2012). Participants rated their beliefs about how "typical" members of White and Black racial groups respond to pain. Two domains were assessed: pain sensitivity and willingness to report pain. Participants used computerized 0 (not at all sensitive) to 100 (most sensitive imaginable) scales to indicate their beliefs about how sensitive to pain the "typical" White and Black person are. A similar 0 (not at all willing) to 100 (most willing imaginable) scale was used to assess participants' beliefs about how willing to report pain the "typical" White and Black person are. The REPQ has been used in prior research on race and pain (Hollingshead, Meints, Miller, Robinson, & Hirsh, 2016; Wandner et al., 2012).

Risk Perceptions—For each patient, providers completed 4 items assessing their level of perceived risk.

Adverse Event.: "Rate this patient's level of risk for having an adverse event related to opioids (e.g., accidental overdose)." Responses were recorded on a scale from 0 (very low) to 4 (very high).

Misuse/abuse.: "Rate this patient's level of risk for misusing or abusing their pain medication." Responses were recorded on a scale from 0 (very low) to 4 (very high).

Diversion.: "How concerned are you about this patient diverting their pain medication (e.g., giving the medication to someone else to take)?" Responses were recorded on a scale from 0 (not at all concerned) to 4 (extremely concerned).

Addiction.: "How concerned are you about this patient becoming addicted to their pain medication?" Responses were recorded on a scale from 0 (not at all concerned) to 4 (extremely concerned).

Analyses

A power analysis was conducted for the primary analyses examining the extent to which patient race and previous opioid misuse behaviors influenced providers' risk perceptions. The following parameters were specified: n_p^2 = .01 (small effect size), p = .0125 (.05/4 to account for the 4 models described below), power = .8. This resulted in a sample size of 120, which was exceeded in the current study (N=135). Descriptive statistics were computed to characterize the study sample. To assess normality of the risk perception outcome variables, we examined their skewness and kurtosis values. Acceptable values for skewness and kurtosis are ±1.5 or ±2 (Field, 2000, 2009; Gravetter & Wallnau, 2014; Tabachnick & Fidell, 2013; Trochim & Donnelly, 2006). Values in the current study ranged from −.385 to .705 for skewness and −.905 to .867 for kurtosis, which are well within the acceptable limits. Normality was also supported by visual inspection of the histograms and Q-Q plots. As such, parametric-based analyses were used to examine risk perceptions. The mean and standard deviation of the race IAT score was calculated at the sample level, and a one-sample t-test was used to compare the sample mean to a no-preference neutral score of 0. Means and standard deviations were calculated separately for the White and Black REPQ items, along with a difference score (described below). Finally, repeated measures analyses of variance (RM-ANOVAs) were used to examine the extent to which patient race (White/Black) and previous opioid misuse behaviors (absent/present) influenced providers' perceptions of patient risk for future adverse events (model 1), opioid-related misuse/abuse (model 2), diversion (model 3), and addiction (model 4). When significant interactions were present, main effects were not reported. Bonferroni adjusted p-values were used to evaluate simple effects in the context of a significant interaction. Effect sizes for t-test and ANOVA analyses used the following benchmarks (Cohen, 1988; Richardson, 2011): d = .2 (small), .5 (medium), .8 (large) and n_p^2 = .01 (small), .06 (medium), .14 (large).

Results

Sample Demographics

The sample consisted of 135 participants (44% female, mean [SD] age = 30 years [2.5]). The self-reported racial breakdown was 72% White, 23% Asian, 4% mixed race, and 1% Black or African American. By comparison, the most recent data reported by the Association of American Medical Colleges indicated that approximately 36% of current, active physicians are female, 56% are White, 17% are Asian, and 5% are Black (Data, US Physician Workforce, 2019). All participants were physicians currently completing a medical residency (87%) or fellowship program (13%). The three practice specialties most frequently endorsed were family/internal/primary care medicine (19%), orthopedics (12%), and psychiatry (10%). Approximately 86% of participants reported having previous experience providing care in a primary care setting, and 89% reported previous experience providing care for patients with chronic pain. Despite this experience, most denied having received specialty training/education in chronic pain (84%). Most reported having received training in opioid prescribing (69%) but considerably fewer reported training in opioid tapering (31%). Fewer still reported having read the 2016 CDC guidelines for prescribing opioids for chronic non-cancer pain (14%).

