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Pain, people, and ethnicity

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BOSTON UNIVERSITY
SCHOOL OF MEDICINE

Thesis

PAIN, PEOPLE, AND ETHNICITY

by

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B.A., University of California, Los Angeles, 2012

Submitted in partial fulfillment of the
requirements for the degree of
Master of Science

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DEDICATION

I would like to thank my family who has supported me and encouraged me to try my best in all circumstances.

PAIN, PEOPLE, AND ETHNICITY

DANIELLE EUN-JOO MIN

ABSTRACT

Pain is an integral part of the life experience. Furthermore, the factors that influence the experience of pain are dynamic. Of the various influencing factors, ethnicity has a growing literature that is revealing how an individual's subjectivity that stems from ancestral and geographic origins is affecting this process of pain perception. The actual perception of pain has been shown to be quite different among different ethnicities. Ethnically motivated dispositions, in terms of coping, has also led to more questions on how effectively patients can be treated for pain when medicine often attempts to mandate objectivity. Moreover, the interaction and feedback that patients and providers give to each other is a powerful indicator of how pain is experienced and how successful the outcomes of treatment will be.

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LIST OF ABBREVIATIONS

ADR	Adverse Drug Reaction
CAS	Color Analog Scale
PVD	Provoked Vestibulodynia
SES	Socioeconomic Status
SPADI	Shoulder Pain Disability Index
SOC	Sense of Coherence
VAS	Visual Analog Scale
VA	Veterans Health Administration
WHO	World Health Organization

INTRODUCTION

Pain is universal. Most individuals experience it to one degree or another. Physically, pain may be a manifestation of thousands of neural impulses from a reflex arc that responds to a prick of the finger or discomfort from extremes of temperature. Emotionally, the hippocampus is the portal for feelings. What exactly leads us to realize that we are, indeed in pain, however, is often subjective (Koyama et al, 2005). A description to capture how people experience pain, what influences pain and how they respond to it, and how others determine outcomes is much more dynamic and less tangible.

Some have hypothesized that gender influences outcomes in patient care. Significant differences in pain responses among male and female patients who are subject to electrical, cold and pressure stimuli have been documented (Ravn et al, 2012). However, for heat stimuli, different gender-influenced perceptions of pain could not be demonstrated (Ravn et al, 2012). When facing thoughts of physical pain, women rated the need for health-related quality of life higher than men at the extreme levels of pain (Craig et al, 2014). However, the differences between quality of life were primarily limited to extremes and showed fewer differences in normal conditions (Craig et al, 2014). In terms of age, patients with differing ages have shown differences in their value of types of pain (Craig et al, 2014). Older patients place higher priority on issues that are typically psychologically linked, such as depression, compared to younger participants (Craig et al, 2014).

Most can agree that patients from different racial and ethnic backgrounds have unique characteristics beyond facial features. There are often-noted physiologic manifestations that distinguish not only different races but also different ethnicities. When comparing the central corneal thicknesses and the intraocular pressures amongst a population of Indian, Malay and Chinese patients, there were differences in the recorded measurements for both measurements (Chua et al, 2014). Intraocular pressure was highest among the Indian patients, followed by Malay and then Chinese subjects (Chua et al, 2014). In another study of Hispanic individuals, those with African ancestry had higher intraocular pressure (Nannini et al, 2016). Furthermore, corneal thickness was highest among Chinese participants compared to Malay and Indian patients (Chua et al, 2014). Amongst ethnic Chinese patients, Han Chinese individuals had the lowest corneal thicknesses relative to the Yi and the Bai ethnicities (Pan et al, 2015).

Pain is a complex manifestation. Furthermore, the idea that race or ethnicity has an effect on pain is a complicated proposal. At times, it may seem reasonable that one's ethnicity may be a strong factor in determining how a person responds to pain. However, the biological proponents are often conflicting. If we are inherently similar in our DNA and overall biology, it also makes sense that we would all have similar pain perceptions and reactions to stimuli (Green and Chakravati, 2001). However, some studies have shown that the actual levels of some hormones in response to pain may vary, leading to differing perceptions of pain (Grewen et al, 2008).

Measuring Pain

Individual and collective group differences between people have been hypothesized to lead to different interpretations of the sensations of pain. Age, gender, and culture could all potentially influence what we consider to be painful. In studies with children, different types of measurements have been assessed to ensure that they were accurately reflecting the feelings that the pediatric patients experienced in response to pain (Tsze et al, 2015). Depending on the type of scale used, some were generalizable, while other measures failed to account for individual differences (Tsze et al, 2015). Studies have demonstrated validity of the Color Analog Scale (CAS) as an effective measurement for pain in pediatric patients (McConahay, Bryson, & Bulloch, 2006). Tsze and colleagues demonstrated that patients who were assessed for pain on the face-pain scale and the color analog scale showed positive results for convergent validity, responsiveness and discriminative validity (Tsze et al, 2013). Pediatric patients have been shown to effectively be able to communicate via the CAS to indicate their feelings along the scale (McConahay, Bryson, & Bulloch, 2006). Moreover, the validity and reliability of the face-pain scale and CAS have been shown to be consistent amongst the variables of ethnicity, sex, and age of the children (Tsze et al, 2013).

