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EXAMINING THE INFLUENCE OF HISPANIC ETHNICITY AND ETHNIC BIAS ON MEDICAL STUDENTS' PAIN DECISIONS

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EXAMINING THE INFLUENCE OF HISPANIC ETHNICITY AND ETHNIC BIAS
ON MEDICAL STUDENTS' PAIN DECISIONS

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ABSTRACT

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Hispanic patients receive disparate pain care compared to non-Hispanic White (NHW) patients. Healthcare providers' ethnic bias may be one reason for pain disparities. This investigation sought to determine the influence of Hispanic ethnicity and ethnic bias on chronic pain management decisions. During an online experiment, 97 medical students made pain assessment and opioid treatment decisions for Hispanic and NHW virtual human patients with chronic pain. They also completed explicit and implicit measures of ethnic bias. Individual-level analyses found that 31% and 36% of participants demonstrated large effect sizes ($d_z \geq .50$), indicating that patient ethnicity strongly influenced their pain assessment and opioid treatment decisions, respectively. At the group level of analysis, participants' decisions did not differ significantly between NHW and Hispanic patients (all p values $> .05$). Participants did not report significant explicit ethnic bias ($t[96]=1.88$, $p=.06$; $d_z=.19$; Hispanic mean rating=77.6[SD=18.7]; NHW mean rating=75.2[SD=19.4]) but demonstrated a small-to-moderate implicit preference for NHWs relative to Hispanics (Mean=.31[SD=.41]). Patient ethnicity and implicit ethnic bias had an interactive effect on opioid treatment decisions ($F[1, 95]=5.15$,

$p < .05$, $\eta_G^2 = .02$); however, the direction of the effect was not as hypothesized.

Participants with higher implicit ethnic bias gave significantly higher opioid ratings to Hispanics relative to NHWs ($p = .05$), whereas participants with lower bias gave marginally higher opioid ratings to NHWs relative to Hispanics ($p = .20$). Participants with higher vs. lower implicit ethnic bias differed only in their treatment ratings for NHW patients, such that participants with lower bias gave significantly higher opioid ratings to NHW patients than did participants with higher bias ($p < .05$). This investigation found that approximately one-third of participants made significantly different chronic pain management decisions for Hispanic vs. NHW patients. Participants' implicit ethnic bias interacted with their opioid treatment decisions but not as expected. Future investigations should measure healthcare providers' stereotypes about Hispanic patients with pain as this may better predict their pain decisions.

INTRODUCTION

Chronic pain is a public health burden that affects over 100 million Americans (Institute of Medicine, 2011). The number of individuals experiencing chronic pain exceeds the number of people with cancer, heart disease and diabetes combined (Institute of Medicine, 2011). Chronic pain is defined as pain that persists beyond 3-6 months or the “expected period of healing” (pg. 13, Flor & Turk, 2011). Chronic pain is difficult to manage, and treatment often includes both pharmacological (e.g., opioid medications, non-steroidal anti-inflammatory drugs [NSAIDS]) and non-pharmacological (e.g., physical therapy, diet and exercise) modalities (Chou et al., 2007; Institute of Medicine, 2011).

Although chronic pain is widely prevalent, many patients receive inadequate pain management (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; Brennan, Carr, & Cousins, 2007); this is particularly true for racial/ethnic minorities (Anderson, Green, & Payne, 2009; Meghani, Byun, & Gallagher, 2012; Tait & Chibnall, 2014). To date, the pain disparities literature has focused largely on non-Hispanic Black (NHB) and non-Hispanic White (NHW) differences. Clinical investigations have found that NHB patients are less likely than NHW patients to be treated with analgesic medication, particularly opioids, for chronic pain (Chen et al., 2005; Meghani, Byun, et al., 2012; Morasco, Duckart, Carr, Deyo, & Dobscha, 2010; Tamayo-Sarver, Hinze, Cydulka, &

Baker, 2003). Providers' racial bias has been identified as one reason for these differences in treatment (Anderson et al., 2009; Green et al., 2003; Meghani, Byun, et al., 2012; Mossey, 2011; Tait & Chibnall, 2014).

Hispanic Americans are also at risk for suboptimal pain care. There is some evidence to suggest that Hispanics are at risk of having their pain underassessed by healthcare providers (Anderson et al., 2000; Calvillo & Flaskerud, 1993). Hispanics also receive less treatment for their pain, particularly opioid medications, than their NHW counterparts (Meghani, Byun, et al., 2012; Todd, Deaton, D'Adamo, & Goe, 2000). A 2012 meta-analysis found that, compared to NHW patients, Hispanics were 22% less likely to receive an opioid prescription for any type of pain and 30% less likely to receive an opioid for non-traumatic/nonsurgical pain (Meghani, Byun, et al., 2012).

Reasons for these disparities have not yet been elucidated. This is striking given that the Hispanic population is one of the fastest growing demographic groups in the U.S. and face significant barriers to healthcare (Brown, Ojeda, Wyn, & Levan, 2000; Ennis, Rios-Vargas, & Albert, 2011). Compared to NHWs, NHBs, Asians, and American Indians/Alaskan Natives, Hispanics have the largest proportion of individuals living in poverty and the highest rates of being uninsured (Brown et al., 2000). One national survey found that Hispanic ethnicity and speaking Spanish were significant predictors of lower access to chronic pain treatment (Nguyen, Ugarte, Fuller, Haas, & Portenoy, 2005). In addition, Hispanics are more often employed in occupations that predispose them to pain (Anderson, Hunting, & Welch, 2000; Institute of Medicine, 2009; U.S. Bureau of Labor Statistics, 2012). These factors can lead to prolonged pain and suffering for Hispanics, which can be compounded by inadequate pain care.

Little is known about the provider factors that contribute to pain treatment disparities for Hispanic patients. Providers' attitudes about Hispanics likely contribute to these disparities. Dual Process Models of decision making posit that individuals may hold explicit and implicit attitudes that are contradictory (e.g., they may explicitly deny ethnic bias, while implicitly preferring NHWs relative to Hispanics; Burgess, van Ryn, Crowley-Matoka, & Malat, 2006; Evans, 2008). Previous investigations of racial bias have found that many individuals endorse explicit egalitarian attitudes about race while holding implicit racial biases (Dovidio & Fiske, 2012). However, these findings may not extend to attitudes towards Hispanics. Hispanic individuals endure explicit discriminatory attitudes in the U.S., particularly in regards to their perceived disinterest in integrating culturally into U.S. society (e.g., speaking Spanish) and their immigration status (Chavez, 2013). These explicit views have been used to promote anti-immigration laws and reinforce unfair hiring practices (Chavez, 2013; Institute of Medicine, 2009). One survey found that NHW laypersons explicitly rated Hispanics as more "unintelligent", "violent", "lazy", "welfare dependent", and "unpatriotic" relative to NHWs (Wilson, 1996). To the investigator's knowledge, only one study has measured healthcare providers' ethnic bias. That investigation found primary care providers did not report explicit ethnic bias but displayed an implicit preference for NHWs relative to Hispanics (Blair et al., 2013). Additional studies are needed to better understand healthcare providers' ethnic bias, in particular, and the extent to which this bias is associated with their pain decisions.