Racial Attitudes and Beliefs

Results of the race IAT (M = 0.39, sd = 0.37) indicated that, at the sample level, there was a moderate implicit preference for White over Black people, which significantly and strongly deviated from a neutral score of 0 (t(133) = 12.23, p < .001, d = 1.05). In terms of explicit beliefs about race and pain, participants rated the "typical" White person (M = 56.27, sd = 11.65) as more sensitive to pain (t(129) = 3.31, p = .001, d_z = .29) than the "typical" Black person (M = 52.61, sd = 12.22); the effect size for this difference was small. Participants also rated the "typical" White person (M = 60.65, sd = 13.25) as more willing to report pain (t(131) = 5.48, p < .001, d_z = .48) than the "typical" Black person (M = 53.54, sd = 13.80); the effect size for this difference was medium. We explored the extent to which these implicit attitudes and explicit beliefs were associated with perceptions of patient risk. First, we created a difference score for explicit beliefs by subtracting participants' REPQ rating of pain sensitivity for the "typical" Black person from their rating of pain sensitivity for the "typical" White person. A difference score for REPQ ratings of willingness to report pain was computed similarly. Next, we computed correlation coefficients to examine bivariate associations between IAT / REPQ difference scores and risk perception ratings. An adjusted p-value of .01 was used given the multiple comparisons. None of the bivariate correlations was significant (M [SD] of all p-values was .47 [.26]; 95% CI .40, .54). Finally, multivariate associations were examined by including the IAT and REPQ difference scores in the RM-ANOVAs on risk perceptions. Neither the IAT nor the REPQ were significant in any of the 4 models (all p-values > .05), indicating that neither showed significant main or interaction effects. In other words, providers' implicit preferences (IAT) and explicit beliefs (REPQ) were not significantly associated with their perceptions of patient risk. Given these results, and for ease of presentation, IAT and REPQ scores were not included in the models reported below.

Risk Perceptions

Average scores of risk perceptions for White and Black patients across the 4 domains (adverse event, misuse/abuse, diversion, addiction) are presented in Table 1.

Adverse Event—Results of the RM-ANOVA on risk perceptions regarding adverse opioid-related events indicated a significant race X previous misuse behavior interaction (F(1, 134) = 5.54, p = .02, n_p^2 = .04, Figure 1); the effect size for this interaction was medium. Bonferroni corrected follow-up tests indicated that when previous misuse behaviors were absent, Black patients were perceived to be at greater risk for a future adverse event (p < .001). However, Black and White patients were perceived to have similar risk given a history of previous misuse behavior (p = .86).

Misuse/abuse—Results of the RM-ANOVA on providers' risk perceptions of prescription opioid misuse/abuse indicated significant main effects of patient race (F(1, 135) = 7.10, p = .009, n_p^2 = .05) and previous misuse behavior (F(1, 135) = 267.65), p < .001, n_p^2 = .67, Figure 2); the effect sizes were medium and large, respectively. Black patients and patients with previous misuse behavior were perceived to be at greater risk for future misuse/abuse of prescription opioids than were White patients and patients with no history of opioid misuse,

respectively. The race X previous misuse behavior interaction was not statistically significant ($p = .45$).

Diversion—Results of the RM-ANOVA on providers' concern about patients diverting their pain medication indicated a significant race X previous misuse behavior interaction ($F(1, 135) = 25.10$, $p < .001$, $n_p^2 = .16$, Figure 3); the effect size for this interaction was large. Bonferroni corrected follow-up tests indicated that when previous misuse behaviors were present, Black patients were perceived to be at greater risk for future diversion ($p < .001$). However, when previous misuse behaviors were absent, there was no significant race difference ($p = .09$).