If the language of a patient is different from the provider's, the patient's ability to communicate his or her level of pain is debatable. Furthermore, the pain reported is relative to standards within the spoken languages, and the scale may differ in expression from the patient's way of expressing pain. In addition, the difference in the words to communicate the magnitude of the pain may not be translatable to another language.

Surprisingly, despite a patient's history being obtained in a different language, the information obtained is usually accurate. When the Shoulder Pain and Disability Index (SPADI) was translated into multiple languages, the results remained consistent across the different languages. In a study conducted by Membrilla-Mesa and colleagues, the shoulder index was translated into Spanish, back-translated, and psychometrically evaluated (Membrilla-Mesa et al, 2015). The results from testing the Spanish version of SPADI indicated a positive correlation with SPADI for both the visual analog scale measures (VAS) and disability of arms, shoulder, and hands for pain (Membrilla-Mesa et al, 2015). Similar studies have been conducted to demonstrate how the English version of SPADI can also be used as a measure for Chinese patients, even when translated into Chinese (Yao et al, 2017). This same positive result was also seen for the translated Thai version of SPADI (Phongamwong and Choosakde, 2015).

Stereotypes have labeled differing races and ethnic groups as having diverse responses to many stimuli, including pain. Emotional reactions are expressed very differently to reflect a seemingly similar feeling. However, it has become more uncertain whether individuals are actually feeling the same sensations. Moreover, the coping mechanisms that individuals use to manage pain are much more variable amongst different populations. Patients with a higher sense of coherence (SOC) were more likely to report being in better health (Chumbler et al, 2013). In elderly populations, patients who had a higher SOC or healthier coping strategies were more likely to lessen the effects of catastrophizing (Andruszkiewicz et al, 2017). Less catastrophizing in turn led to decreased pain perception overall and better outcome for the elderly participants

(Andruszkiewicz et al, 2017). Moreover, patients with a higher SOC were found to take fewer analgesics for pain management and had significantly greater social functioning and self-efficacy, all of which are important tools to cope with pain and difficulties (Chumbler et al, 2013). Furthermore, patients who engaged in more prayer and constructive methods of coping reported a decrease in overall pain perception than other patients (Andruszkiewicz et al, 2017).

Psychological Factors in Pain

Multiple physical manifestations of psychological pain have been documented. Lack of sleep, irritability, and difficulty with concentration are just a few manifestations (Baker et al, 2016). Baker and colleagues found that those who had issues with sleeping and irritability also had greater reactions to and perceptions of pain (Baker et al, 2016). People with psychological disturbances are often more susceptible to pain stimuli. Table 1 lists different types of psychological variables that can affect pain perception (Baker et al, 2016). Because lack of sleep is often considered a psychologically-linked struggle, patients with sleeping issues and irritability do, indeed, report more pain (Baker et al, 2016). Additionally, self-efficacy was used as an indicator for the experience of pain (Baker et al, 2014). Because self-efficacy is a self-assessment of an individual's ability to succeed in specific situations, it is assumed that a higher self-efficacy would be associated with a greater ability to cope with pain.

PSYCH variables	r
Pain presence	
Difficulty Concentrating	.30 **
Feeling Nervous	.26 **
Difficulty Sleeping	.19 *
Feeling Sad	.28 **
Worrying	.32 **
Feeling Irritable	.34 **
Pain-related Distress	
Feeling Irritable	.22 *

* $p < .01$; ** $p < .001$

Table 1. Psychological variables associated with pain. There was a significant interaction between patients who had pain with other psychological variables. Patients with pain reported increase levels of feeling nervous, difficulty sleeping and feelings of worry, irritability, and sadness (Baker et al, 2016).

Opioids in Medicine

Opioids are becoming more and more commonly prescribed to patients to manage pain. In South Korea, following spinal injuries, 83.5% patients in one study received opioid treatment while the remaining patients eventually received opioids when it was required later (Chung et al, 2016). Opioids were perceived by many patients as a positive way to treat pain, and the negative outcomes or adverse drug reactions (ADR) were seen in approximately 8.6% of the patients who had been prescribed opioids (Chung et al, 2016). Although opioid overuse is often associated with suffering greater pain, the patterns of misuse are typically not influenced by the severity of the patient's pain. Greater pain does not lead to greater opioid usage (Ives et al, 2006). Furthermore,

overuse has not been linked to other factors such as race, education or other socioeconomic factors (Ives et al, 2006).