Because previous ethnic disparities studies were observational in nature and lacked experimental control, it is unclear whether pain management disparities were due to the patients' ethnic group per se or due to other clinically-relevant variables (e.g.,

language barriers, access to care barriers). Previous research examining racial disparities have relied on experimental methods to help rule out such confounds (Hirsh et al., 2013; Hollingshead, Matthias, Bair, & Hirsh, 2014; Stepanikova, 2012). To date, only one pain-related study has examined Hispanic ethnicity using experimental methods (Tamayo-Sarver, Dawson, et al., 2003). The results indicated that providers made similar opioid recommendations for a Hispanic, NHW, and NHB patient presenting with either migraine headache, low back pain, or ankle fracture (Tamayo-Sarver, Dawson, et al., 2003). However, that study used a traditional paper-pencil vignette approach, included only 3 text-based vignettes (1 Hispanic, 1 NHW, 1 NHB), and did not examine judgments about pain assessment. These limitations raise concerns about the ecological validity and generalizability of their findings. Novel experimental methodology, such as lens model design and virtual human (VH) technology, can help address these limitations and facilitate a better understanding of ethnic disparities in pain care.

In the current study, I used experimental methods to examine the influence of Hispanic ethnicity on medical students' chronic pain assessment and opioid treatment decisions. I also measured medical students' explicit and implicit ethnic bias in order to examine the influence of ethnic bias on their chronic pain management decisions. I hypothesized that: [1] participants will give lower pain assessment and opioid treatment ratings to Hispanic patients relative to NHW patients, [2] participants will express explicit and implicit ethnic bias towards Hispanics relative to NHWs, and [3] participants with higher ethnic bias will demonstrate greater disparities in their pain management decisions for Hispanic vs. NHW patients than participants with lower ethnic bias.

METHODS

Participants

Medical students were recruited from Midwestern medical schools via e-mail. Medical students were chosen because they are currently engaged in aspects of patient care and will be independent physicians in the near future. Participants were informed that the purpose of the study was to examine how healthcare providers make chronic pain management decisions but were not given information about the aims or hypotheses. In order to be eligible for the study, interested participants had to: [1] be 18 years of age or older, [2] be currently enrolled as a medical student, [3] have access to a computer with high speed internet, and [4] confirm their university affiliation by responding to the screening items with a university email address.

Procedure

Eligible participants accessed the online study using a unique username and were directed to one of two online versions of the study. After logging in, all participants were asked to give informed consent and provide demographic information. Participants were then directed to either an instructions page and asked to make chronic pain management decisions for 8 VH patients or completed the explicit and implicit measures of ethnic bias; participants then completed the remaining task. Finally, participants were asked to guess

at the purpose of the investigation. The study took no more than 1 hour to complete and participants were compensated with a \$30 Amazon.com e-gift card.

Methodology

This investigation employed a lens model design. Lens model designs are well-suited for examining medical decision making, as they require multiple ratings for each patient-type and allow for more reliable results (Doherty & Kurz, 1996; Wigton, 1996). The lens model design of the current study allowed for a quantitative estimate of how influential ethnicity was in participants' decisions, while holding other confounding variables constant (Wigton, 1996).

This investigation used VH technology to examine the influence of ethnicity on participants' pain management decisions. The use of VH patients allows for more experimental control than retrospective clinical studies and greater realism than pencil and paper vignette approaches. This novel approach also allows for more experimental control than can be achieved with live actors (e.g., pain behaviors, attractiveness). The computer-simulated patients were developed using *The Sims 3* software (Electronic Arts; Redwood City, CA). Participants were presented with 8 videos of VH patients (4 Hispanic, 4 NHW) with accompanying text vignettes. Each video consisted of a VH with prototypical features of Hispanic or NHW ethnicity (i.e., Hispanic patients had darker skin, brown hair, and brown eyes relative to NHWs) who demonstrated mild or severe pain behaviors (see Figure 1). The accompanying text vignettes included a common surname from each ethnic group (e.g., Mr. Rodriguez, Mr. Smith) and included

information that was formatted like a medical record. Patients were described as having chronic low back pain that began after an incident 1 year ago. Specific features of the pain were described, including objective diagnostic findings, exacerbating/relieving factors, and medical history. The specific text (e.g., patient name, details of the clinical situation) varied to increase study realism, but was equivalent across patients. Vital sign information was presented and varied minimally within normal limits. Gender and pain behaviors were counterbalanced across vignettes.

Study stimuli were piloted with 48 undergraduate students at IUPUI. After viewing the patient videos and reading the clinical vignettes, students were asked to identify whether the patients' ethnicity was Hispanic or NHW. The majority of participants correctly identified the ethnicity of the 4 NHW patients (% correct range=89.6%-97.9%) and 4 Hispanic patients (% correct range=75%-87.5%). These results support the validity of the ethnicity manipulation.

Measures

Demographics questionnaire. Participants provided information about their age, sex, race, and ethnicity. They also indicated their medical school training year and clinical experience with chronic pain on a visual analogue scale (VAS) from 0 (*not at all experienced*) to 100 (*very experienced*).

Pain management decision items. Participants made pain assessment and treatment decisions for the 8 VH patients. Participants rated pain intensity on a VAS from 0 (*no pain*) to 100 (*extreme pain*). Participants also rated their likelihood to prescribe an

opioid analgesic to relieve the patient's pain on a VAS from 0 (*not at all likely*) to 100 (*very likely*).

Explicit ethnic bias. Explicit ethnic bias was assessed using two standard Feeling Thermometer scales. Participants rated their feelings towards Hispanic Americans and NHW Americans on separate 0 (*extremely cold or unfavorable*) to 10 (*extremely warm or favorable*) VASs. Feeling Thermometers are widely used, reliable, and precise ways to assess feelings/attitudes towards different groups. The Feeling Thermometers used in this study are consistent with those used in a previous study on explicit ethnic bias (Blair et al., 2013).

Implicit ethnic bias. Participants' implicit ethnic bias was assessed using the Implicit Association Test (IAT). The IAT measures the relative association strength of target concepts with evaluations. Participants categorized names as Hispanic (i.e., Carlos, Jose, Miguel, Maria, Juanita, Consuelo) or NHW (i.e., Charles, Robert, Patrick, Nicole, Jenna, Catherine) and evaluative words as good or bad. On critical trials, participants press one key if the stimulus is a Hispanic name or a good word and press a different key if the stimulus is a NHW name or a bad word. On reverse trials, the categories Hispanic and bad share a response key, and NHW and good share a different response key. The order of trials is counterbalanced across participants. A response time difference is calculated by comparing the combined critical trials to the combined reverse trials. Faster responses for the *NHW+Good/Hispanic+Bad* compared to responses for the *Hispanic+Good/NHW+Bad* indicate an implicit/automatic preference for NHWs relative to Hispanics. Scores can be characterized as "slight" (.15), "moderate" (.35), or "strong" (.65; <https://implicit.harvard.edu/implicit/demo/background/raceinfo.html> [Accessed on

February 26, 2016]). The IAT demonstrates good reliability and validity and is less susceptible to social desirability than explicit measures (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). This study used the same IAT that was successfully piloted in a previous investigation (Weyant, 2005).

Guess at study purpose. Participants were asked to guess the purpose of the study in order to rule out the effects of social desirability on participants' decisions and the study results. Open text box responses were coded as either being *aware* or *unaware* of the study's purpose by two independent coders; discrepancies were resolved by the study investigator.

Statistical analyses

Descriptive statistics were used to characterize the sample and ensure data quality. All analyses were performed using SPSS Statistics version 23.0 (IBM Corp; Armonk, NY).

For the first hypothesis, data were examined at the individual- and group-level. Dependent samples t-test analyses were used to examine the influence of ethnicity on each participant's pain management decisions (pain assessment, opioid treatment recommendation). Frequency analyses were used to characterize individual-level results by the p-value (alpha levels of .05 and .10) and the effect size (Cohen's d_z for paired samples; $d_z < .20$ =small effect, $d_z < .50$ =medium effect, $d_z < .80$ =large effect, $d_z \geq .80$ = larger effect). For group-level analyses, participants' pain assessment ratings were averaged for Hispanic and NHW patients; averages were also calculated for participants' opioid treatment decisions. Separate Pearson's correlations were used to examine the

relationship between participants' pain assessment and opioid treatment decisions for Hispanic, NHW, and all (Hispanic + NHW) patients. Dependent samples t-tests were used to compare pain management decisions between Hispanic and NHW patients. Cohen's d_z for paired samples was calculated to determine effect size.