Addiction—Results of the RM-ANOVA on concern about patients becoming addicted to their pain medication indicated a significant main effect of previous misuse behavior ($F(1, 135) = 133.44$, $p < .001$, $n_p^2 = .50$, Figure 4); the effect size was large. Providers expressed more concern about future addiction for patients with a history of prescription opioid misuse. Neither the main effect of race ($p = .33$) nor the race X previous misuse behavior interaction ($p = .65$) were significant.

Discussion

The current study is marked by several strengths and makes important contributions to our understanding of disparities in pain care. First, it is one of the few (if not the only) experimental studies on provider perceptions in the context of the dual public health crises of chronic pain and opioid use. The recent seismic shift in attitudes regarding the role of opioids in managing chronic pain necessitated a corresponding examination of how patient race and previous opioid use behaviors may interact to influence provider risk perceptions. Second, the virtual patient methodology allowed for a balance of high realism and high experimental control to isolate the effects of patient race and misuse history on these perceptions. Third, we included four different risk perception categories that are relevant in this context, which allowed for both comprehensive coverage and nuanced findings across the different categories.

The dual public health crises of chronic pain and opioid use have captured national and international attention, prompting major changes in public health policy and clinical care. Foremost among these changes is the reversal of a decades-long standard of practice in which opioids played a prominent role in chronic pain management. Providers are now more reluctant to prescribe opioid medications and more vigilant about assessing patients for risk of opioid-related problems (Dowell et al., 2016; Guy Jr et al., 2017; Kroenke & Cheville 2017). When such dramatic sociological changes occur, certain groups may be particularly vulnerable to the unintended and/or under-appreciated negative consequences of such shifts. In the context of chronic pain and opioids, our findings demonstrate that racial minorities and patients with a history of opioid misuse are two key vulnerable groups.

At perhaps the broadest level pertaining to risk for an *adverse event*, racial disparities depended upon whether patients had a history of opioid misuse. Racial disparities did not emerge among patients with a previous history of opioid misuse; rather, it was only among

patients who adhered to their previous opioid prescription that disparities manifested – specifically, that Black patients were perceived to be at greater risk for a future opioid-related adverse event than White patients. One interpretation of this medium sized interaction is that providers strongly weighted indicators of previous opioid misuse when making judgments about future risk for an adverse event. When previous misuse behaviors were documented, White and Black patients were judged similarly. In this way, previous misuse may function as an "equalizer" of sorts, overriding any stereotypes or biases that lead to greater suspicion/concern about certain (i.e., Black) patients. However, when such equalizing information is unavailable, there may be more room for racial stereotypes to intrude on the risk assessment process, thus leading to the perception that Black patients are at greater risk. This interpretation is consistent with a dual process perspective wherein ambiguous situations are more likely to give rise to biased judgments (Burgess, van Ryn, Crowley-Matoka, & Malat, 2006). Through this lens, a previous history of opioid misuse reduces ambiguity by providing clear and clinically relevant information. By contrast, a lack of such information introduces more ambiguity (patients may intentionally or unintentionally misreport previous adherence), thus allowing for more biased decision-making.

Interestingly, racial disparities in risk perceptions about *diversion* also depended on misuse history but in a different way and more strongly, as indicated by a large effect size. Only in the context of a history that was positive for misuse behaviors were Black patients perceived to be at greater risk for future opioid diversion. One possible explanation for these seemingly divergent results concerns the nature of the risk category. Although it is not entirely clear how providers defined an adverse event, the wording of the item, as well as the parenthetical example of an accidental overdose, implies an external locus of control. That is, adverse events might be perceived as unintended occurrences that happen to patients. Conversely, medication diversion is typically considered to be intentional – something a patient knowingly does – reflecting an internal locus of control (Ajzen, 2002). The intentionality of diversion may align with negative preconceived notions about Black people, drug use, and criminality (Moskowitz, Stone, & Childs, 2012; Sigelman & Tuch, 1997; Welch, 2007), giving rise to the perception that Black patients with a history of opioid misuse (the operationalization of which conveyed an internal locus of control) are at particularly high risk for future diversion.

Main effects of patient race and misuse history were found for provider risk perceptions about future opioid *misuse/abuse*. Because the latter is relatively straightforward and intuitive – "past is prelude" – we focus on the medium sized race effect here. Black patients were perceived to be at greater risk for future opioid misuse/abuse than White patients. This racial disparity was evident regardless of patients' previous history of misuse. The same racial stereotypes about drug use that were discussed in regard to opioid diversion may also apply here. An additional stereotype about treatment adherence may also be relevant. Studies have identified implicit and explicit stereotypes that Black patients are less adherent to treatment than are White patients. For example, Cooper and colleagues (2012) found that clinicians had a strong implicit association between Black race and treatment non-compliance, which mirrored their explicit perceptions that Black patients are less cooperative than White patients. Moreover, this stereotyping was associated with several

interpersonal aspects of patient care. The existence of such stereotypes seems clear. But what do the data say about actual race differences in treatment adherence? In short, it depends. Specific to the opioid crisis, evidence suggests that while racial minorities have higher rates of nonmedical use of prescription opioids, they have lower rates of prescription opioid use disorders (Han et al., 2015). In regards to treatment adherence more generally, a considerable body of evidence indicates that racial minority patients have lower adherence (Lewey et al., 2013; Simoni et al., 2012; Vaidya, Gabriel, Patel, Gupte, & James, 2019; Xie, Clair, Goldman, & Joyce, 2019). For example, Xie and colleagues (2019) analyzed longitudinal claims data from a US-based insurance provider to assess patient adherence to oral antidiabetic (N=56,720), antihypertensive (N=156,468), and antihyperlipidemic (N=144,673) medications. The results indicated that rates of adherence among Black patients were substantially lower than among Whites, and this difference was driven by inconsistent pill-taking rather than medication discontinuation. The contributors to these race differences in adherence are multifactorial – there is substantial causal density. Mutual mistrust between patients and providers, along with patient perceptions of discrimination, are key among them and may result in a self-perpetuating feedback loop. Black patients are more mistrustful of providers and experience more healthcare discrimination than their White counterparts (Dovidio et al., 2008). This mistrust and discrimination, combined with the fact that many providers harbor negative stereotypes – particularly related to drug abuse and/or medication adherence – about Black individuals (Bogart, Catz, Kelly, & Benotsch, 2001; Moskowitz, Stone, & Childs, 2012; Sigelman & Tuch, 1997; Welch, 2007), may lead to worse care (e.g., greater scrutiny, less trust) and worse patient engagement (e.g., poorer communication, lower activation) (Benkert, Peters, Clark, & Keves-Foster, 2006; Hibbard et al., 2008; Palmer et al., 2014). The magnitude of this issue is only heightened by the prevalence and consequences of chronic pain, particularly in racial minorities, the risks associated with opioids, and the uneven access to multidisciplinary treatment options.