Descriptive statistics were used to characterize responses to the explicit and implicit bias measures for the second hypothesis. Dependent samples t-tests examined differences in thermometer ratings for Hispanic and NHWs. A difference score was calculated for participants by subtracting their Hispanic rating from their NHW rating to represent participants' explicit bias; higher scores indicate more negative bias against Hispanics. Participants were coded as having higher (score >0) or lower (score ≤ 0) explicit bias. Participants were also coded as having higher (score $>$ IAT mean score) or lower (score \leq IAT mean score) implicit bias. Correlation analyses examined the relationship between the explicit difference and implicit bias scores.

For my final hypothesis, repeated measures analysis of variance (rANOVA) with Bonferroni-corrected pairwise comparisons examined the influence of ethnicity and ethnic bias on pain management decisions. Averaged ratings for Hispanic and NHW patients were used to examine the main effect of ethnicity on participants' pain assessment and opioid treatment decisions. Explicit and implicit biases (coded as described above) were also included in separate models as the between-subjects factor to examine the presence of an ethnicity X bias interaction. Generalized eta-squared (η_G^2) and partial eta-squared (η_P^2) coefficients were calculated for effect size.

Power analysis

The current investigation was powered for individual-level analyses as specified by the lens model design. Lens model studies recommend a 5:1 vignette-to-cue ratio (Cooksey, 1996). This minimum was exceeded in the current study by using 8 vignettes to 1 cue of interest (i.e., ethnicity), which enhances the reliability of participants' ratings and increases study power. Sample size was determined based on the results of previous work using a similar design (Hirsh et al., 2013; Hollingshead et al., 2014), a study measuring primary care providers' attitudes towards Hispanics (Blair et al., 2013), and a Monte Carlo simulation.

RESULTS

Participants

One-hundred thirty-eight individuals expressed an interest in the study. Of these individuals, 9 did not respond to the screener items and 8 did not meet eligibility requirements (i.e., not medical students). Recruitment ceased after 120 individuals were given usernames; 113 participants completed the study.

Data were checked for violations of normality, outliers, and missingness. While some outliers were detected (responses converted to z-scores, outliers were values +/-3), examination of the data indicated that the pattern of responding for each case did not appear random. Thus, these cases were retained without any transformation. Five participants met exclusion criteria for their IAT performance (i.e., they had trials over 10,000 msec or had >10% of trials under 300 msec; Greenwald, Nosek, & Banaji, 2003). Nine users had incomplete or missing explicit bias ratings. Two participants had incomplete vignette ratings. This resulted in 97 participants with complete data.

Independent samples t-test and cross-tabulation analyses were used to detect any differences between participants with missing and complete data. Both groups of participants were similar on demographic characteristics, ethnic bias scores, and the majority of their averaged pain management ratings (all p values >.05). Compared to participants with complete data, participants with missing data gave significantly higher

opioid treatment ratings to Hispanics ($t[109]=2.78$, $p<.01$, $d=.80$), NHWs ($t[109]=3.90$, $p<.001$, $d=1.12$), and overall (i.e., average of opioid ratings across all 8 patients; $t[109]=3.13$, $p<.01$, $d=.90$). These findings suggest participants with missing data gave significantly higher opioid ratings to all patients, regardless of patient ethnicity. No differences were detected when analyses were run with and without participants with missing data. Thus, for ease of interpretation, I only present results on the sample of 97 participants.

Participants' self-reported demographic characteristics are reported in Table 1. The average age of the sample was 25.0 ($SD=2.15$) and the majority of the participants were women (52.6%). The sample identified as mostly non-Hispanic White (40.2%) and Asian/Pacific Islanders (40.2%). The sample largely consisted of medical students in their first or second year of training (27.8% and 36.1%, respectively). Participants' average clinical experience with chronic pain was 19.1 ($SD=18.6$) on the 0-100 VAS. While there is no validated interpretation for this measure, this value suggests participants' average pain experience was small-to-medium, which is consistent with their status as medical students.

Hypothesis 1: Pain management decisions

Table 2 displays the individual-level results as characterized by the p-value and effect size. Overall, the amount and direction of ethnicity's influence varied between participants.

When making pain assessment ratings, 3 participants were significantly influenced by ethnicity ($p<.05$; d_z range=1.72-1.97) and 1 participant was reliably

influenced by ethnicity ($p < .10$; $d_z = 1.30$). All 4 of these participants gave higher pain assessment ratings to Hispanics relative to NHWs. Thirty participants, including the 4 previously discussed, demonstrated large effect sizes ($d_z > .50$), suggesting that ethnicity was influential in these participants' pain assessment decisions. Of these 30 participants, 21 gave higher ratings to Hispanics and 9 gave higher ratings to NHWs.

When making opioid treatment ratings, 1 participant was significantly influenced by ethnicity ($p < .05$; $d_z = 2.17$) and 4 participants were reliably influenced by ethnicity ($p < .10$; d_z range = 1.21-1.50). Of these participants, 4 gave higher opioid ratings to Hispanics relative to NHWs and 1 gave higher opioid ratings to NHWs relative to Hispanics. Including those 5 participants, 35 participants had large effect sizes ($d_z > .50$) when making their opioid treatment ratings, with 20 participants giving higher ratings to Hispanics and 15 participants giving higher ratings to NHWs.

At the group-level, participants' assessment and treatment decisions were positively correlated, indicating that higher pain assessment ratings were significantly associated with higher opioid treatment ratings for Hispanic ($r^2 = 0.44$, $p < .001$), NHW ($r^2 = 0.34$, $p < .001$), and all ($r^2 = 0.49$, $p < .001$) patients. Fisher's r-to-z transformation analyses indicated that the correlation coefficients were not statistically different from one another (all p values $> .05$). Participants made similar pain assessment ($t[96] = 0.75$, $p = .46$, $d_z = .07$; Mean Hispanic rating = 50.4[SD = 14.9], NHW rating = 49.3[SD = 15.0]) and opioid treatment ($t[96] = 0.58$, $p = .56$, $d_z = .06$; Mean Hispanic rating = 25.1[SD = 22.3], NHW rating = 23.8[SD = 19.9]) decisions for Hispanic and NHW patients.

Hypothesis 2: Ethnic bias

On average, participants reported slightly warmer feelings ($t[96]=1.88, p=.06; d_z=.19$) towards Hispanics (Mean=77.6[SD=18.7]) relative to NHWs (Mean=75.2[SD=19.4]). Consistent with my hypothesis, participants demonstrated a slight-to-moderate implicit preference for NHWs relative to Hispanics (Mean=0.31[SD=.41]). Implicit and explicit difference scores were positively correlated ($r=.34, p<.001$) indicating that warmer feelings towards NHWs relative to Hispanics was associated with an implicit preference for NHWs relative to Hispanics.

Hypothesis 3: Influence of ethnic bias on pain management decisions

Participants were characterized as having lower (difference score ≤ 0 ; 69% of participants) or higher (difference score > 0 ; 31%) explicit ethnic bias as well as lower (score $\leq .31$; 44.3% of participants) or higher (score $> .31$; 55.7%) implicit ethnic bias. For participants' pain assessment ratings, I detected no significant main effect of patient ethnicity (all p values $> .05$) nor an interaction of ethnicity X explicit bias ($p=.81$) or ethnicity X implicit bias ($p=.56$). There was also no main effect of ethnicity ($p=.44$) or interaction of ethnicity X explicit bias ($p=.52$) detected for opioid treatment ratings. However, a significant ethnicity X implicit bias interaction did emerge for participants' opioid treatment ratings ($F[1, 95]=5.15, p<.05, \eta_G^2=.02$; Figure 2).

Decomposition of the interaction indicated that, counter to my hypothesis, participants with higher implicit ethnic bias gave higher opioid treatment ratings to Hispanics relative to NHWs ($p=.05, \eta_p^2=.04$) and participants with lower implicit ethnic

bias gave marginally higher opioid treatment ratings to NHWs relative to Hispanics ($p=.20, \eta_p^2=.02$). I further explored this interaction and found participants with lower bias gave NHW patients significantly higher opioid ratings than participants with higher bias ($p<.05, \eta_p^2=.05$). Hispanic patients received statistically similar opioid ratings regardless of participants' implicit ethnic bias ($p=.72, \eta_p^2=.001$).

To further explore these data, I examined differences between patients displaying mild or severe pain behavior. I calculated the average of each decision by pain behavior and by patient ethnicity (e.g., the average opioid rating for the 2 Hispanic patients expressing severe pain). The above rANOVAs were then repeated. These exploratory analyses found no significant main (implicit bias, ethnicity) or interaction (implicit bias X ethnicity) effects (all p values $>.10$). I found a main effect of ethnicity on pain assessment ratings ($F[1,95]=3.72, p=.06, \eta_G^2=.004$), wherein Hispanic patients displaying severe pain received marginally higher pain assessment ratings (estimated marginal mean [EMM]=55.875 [standard error (SE)=1.5]) than NHW patients displaying severe pain (EMM=53.782 [SE=1.6]).

Social desirability

All but 2 participants expressed some level of awareness of the purpose/hypotheses of this investigation. Therefore, there was not enough power to examine whether participants' awareness influenced their pain management decisions. Approximately 31% and 36% of participants demonstrated a large effect of ethnicity on their pain assessment and opioid treatment ratings, respectively. Furthermore, 31% and

44.3% of participants demonstrated higher levels of explicit and implicit ethnic bias, respectively. These findings suggest that, regardless of awareness, many participants did not respond in a socially desirable manner.

I also examined the influence of counterbalancing the study (i.e., completing the decision task before the ethnic bias task and vice versa) on participants' ratings and bias scores. Independent samples t-tests indicated that participants had equivalent results regardless of task order (all p values $>.05$). The only exception was, on average, participants who completed the ethnic bias task first had higher IAT scores (Mean IAT score = .50 [SD=.32]) than participants who completed the decision task first (Mean IAT score = .15 [SD = .42]; $t[93.8]=4.65$, $p<.001$, $d=.94$), suggesting that task order may have influenced participants' implicit ethnic bias scores. Separate two-way ANOVAs were used to determine whether task order interacted with providers' IAT scores when making their decisions for Hispanic and NHW patients. For all analyses, I found no main effect of task order or interaction of task order X IAT score on participants' pain management ratings (all p values $>.05$). Based on these results, I conclude that task order did not significantly influence participants' pain management decisions for Hispanic and NHW patients.

DISCUSSION

This investigation employed VH patients to explore the influence of Hispanic ethnicity and ethnic bias on medical students' pain management decisions. Individual-level analyses found that approximately one-third of participants demonstrated a large effect for the influence of patient ethnicity on their pain management decisions. At the group level of analysis, Hispanic patients and NHW patients received statistically similar pain assessment and opioid treatment ratings. Although participants reported egalitarian attitudes on explicit measures, they demonstrated a slight-to-moderate preference for NHWs relative to Hispanics on implicit measures. Counter to my hypothesis, an ethnicity X implicit bias interaction indicated that participants with lower implicit ethnic bias gave higher opioid treatment ratings to NHWs, whereas participants with higher implicit bias gave marginally higher opioid ratings to Hispanics.

The benefit of a lens model design is the ability to examine the influence of ethnicity at the individual and group level. At the individual level, 31% and 36% of participants demonstrated large effects for the influence of patient ethnicity when making their pain assessment and opioid treatment ratings, respectively. The direction of this influence varied across participants, with some participants providing higher ratings to NHW patients and others giving higher ratings to Hispanic patients. Given this variability at the individual level, it is not surprising that I detected no significant differences in

decisions for Hispanic and NHW patients when ratings were averaged for group-level analyses. Although both sets of analyses are informative, individual-level analyses are particularly important when considering how to reduce healthcare disparities. For instance, this information can be used to tailor interventions to healthcare providers' biases. To date, interventions aimed at healthcare providers have been largely unsuccessful, as they do not appear relevant to providers and demand too much of their time (Burgess, Fu, & van Ryn, 2004; Meghani, Polomano, et al., 2012). Brief, tailored interventions that provide individual-level feedback on clinicians' decisions may be more effective in reducing ethnic and racial disparities in pain care than one-size-fits-all interventions.

Consistent with the Dual Process Models of decision making theory (Burgess et al., 2006; Evans, 2008), participants demonstrated an implicit preference for NHWs relative to Hispanics despite explicitly reporting egalitarian attitudes. The pattern of ethnic bias found in the current investigation is consistent with a previous study that measured primary care providers' (PCPs') explicit and implicit ethnic bias (Blair et al., 2013). The PCPs in that investigation reported no explicit ethnic bias but demonstrated an implicit preference for NHWs over Hispanics (mean IAT score=.33 [SD=.38]), which is similar to the implicit bias demonstrated by my medical student sample (mean IAT score=.31 [SD=.41]). This pattern of ethnic bias is consistent with a form of racial bias called, "aversive racism" (Dovidio & Gaertner, 2004). One study found that healthcare providers who demonstrated aversive racism were rated by Black patients as less friendly and warm during clinical encounters compared to providers without aversive racism (Penner et al., 2010). Future research should investigate whether this pattern of ethnic

bias (high implicit + low explicit bias) also leads to low satisfaction among Hispanic patients.

Implicit bias has been shown to be a better predictor of behavior than explicit bias (Dovidio & Fiske, 2012). Consistent with this literature, I found implicit ethnic bias significantly interacted with patient ethnicity when participants made opioid treatment decisions, whereas explicit ethnic bias did not. Decomposition of the interaction indicated that participants with higher implicit ethnic bias gave higher opioid treatment ratings to Hispanic patients relative to NHW patients. This finding is counter to my hypothesis that participants with higher bias would give Hispanic patients lower opioid ratings compared to NHW patients. One speculative reason for this finding is that participants with higher implicit ethnic bias feel less comfortable treating Hispanic patients and, thus, are more likely to recommend a “quick fix” (i.e., medication) for their pain. Relative to NHW patients, healthcare providers spend significantly less time with racial/ethnic minority patients, including Hispanics (Andersen, Lewis, Giachello, Aday, & Chiu, 1981; Ferguson & Candib, 2002; Hirsh, Hollingshead, Ashburn-Nardo, & Kroenke, 2015; Malat, 2001). Providers also demonstrate poorer clinical interviewing skills with Hispanic patients compared to NHW patients, even when Hispanic patients speak English (Ferguson & Candib, 2002). Less time with patients and poorer communication could lead providers to rely on prescription medications rather than discuss other treatment options, such as physical therapy and mental health counseling. Future investigations should examine providers’ comfort with providing pain care to Hispanic patients, particularly Spanish-speaking Hispanic patients, and examine whether provider comfort influences their pain management decisions. For instance, providers’ intergroup anxiety

(anxiety experienced when engaging with an outgroup, such as racial/ethnic minorities; Stephan, 2014) may influence their decisions for Hispanic patients independently and/or interactively with implicit ethnic bias. This line of research would enhance understanding of pain management disparities in pharmacological and non-pharmacological treatments.