The final risk category, opioid *addiction*, showed only a history effect. Patients with a previous history of opioid misuse behaviors were perceived to be at considerably greater risk for future opioid addiction. This too seems relatively straightforward. Perhaps more interesting is the lack of a race effect. Although one should tread lightly when interpreting non-significant findings, the following question might warrant pondering: Given the race-drug use stereotypes discussed above, why were Black patients not perceived to be at greater risk for addiction? One possible explanation concerns the substance at issue – prescription opioids. Data suggest that the recent opioid crisis has largely affected White Americans, which has been reflected in numerous media portrayals (Addison, 2019, July 18; Galvin, 2019, February 11; Hansen & Netherland, 2016; Healy, 2019, February 11; Johnson, 2016). As such, although providers may hold stereotypes about Black people being more prone to drug addiction in general (Welch, 2007), this may not translate to prescription opioid addiction in particular. Also of potential relevance is the fact that of the four risk categories assessed herein – adverse event, misuse/abuse, diversion, and addiction – providers rated risk for addiction the highest. The high salience of addiction may constrain the emergence of any racial biases in perceived risk. However, we must reiterate that these are speculative explanations of a null result and, thus, should be interpreted cautiously.

Our findings on provider risk perceptions should be considered in light of data on opioid safety. Unfortunately, the availability and quality of such data are limited (Coyle et al., 2017; Ranapurwala et al., 2018). The most comprehensive data are on incidence of overdose, which overlaps with our risk category of adverse event. A recent meta-analysis of over 11 million patients found that the rate of unintentional prescription opioid overdose ranged from 0.04% to 0.60%, with higher doses associated with increased incidence (Adewumi et al., 2018). Another meta-analysis of over 300,000 patients examined incidence of opioid dependence or abuse disorders after exposure to prescribed opioid analgesics (Higgins, Smith, & Matthews, 2018) – this study best maps onto our risk categories of misuse/abuse and addiction. The pooled incidence was 4.7%, but there was substantial variability across studies (0.2% – 34.2%) (Higgins, Smith, & Matthews, 2018). Finally, despite considerable attention on reducing prescription opioid diversion, data on its incidence are relatively sparse. An analysis of 2009-2015 data from the Researched Abuse, Diversion and Addiction Related Surveillance (RADARS®) System found a downward trend in the population-adjusted rate of diversion for both immediate release (IR) and extended release (ER) opioids. In the final capture period of 4th quarter 2015, the diversion rate was 0.709 for IR and 0.116 for ER opioids per 100,000 population (Iwanicki et al., 2016). It is anticipated that sustained efforts to monitor prescription opioids (Prescription Drug Monitoring Program Training and Technical Assistance Center, 2018) will yield better data, leading to providers' risk assessments that are evidence-based and more equitably applied across patients.

In discussing our primary findings on provider risk perceptions, stereotypes were frequently mentioned. Although we did not specifically measure provider stereotypes about drug abuse or treatment adherence, we did measure general implicit associations about race (IAT) and explicit beliefs about race differences in pain (REPQ). Consistent with prior studies, providers demonstrated an implicit preference for White over Black people (FitzGerald & Hurst, 2017) and explicit beliefs that White people are more sensitive to and willing to report pain than Black people (Hollingshead et al., 2016; Wandner et al., 2012). Nevertheless, these implicit preferences and explicit beliefs were not associated with perceptions of patient risk. It should be noted that the IAT assesses general implicit preferences, perhaps reflecting specific stereotypes but not actually measuring them. Thus, the lack of an IAT effect does not negate interpretation of the risk perception findings through the lens of stereotyping. Regarding explicit beliefs, although this study involved chronic pain, providers were not asked to make pain assessment ratings, which might be more relevant to REPQ items about race differences in sensitivity and willingness. Future studies might build on the current one by including implicit and explicit measures of racial stereotypes about drug use, adherence, and pain. Results of such work might identify specific biases to target for interventions to reduce racial disparities in risk perceptions.

Future studies might also examine how patient sex impacts provider risk assessments for opioid-related problems. The 2016-2017 National Survey on Drug Use and Health indicated that men were more likely than women to misuse prescription opioids (Griesler et al., 2019). However, deaths from prescription opioid overdoses have been increasing more rapidly among women than men (Centers for Disease Control and Prevention, 2018). The male-female gap in rates of substance use disorders more generally is also narrowing (McHugh et al., 2018). It will be important for future studies to determine whether and how such trends

affect provider risk perceptions regarding prescription opioids for chronic pain, as well as the consequences of such effects (e.g., impact on pain care and/or referral to substance use services).