I was also surprised to find that participants with lower implicit ethnic bias gave marginally higher opioid treatment ratings to NHW patients relative to Hispanic patients. This finding could be due to participants with lower ethnic bias being aware of Hispanic patients' concerns about opioid medications (Hollingshead, Ashburn-Nardo, Stewart, & Hirsh, 2016). Hispanic individuals report a general hesitancy to take opioid medications. This hesitancy stems from cultural beliefs, such as the belief that pain should be overcome without medication (Monsivais & Engebretson, 2012) and worries about adverse treatment outcomes (Katz et al., 2011). Although opioid concerns are not unique to Hispanic patients, Hispanics report greater worries about opioid medications than NHWs (Katz et al., 2011; Nguyen et al., 2005; Portenoy, Ugarte, Fuller, & Haas, 2004). Participants with lower ethnic bias may assume this treatment preference for all Hispanic patients and respond by not offering such medications – even when clinically indicated – which could lead to greater disparities in treatment.

Interestingly, participants with higher vs. lower implicit ethnic bias differed only in their treatment ratings for NHW patients. I found participants with lower bias gave significantly higher opioid ratings to NHW patients than did participants with higher bias. Participants with higher and lower implicit bias did not significantly differ in their opioid ratings for Hispanic patients. Taken together, these results suggest that implicit ethnic bias may not always function such that Hispanic patients receive less care; rather, implicit

bias may lead to providing *more* care to NHWs in the case of opioid treatment for chronic pain. However, this finding should be interpreted with caution as there is no clear theoretical reason why lower ethnic bias would lead to greater care for NHW patients. This finding might be due to participants with lower ethnic bias having greater empathy than participants with higher ethnic bias. Studies have shown subjects demonstrate increased activity in brain regions and other areas (e.g., pupil dilation) associated with empathy when watching same-race individuals experience pain compared to watching other-race individuals (Azevedo et al., 2013; Xu, Zuo, Wang, & Han, 2009). Given that most of my sample – and healthcare providers, in general (Association of American Medical Colleges, 2016) – are NHW, greater empathy may contribute to more aggressive pain treatment for NHW patients. However, this interpretation is highly speculative. Furthermore, this interaction should be interpreted with caution, as it was not replicated when patients were separated by pain behavior. Future investigations should replicate this study in order to better understand the influence of ethnic bias on opioid treatment decisions for Hispanic and NHW patients.

Severe pain reports can provoke feelings of uncertainty and distrust in healthcare providers, which can activate stereotypes and biases (Tait & Chibnall, 2014). For this reason, I ran exploratory analyses to examine how implicit bias and patient ethnicity affected pain management decisions for patients displaying mild or severe pain behaviors. I found no significant main effects of ethnicity or interaction of ethnicity X implicit ethnic bias when I compared patients demonstrating mild pain or patients demonstrating severe pain. The only exception was a main effect of ethnicity on pain assessment ratings, wherein Hispanic patients with severe pain received marginally higher pain assessment

ratings compared to NHW patients with severe pain. This finding indicated that providers made different pain assessment decisions when Hispanic and NHW patients present with severe pain behaviors. This could be due to the stereotype that Hispanics are more stoic than NHWs (Hollingshead et al., 2016). This stereotype may lead providers to overestimate Hispanic patients' pain. Future investigations should examine stereotypes about Hispanic patients with chronic pain in order to determine the extent to which these stereotypes influence pain management decisions. It is also important to note that these exploratory analyses did not replicate the previously reported patient ethnicity X implicit bias interaction for opioid treatment decisions, nor did they help explain it.

Implicit ethnic bias did not result in less pain care for Hispanic relative to NHW patients. My finding runs contrary to evidence that the IAT, in general, is a good predictor of behavior (Greenwald et al., 2009), and that the Race IAT predicts patient-provider interactions and clinical relationships (Hall et al., 2015). This discrepancy suggests that stereotypes towards Hispanics with pain are different than general attitudes towards Hispanics, whereas this may not be the case for Black individuals and racial bias. For instance, racial stereotypes include believing Black individuals are more involved in criminal activity and are more athletic than NHWs (Czopp & Monteith, 2006). These general stereotypes may be relevant to pain care, such that providers who hold these stereotypes may believe Black patients are more likely to misuse or sell medications, particularly opioids (van Ryn & Burke, 2000; Vijayaraghavan, Penko, Guzman, Miaskowski, & Kushel, 2011), and that Black patients feel less pain than NHWs (Hoffman, Trawalter, Axt, & Oliver, 2016; Trawalter, Hoffman, & Waytz, 2012). Conversely, stereotypes about Hispanics include believing they are immigrants, do not

speak English, and that they have a strong work ethic (Lu & Nicholson-Crotty, 2010).

These stereotypes appear less relevant to pain care. Therefore, a general measure of ethnic bias may not be strongly associated with pain management decisions for Hispanic patients.

A better predictor of pain decisions would likely be a measure of stereotypes that are specific to Hispanics' pain experience. At the end of the current investigation, participants were asked to share any impressions they have of Hispanic patients who have chronic pain (data not shown). Over a quarter of the participants, regardless of higher or lower bias, remarked that Hispanic patients underreport their pain (e.g., more stoic pain presentation). A smaller but substantial percentage of participants (approximately 15%) wrote that Hispanic patients do not use healthcare services unless they are in "real" pain. Investigations are needed that examine providers' stereotypes about Hispanic patients with pain, and the extent to which these stereotypes influence their pain management decisions.

Although this investigation had notable strengths, limitations should be discussed. First, this study used VH patients, thus my findings may not generalize to real patient interactions and actual clinical scenarios. In addition, the results from my medical student sample may not generalize to physicians or other provider types (e.g., nurses). Individual-level analyses were likely underpowered to detect meaningful differences even though I exceeded the 5:1 recommendation (Cooksey, 1996). I attempted to account for this low power by characterizing scores by the effect size as well as the alpha level; however, future investigations should consider using a greater number of vignettes to increase power for individual analyses. Although counterbalancing is recommended for

experimental studies, I found that task order might have influenced participants' responding to the IAT. Showing Hispanic patients in pain during the decision task may have induced feelings of empathy towards Hispanics and resulted in lower IAT scores for participants who completed the decision task first compared to participants who completed the ethnic bias task first. This possible effect of task order should be analyzed in future experimental investigations of bias and decision-making.

Future investigations should manipulate other variables of interest, such as English language proficiency, in order to better understand the influence of Hispanic ethnicity on providers' pain management decisions. One non-pain survey found that Hispanic patients considered ethnicity and Spanish fluency when selecting a healthcare provider and reported more satisfaction with Hispanic providers (Saha, Komaromy, Koepsell, & Bindman, 1999). Given the subjective nature of chronic pain complaints, patient and provider communication is critical for effective pain care. Providers' racial/ethnic group and Spanish fluency should be considered in future pain investigations. Investigations should also examine Hispanic patients' English fluency, as this may also influence pain management decisions and contribute to disparate care. As previously discussed, future investigations are needed that examine healthcare providers' stereotypes about Hispanic patients with pain. These stereotypes may be better predictors of their pain management decisions.

This is the first investigation to examine the influence of patient ethnicity and provider ethnic bias on pain management decisions. This study extends the current literature by finding that one-third of medical students were influenced by patient ethnicity when making chronic pain management decisions. Results suggest that

providers' implicit ethnic bias interacted with patient ethnicity when making their opioid medication decisions, although not as expected. This study found that a general measure of ethnic bias might not be a good predictor of pain-related decisions. Future investigations should examine other potential sources of pain-related ethnic disparities.