Scaling out even further, the current results can be considered in the context other health conditions that may entail treatment with controlled substances and, thus, that require providers to assess for patient risk. Like in pain, racial disparities have been identified in these treatment decisions. For example, Peters and colleagues found that White patients were more likely than racial minority patients to receive a benzodiazepine prescription at discharge from psychiatric inpatient care (Peters et al., 2015). Racial disparities in benzodiazepine prescriptions were also observed in health record data from an urban healthcare system (Cook et al., 2018). Of particular relevance to the current study, racial minorities were more likely than Whites to only have one benzodiazepine prescription, suggesting potential disparities in discontinuation. Although they did not measure provider risk perceptions, the authors discussed such perceptions as a candidate mechanism, given that Black patients are more likely to be assessed as at risk for substance abuse and noncompliance (Van Ryn & Burke, 2000). Noting the paucity of research in this area, the authors called for future studies on physician perceptions of patient risk for benzodiazepine misuse. We echo their call and extend it to other relevant conditions and treatments.

Our study has several limitations. Despite the enhanced realism of the virtual patient methodology, it is still an analogue of real-life clinical care. Although the sample roughly approximated the demographic characteristics of US physicians overall (Data, US Physician Workforce, 2019), it nevertheless lacked racial diversity. Because only 1% of study participants were Black, future research should examine whether our findings vary with physician race. Relatedly, the sample consisted of early-career physicians who naturally have less clinical experience than more seasoned practitioners. It remains to be seen whether and how professional experience impacts opioid-related risk perceptions.

We are still at the early stages of understanding the contributors to and consequences of the dual public health crises of chronic pain and opioid use. As research and practice rush to catch up, already vulnerable patients are at further risk of bearing the unintended consequences of a rapidly changing clinical landscape. Attention to these issues is paramount so as to minimize the possibility of creating new crises while attempting to solve the current ones.

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Public significance statement: This study found that, in the context of chronic pain care, patient race and previous opioid misuse impact providers' risk assessments for future opioid-related problems. These findings suggest that efforts to address the dual public health crises of chronic pain and opioid use may have unintended negative consequences for certain patient groups.

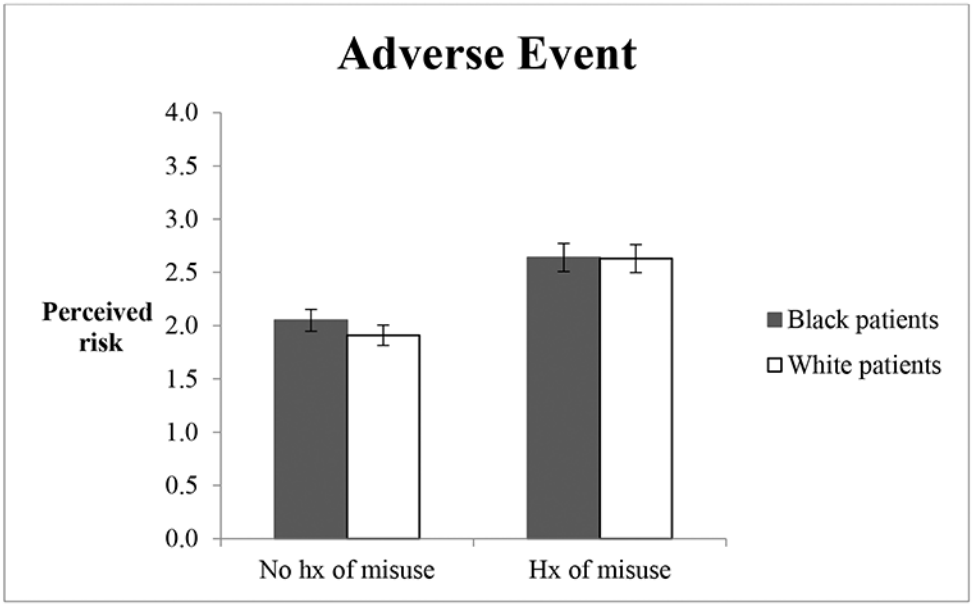

Figure 1. Risk Perception of an Adverse Opioid-related Event

Note: Estimated marginal means and 95% CI bars are displayed. Perceived risk ratings range from 0 to 4 with higher numbers representing greater risk.

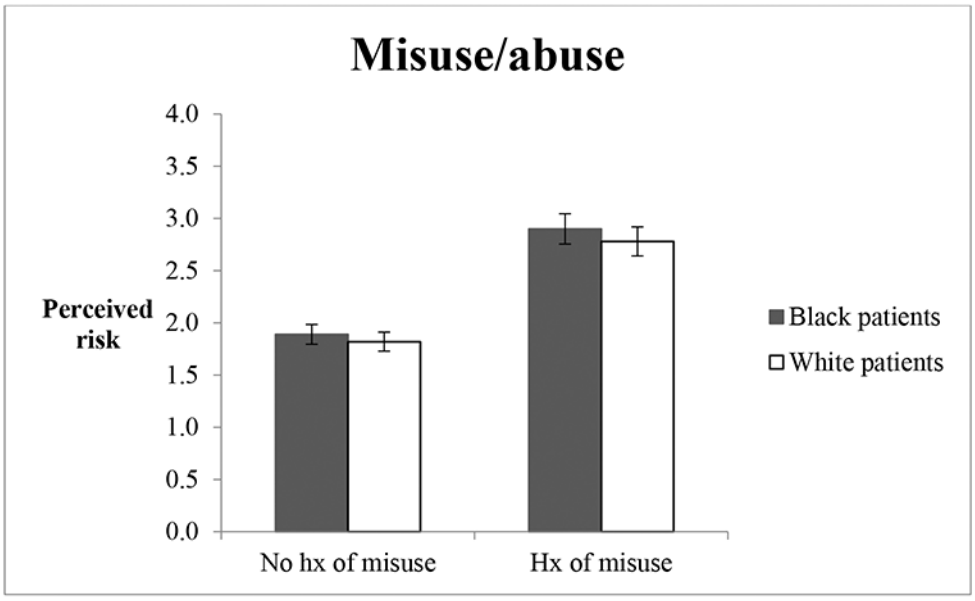

Figure 2. Risk Perception of Prescription Opioid Misuse/abuse

Note: Estimated marginal means and 95% CI bars are displayed. Perceived risk ratings range from 0 to 4 with higher numbers representing greater risk.