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TABLES

TABLES

Table 1. Participants' demographic characteristics

	% total
Gender	
Men	47.4%
Women	52.6%
Race/Ethnicity	
Non-Hispanic White	40.2%
Asian/Pacific	40.2%
Black	4.1%
Hispanic	3.1%
Native American/Eskimo/Aleut	3.1%
Other or more than 1 race	9.3%
Training level	
First year	27.8%
Second year	36.1%
Third year	19.6%
Fourth year	16.5%

Table 2. Characteristics of participants' idiographic ratings

Pain Decision		Higher to NHWs	Higher to Hispanics	Total
Pain assessment	p<.05	0	3	3
	p<.10	0	1	1
	d_z<.20	14	16	31*
	d_z<.50	18	18	36
	d_z<.80	3	8	11
	d_z>.80	6	13	19
Opioid treatment	p<.05	0	1	1
	p<.10	1	3	4
	d_z<.20	11	11	26†
	d_z<.50	20	16	36
	d_z<.80	13	12	25
	d_z>.80	2	8	10

The numbers in each cell indicate how many participants met criteria for each row. Each row includes a unique number of participants (e.g., participants who met criteria for p<.05 are not included in the row for p<.10). For instance, in the first row, 0 participants gave higher pain assessment ratings to NHWs relative to Hispanics and 3 participants gave higher pain assessment ratings to Hispanics relative to NHWs at the p<.05 level.

*One participant gave NHWs and Hispanics the same rating.

†Four participants gave NHWs and Hispanics the same rating.

FIGURES

FIGURES



Figure 1. Example of virtual humans

Right image displays a Hispanic patient displaying severe pain. The left image displays a non-Hispanic White patient displaying mild pain.

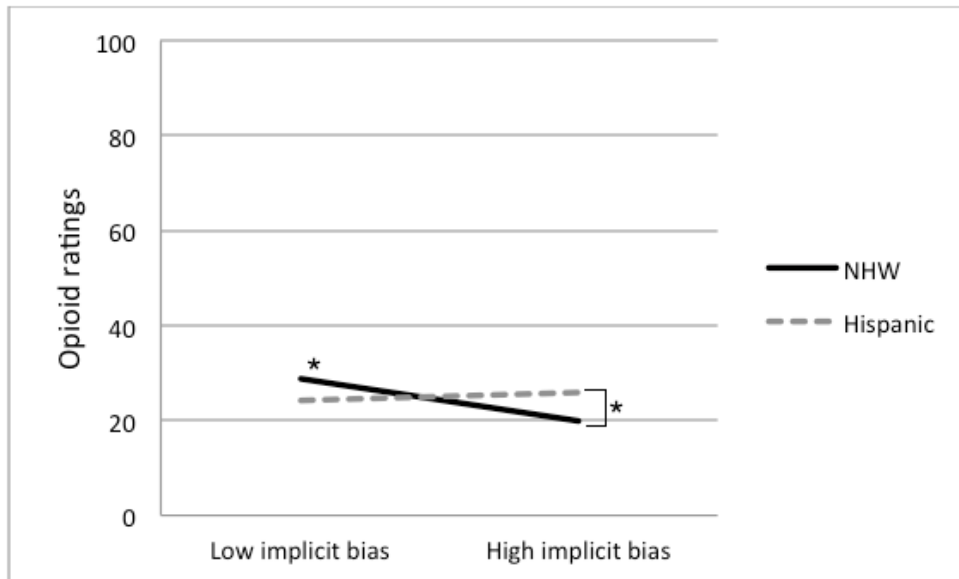


Figure 2. Interaction of ethnicity and implicit ethnic bias on opioid treatment ratings.

Opioid ratings were made on a 0 (not at all likely to recommend) to 100 (very likely to recommend) visual analogue scale.

* $p \leq .05$

VITA

VITA

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- 2016 **Research Award**, recognition of achievement in research activities
Clinical Psychology Department, IUPUI
- 2015 **Elite 50 Recipient**, selected as one of the top fifty graduate students at
IUPUI
Graduate and Professional Student Government, IUPUI

- 2013 **Junior Investigator Award for Excellence in Research**, research recognition
Pain and Disparities Special Interest Group, American Pain Society
- 2013 **Junior Investigator Poster Award, Runner up**, research recognition
Psychosocial Research Special Interest Group, American Pain Society
- 2013 **Citizenship, Honorable mention**, recognition of service to the
department
Clinical Psychology Department, IUPUI
- 2012 **Citizenship, Honorable mention**, recognition of service to the
department
Clinical Psychology Department, IUPUI
- 2008 **Diploma with University Honors**, completion of undergraduate thesis
and honors courses, Bowling Green State University
- 2004-2008 **Dean's list**, all semesters
Bowling Green State University

RESEARCH INTEREST

- Psychosocial influences on the experience and management of pain
- Treatment disparities
- Clinical decision-making

RESEARCH EXPERIENCE

PEER-REVIEWED PUBLICATIONS

1. **Hollingshead NA**, Ashburn-Nardo L, Stewart J, Hirsh AT. The pain experience of Hispanic Americans: A critical literature review and conceptual model. *Journal of Pain*, 17(5): 513-528. *Selected as a *Featured Journal Club Article*
2. **Hollingshead NA**, Vransy EA, Stewart JC, Hirsh AT. Differences in Mexican Americans' prevalence of chronic pain and co-occurring analgesic medication and substance use relative to Non-Hispanic White and Black Americans: Results from NHANES 1999-2004. *Pain Medicine*, in press.
3. **Hollingshead NA**, Matthias M, Bair M, Hirsh AT. Healthcare providers' perceptions of socioeconomically disadvantaged patients with chronic pain: A qualitative investigation. *Journal of Health Disparities Research and Practice*, in press.
4. **Hollingshead NA**, Matthias M, Bair M, Hirsh AT. (2015) Impact of race and sex on pain management by medical trainees: A mixed-methods pilot study of decision making and awareness of influence. *Pain Medicine*, 16(2): 280-290.

5. **Hollingshead NA**, Meints SM, Middleton SK, Free C, Hirsh AT. (2015) Examining influential factors in providers' chronic pain treatment decisions: A comparison of physicians and medical students. *BioMed Central Medical Education*, 15: 164.
6. Hirsh AT, **Hollingshead NA**, Ashburn-Nardo L, Kroenke K. (2015) The interaction of patient race, provider bias, and clinical ambiguity on pain management decisions. *Journal of Pain*, 16(6): 558-568.
7. Hirsh AT, **Hollingshead NA**, Matthias M, Bair M, Kroenke K. (2014) The influence of patient sex, provider sex, and sexist attitudes on pain treatment decisions. *The Journal of Pain*, 15(5): 551-559.
8. Hirsh AT, **Hollingshead NA**, Bair M, Matthias M, Kroenke K. (2014) Preferences, experience, and attitudes in the management of chronic pain and depression: A comparison of physicians and medical students. *Clinical Journal of Pain*, 30(9): 766-774.
9. Hirsh AT, **Hollingshead NA**, Bair M, Matthias M, Wu J, Kroenke K. (2013) The influence of patient's sex, race, and depression on clinician pain treatment decisions. *European Journal of Pain*, 17(10): 1569-79.