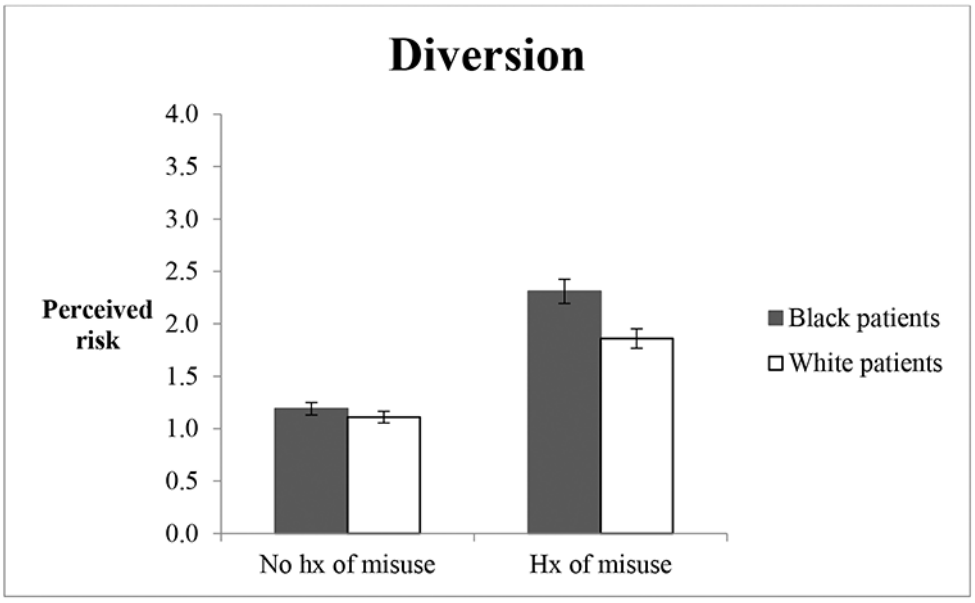

Figure 3. Concern about Opioid Diversion

Note: Estimated marginal means and 95% CI bars are displayed. Perceived risk ratings range from 0 to 4 with higher numbers representing greater risk.

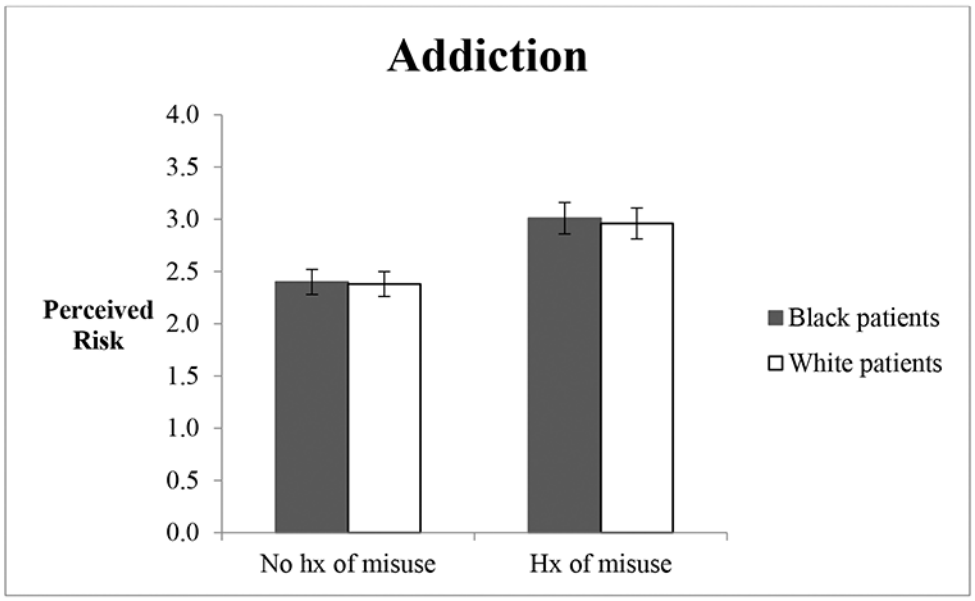

Figure 4. Concern about Addiction

Note: Estimated marginal means and 95% CI bars are displayed. Perceived risk ratings range from 0 to 4 with higher numbers representing greater risk.

Table 1

Risk Perceptions across Patient Race and Misuse Categories (N=135)

Perceived Risk	Patient Race	History of misuse			No history of misuse		
		Mean	SD	Range	Mean	SD	Range
Adverse event	Black	2.64	0.71	1-4	2.04	0.78	0-4
	White	2.63	0.69	1-4	1.91	0.74	0-4
Misuse/abuse	Black	2.90	0.65	1-4	1.89	0.77	0-4
	White	2.78	0.70	0.5-4	1.82	0.78	0-4
Diversion	Black	2.31	0.98	0-4	1.11	0.81	0-4
	White	1.86	0.92	0-4	1.19	0.79	0-4
Addiction	Black	3.01	0.72	1-4	2.40	0.94	0.5-4
	White	2.96	0.73	1-4	2.38	0.97	0.5-4