MANUSCRIPTS UNDER REVIEW

1. **Hollingshead NA**, Meints, S, Miller MM, Robinson ME, Hirsh AT. Race-related pain judgments and the better than average effect. (submitted)
2. Miller MM, Allison A, **Hollingshead NA**, Trost Z, Goubert L, DeRuddere L, Hirsh AT. Judgments of overweight and obese individuals: Gender matters. (submitted)

MANUSCRIPTS IN PREPARATION

1. **Hollingshead NA**, Vransy EA, Hsueh L, Stewart JC, Hirsh AT. Acculturation's influence on Mexican Americans' chronic pain and healthcare experience. (using archival NHANES data)
2. Hsueh L, Vransy EA, **Hollingshead NA**, Hirsh AT, Stewart JC. Immigrant status is associated with differences in diabetes treatment: Data from the Continuous National Health and Nutrition Examination Survey (NHANES). (using archival NHANES data)

PUBLISHED ABSTRACTS

1. **Hollingshead NA**, Asburn-Nardo L, Stewart J, Maupomé G, Hirsh A. (2016) Examining the influence of Hispanic ethnicity and ethnic bias on medical students' pain management decisions. *Journal of Pain*, 17(4): S99.
2. **Hollingshead NA**, Vraney EA, Stewart JC, Hirsh AT. (2015) Differences in Mexican Americans' prevalence of chronic pain and co-occurring analgesic medication and substance use relative to Non-Hispanic White and Black Americans: Results from NHANES 1999-2004. *Journal of Pain*, 16(4): S32.
3. Hirsh AT, **Hollingshead NA**, Ashburn-Nardo L, Kroenke K. (2015) Evidence of racial disparities in time spent with patients in pain. *Journal of Pain*, 16(4): S96.
4. Wheelis T, Allison A, Nowlin L, **Hollingshead NA**, de Ruddere L, Goubert L, Hirsh A, Trost Z. (2015) Disparities in gender and weight bias toward chronic low back pain patients. *Journal of Pain*, 16(4): S96.
5. **Hollingshead NA**, Meints SM, Middleton S, Free C, Hirsh AT. (2014) Influential factors in providers' chronic pain treatment decisions. *Journal of Pain*, 4(15): S104.
6. Hirsh AT, **Hollingshead NA**, Miller MM, Ashburn-Nardo L, Kroenke K. (2014) The influence of patient race, provider bias, and clinical ambiguity on pain assessment and treatment decisions. *Journal of Pain*, 4(15): S103.
7. Miller MM, **Hollingshead NA**, Meints SM, Middleton SK, Hirsh AT. (2014) Further psychometric evaluation of a measure assessing gender, race/ethnicity, and age expectations of pain. *Journal of Pain*, 4(15): S105.
8. **Hollingshead NA**, Matthias MS, Bair MJ, Middleton S, Hirsh AT. (2013) Variability in pain treatment decisions and provider self-insight: A mixed methods investigation. *Journal of Pain*, 4(14): S102.
9. Meints SM, **Hollingshead NA**, Hirsh AT. (2013) Factors influencing providers' treatment decisions for chronic low back pain. *Journal of Pain*, 4(14): S101.
10. Hirsh AT, **Hollingshead NA**, Bair MJ, Matthias MS, Kroenke K. (2013) Does provider sexism contribute to sex/gender disparities in pain treatment decisions? *Journal of Pain*, 4(14): S102.
11. **Hollingshead NA**, Neuffer AM, Hirsh AT. (2012) An investigation of provider self-insight into their chronic pain management decisions. *Journal of Pain*, 13(4): S90.

12. Hirsh AT, **Hollingshead NA**, Wu J, Bair MJ, Matthias MS, Kroenke K. (2012) Provider decision making in chronic pain management: Influence of patient sex, race, and depression. *Journal of Pain*, 13(4): S106.

SELECTED POSTER PRESENTATIONS

1. Hirsh AT, **Hollingshead NA**, Meints SM, Miller MM. (September 2016) Race differences in the land of Lake Wobegon. International Association for the Study of Pain, Yokohama, Japan.
2. **Hollingshead NA**, Ashburn-Nardo L, Stewart JC, Maupomé G, Hirsh AT. (May 2016) Examining the influence of Hispanic ethnicity and ethnic bias on medical students' pain management decisions. American Pain Society, Austin, TX.
3. **Hollingshead NA**, Vransy EA, Stewart JC, Hirsh AT. (May 2015) Differences in Mexican Americans' prevalence of chronic pain and co-occurring analgesic medication and substance use relative to Non-Hispanic white and Black Americans: Results from NHANES 1999-2004. American Pain Society, Palm Springs, CA.
4. Wepler R, **Hollingshead NA**, Hirsh AT. (May 2015) The role of diet in the etiology and severity of rheumatoid arthritis: A prospective analysis of the NHANES I Epidemiological Follow-up Study (NHEFS) cohort. American Pain Society, Palm Springs, CA.
5. Hirsh AT, **Hollingshead NA**, Ashburn-Nardo L, Kroenke K. (May 2015) Evidence of racial disparities in time spent with patients in pain. American Pain Society, Palm Springs, CA.
6. Wheelis T, Allison A, Miller M, Nowlin L, **Hollingshead NA**, de Ruddere L, Goubert L, Hirsh AT, Trost Z. (May 2015) Disparities in gender and weight bias toward chronic low back pain patients. American Pain Society, Palm Springs, CA.
7. Allison A, Wheelis T, Miller M, Nowlin L, **Hollingshead NA**, de Ruddere L, Goubert L, Hirsh A, Trost Z. (May 2015) Evidence of racial differences in perception of others' pain. Association for Psychological Science, New York City, NY.
8. **Hollingshead NA**, Meints SM, Middleton S, Free C, Hirsh AT. (May 2014) Influential factors in providers' chronic pain treatment decisions. American Pain Society, Tampa, FL.
9. Hirsh AT, **Hollingshead NA**, Miller MM, Ashburn-Nardo L, Kroenke K. (May 2014) The influence of patient race, provider bias, and clinical ambiguity on pain assessment and treatment decisions. American Pain Society, Tampa, FL.

10. Miller MM, **Hollingshead NA**, Meints SM, Middleton SK, Hirsh AT. (May 2014) Further psychometric evaluation of a measure assessing gender, race/ethnicity, and age expectations of pain. American Pain Society, Tampa, FL.
11. Allison A, **Hollingshead NA**, de Ruddere L, Goubert L, Hirsh AT, Trost Z. (April 2014) Evidence of gender disparities in weight and beauty bias toward chronic pain patients. Society of Behavioral Medicine, Philadelphia, PA.
12. **Hollingshead NA**, Matthias MS, Bair MJ, Middleton S, Hirsh AT. (May 2013) Variability in pain treatment decisions and provider self-insight: a mixed methods investigation. American Pain Society, New Orleans, LA.
13. Meints SM, **Hollingshead NA**, Hirsh AT. (May 2013) Factors influencing providers' treatment decisions for chronic low back pain. American Pain Society, New Orleans, LA.
14. Hirsh AT, **Hollingshead NA**, Bair MJ, Matthias MS, Kroenke K. (May 2013) Does provider sexism contribute to sex/gender disparities in pain treatment decisions? American Pain Society, New Orleans, LA.
15. **Hollingshead NA**, Neuffer AM, Hirsh AT. (May 2012) An investigation of provider self-insight into their chronic pain management decisions. American Pain Society, Honolulu, HI.
16. Hirsh AT, **Hollingshead NA**, Wu J, Bair MJ, Matthias MS, Kroenke K. (May 2012) Provider decision making in chronic pain management: Influence of patient sex, race, and depression. American Pain Society, Honolulu, HI.
17. **Hollingshead NA**, Orel N. (April 2008) Examining physician communication with older women regarding STD and HIV/AIDS information. Ohio Association of Gerontology and Education Conference, Cleveland, OH.

ORAL PRESENTATIONS

1. **Hollingshead NA**. (2015) Case presentation of "Charlie": A transgendered veteran. Case presentation at a Proseminar on Professional Issues. IUPUI, Indianapolis, IN.
2. **Hollingshead NA**. (2013) Treatment variability and provider awareness in the management of chronic pain and depression. Research presentation at a Veteran's Affairs Work-in-Progress meeting. Roudebush VA Medical Center, Indianapolis, IN.

3. **Hollingshead NA.** (2013) Variability in pain treatment decisions and provider self-insight: a mixed methods investigation. Research presentation to the Pain and Disparities Special Interest Group. American Pain Society Annual Conference, New Orleans, LA.
4. **Hollingshead NA.** (2013) Treatment variability and medical trainee decision-making awareness in the management of chronic pain: A mixed-methods investigation. Research presentation at a Proseminar on Professional Issues. IUPUI, Indianapolis, IN.
5. **Hollingshead NA.** (2008) Examining physician communication with older women regarding STD and HIV/AIDS information. Research presentation at the Women's Studies Research Symposium. Bowling Green State University, Bowling Green, OH.
6. **Hollingshead NA.** (2008) Examining physician communication with older women regarding STD and HIV/AIDS information. Research presentation at the Honors Project Reception, Bowling Green State University, Bowling Green, OH.

CLINICAL EXPERIENCE

August 2015- **Palliative Care Unit, Richard L. Roudebush Veterans Affairs Medical Center**
 Dec. 2015

Supervisor: Samantha Outcalt, Ph.D., HSPP, ABPP
Setting: Inpatient VA medical center; Indianapolis, IN

August 2014- **Primary Care Clinic, Richard L. Roudebush Veterans Affairs Medical Center**
 June 2015

Supervisor: Jennifer Chambers, Ph.D., HSPP
Setting: Outpatient VA primary care clinic; Indianapolis, IN

August 2013- **Pain Clinic, Riley Hospital for Children at Indiana University Health**
 June 2014

Supervisor: Eric L. Scott, Ph.D., HSPP
Setting: Children's hospital outpatient clinic; Indianapolis, IN

Jan. 2013- **Bariatric Assessment, Community South Hospital**

June 2013
Supervisor: Theresa Rader, Psy.D., HSPP, LCAC
Setting: Outpatient clinic; Indianapolis, IN

August 2012- **Larue D. Carter Memorial Hospital**

Dec. 2012
Supervisor: Sarah A. Landsberger, Ph.D., HSPP
Setting: Adult inpatient psychiatric state hospital; Indianapolis, IN

SUPERVISION EXPERIENCE

- 2015 **Peer supervisor**
Served as a clinical peer supervisor to two Clinical Psychology graduate students. Met with supervisees bi-weekly and attended a monthly course on providing clinical supervision facilitated by the Assistant Director of Clinical Training.
- 2012-2015 **Meta-supervision**
Attended monthly supervision meetings facilitated by the Assistant Director of Clinical Training. Received feedback on recorded or transcribed clinical sessions and participated in didactic seminars on clinical topics.

RESEARCH PROJECTS

- 2015-Present **Examining the influence of Hispanic ethnicity and ethnic bias on medical students' pain decisions**
Funded by American Psychological Association Division 38: Health Psychology, National Institute of Health (R01MD008931; PI: Dr. Hirsh) and IUPUI Clinical Psychology Department
Position: Primary investigator
- 2014-Present **Virtual perspective-taking to reduce race and SES disparities in pain care**
Funded by National Institute on Minority Health and Health Disparities, National Institute of Health (R01MD008931)
Position: Research assistant
PI: Adam T. Hirsh, Ph.D. (IUPUI)
- 2013-2015 **Examining individuals' appraisal of chronic pain patients**
Position: Research assistant
PIs: Adam T. Hirsh, Ph.D. (IUPUI); Zina Trost, Ph.D. (University of Alabama at Birmingham); Liesbet Goubert Ph.D. and Lies DeRuddere, Ph.D. (Ghent University)
- 2012-2014 **The role of race and ambiguity level on clinical decision-making for pain management**
Funded by Future Leaders in Pain Research Grant, American Pain Society
Position: Research assistant
PI: Adam T. Hirsh, Ph.D. (IUPUI)

- 2011-2013 **Clinical decision-making for pain management**
 Funded by Indiana University Collaborative Research Grant
Position: Research assistant
PI: Adam T. Hirsh, Ph.D. (IUPUI)
- 2009-2011 **Project RAP (Risk Avoidance Partnership)**
Position: Research Assistant (volunteer)
PI: Marina Tolou-Shams, Ph.D. (Division of Child and Adolescent
 Psychiatry, Rhode Island Hospital)

RESEARCH AND CLINICAL WORKSHOPS

- 2016 **From Cancer to Health™ Training Institute**
 Primary instructor: Barbara L. Andersen, Ph.D. (Ohio State University)
- 2016 **Interpersonal Process Group Therapy**
 Instructor: Diane Sobel, Ph.D. (University of Kentucky)
- 2015 **Multilevel and Longitudinal Modeling**
 Instructor: Kevin King, Ph.D. (University of Washington)
- 2015 **Acceptance and Commitment Therapy Clinical Workshop**
 Instructor: Jennifer Lydon-Lam, Ph.D. (Roudebush VA Medical Center)
- 2014 **Mediation, Moderation, and Conditional Process Analysis**
 Instructor: Andrew F. Hayes, Ph.D. (The Ohio State University)
- 2013 **Translating Research into Policy: The Indiana POST Program**
 Instructor: Susan Hickman, Ph.D. (IU School of Nursing)
- 2013 **Introduction to Meta-analysis Workshop**
 Instructor: Noel Card, Ph.D. (University of Arizona)
- 2013 **Hypnotic Therapy Workshop**
 Instructor: Mark Jensen, Ph.D. (University of Washington)
- 2013 **Fidelity Research**
 Instructor: Angie Rollins, Ph.D. (Assertive Community Treatment [ACT]
 Center)
- 2012 **Introduction to Structural Equation Modeling**
 Instructor: Gregory R. Hancock, Ph.D. (University of Maryland)
- 2012 **Writing from the Reader's Perspective**
 Instructor: George D. Gopen, Ph.D. (Duke University)
- 2011 **Atlas.ti Training**
 Instructor: Raymond C. Maietta (ResearchTalk Inc.)
- 2011-2016 **Proseminar on Professional Issues in Clinical Psychology**
 Instructor: Varied weekly based on session topic, offered by the IUPUI
 Clinical Psychology Department

TEACHING EXPERIENCE

- Summer 2015 **Instructor**
 PSY B370: Social Psychology (online, undergraduate-level)

- Summer 2014 **Teaching Assistant**
PSY B454: Capstone Seminar in Psychology (undergraduate-level)
- Spring 2014 **Teaching Assistant**
PSY B454: Capstone Seminar in Psychology (2 sections, undergraduate-level)
- Fall 2014 **Invited Lecturer**
PSY B386: Introduction to Counseling (lecture on conducting an intake assessment)
- Fall 2013 **Teaching Assistant**
PSY I664: Psychological Assessment I: Intelligence Testing (graduate-level)
- Fall 2013 **Teaching Assistant**
PSY B380: Abnormal Psychology (2 sections, undergraduate-level)

AD HOC REVIEWER

- *Pain Medicine*
- *The Journal of Pain* (mentored by Dr. Hirsh)
- *PAIN* (mentored by Dr. Hirsh)
- *Clinical Journal of Pain* (mentored by Dr. Hirsh)
- *Archives of Physical Medicine and Rehabilitation* (mentored by Dr. Hirsh)

PROFESSIONAL MEMBERSHIP

- American Psychological Association (student affiliate)
- American Psychological Association Division 38: Health Psychology (student member)
- American Pain Society (student member)
- American Psychological Association of Graduate Students (student member)
- American Academy of Pain Management (student member)
- Indiana Psychological Association (student member)

SERVICE AND VOLUNTEER ACTIVITIES

- Graduate program selection committee member, IUPUI Clinical Psychology Department (2016)
- Graduate student representative, IUPUI Clinical Psychology Department (2014-2015)
- Street outreach volunteer, AIDS Care Ocean State, Providence, RI (2008-2010)