In contrast to the goals of the World Health Organization (WHO), opioid and pain relievers are not being prescribed in the systematic way as originally intended (Heines et al, 2006). According to studies, particular physicians were found to be prescribing either high or very low doses for their patients, rather than using a uniform pattern of prescribing (Heines et al, 2006). Age, race, and gender all seemed to highly influence the pattern of prescribing by these physicians (Heines et al, 2006). Moreover, the types of opioids being prescribed can have varying consequences, including addiction, and side effects on patients. In a cross-sectional review of opioid prescribing in U.S. emergency departments, the three most common opioid pain relievers that were prescribed were oxycodone, hydrocodone, and codeine (Hoppe et al, 2015). In South Korea, the most common opioids to treat spinal injuries were fentanyl and oxycodone (Chung et al, 2016).

Hoppe and colleagues studied patients being evaluated in the emergency room and found that 11.9% of all patients received a prescription for opioids at an average of 16.6 pills per prescription (Hoppe et al, 2015). Studies have shown that opioids are prescribed at different rates (Joynt, Train, & Robbins, 2013). After controlling for possible confounders, patients in higher socioeconomic status (SES) quartiles have a higher rate of receiving opioid prescriptions compared to the lowest SES quartile (Joynt, Train, & Robbins, 2013). Furthermore, Joynt, Train, and Robbins showed that African American patients were less likely to receive a prescription for opioids compared to non-Hispanic Caucasian patients (Joynt, Train, & Robbins, 2013). Possible bias in prescribing

has made the issue much more complex. The current epidemic of opioid overuse and abuse may perhaps be related to that fact that patients with particular characteristics, such as SES or ethnicity, were entrusted with greater amounts of opioids and have, in-turn, developed more problems with overuse and abuse. Opioid use has been documented to have increased over the past several years (Pletcher et al, 2008). Likely due to greater awareness and caution for opioid misuse, obtaining opioids has become more challenging even for patients with legitimate pain. In a study by Grasso and colleagues, there were a lower percentage of patients receiving prescriptions for opioids between 2011-2015 within the Veterans Health Administration (VA) (Grasso et al, 2016).

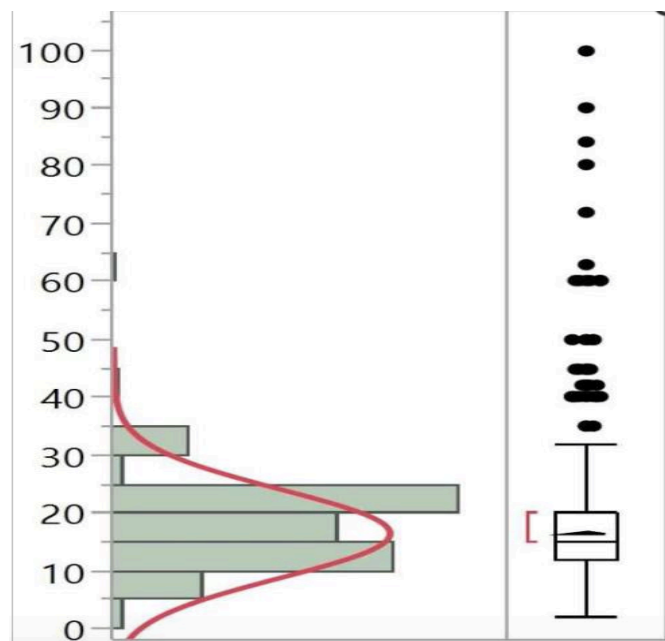


Figure 1. Average number of opioids in emergency rooms. The average number of opioids prescribed to patients who came to the emergency room was 16.6 pills (Hoppe et al, 2015).

Not only are the perceptions of patients important, the care direction from providers can have a lasting and fundamental impact on patient outcomes. It was found that assessments of the risk of potential opioid addictions may not be as distinct as the objective ideals that healthcare providers hold (Setnick et al, 2016). It was often found that providers made lower estimates for whether or not patients had the potential to become addicted to and abuse drugs (Setnick et al, 2016). According to Ng and colleagues, men were prescribed a higher amount of analgesics than women (Ng et al, 1996). Interestingly, the gender of the provider also was a factor in the dosage of analgesics prescribed (Weisse, Sorum, & Dominguez, 2003). Female physicians often prescribed less opioids to men compared to male physicians (Weisse, Sorum & Dominguez, 2003).

Intrinsic Views and Their Effect on Acceptance and Adherence to Treatment

The differences in pain perception between racial groups have been hypothesized to account for differential outcomes of how patients seek and adhere to treatment, as well as outcomes. The results are often conflicting. In a study conducted by Chung and colleagues, four racial groups including Caucasian, Hispanic, Asian, and African-American patients were assessed at a hospital in the United States (Chung et al, 2016). Significant differences in pain reduction were found within the same racial group (Chung et al, 2016). However, the difference among the different racial groups was insignificant (Figure 2). Furthermore, Worster and colleagues found that the race of patients did not

predict the likelihood to seek treatment or other factors including hospital stay (Worster et al, 2017).

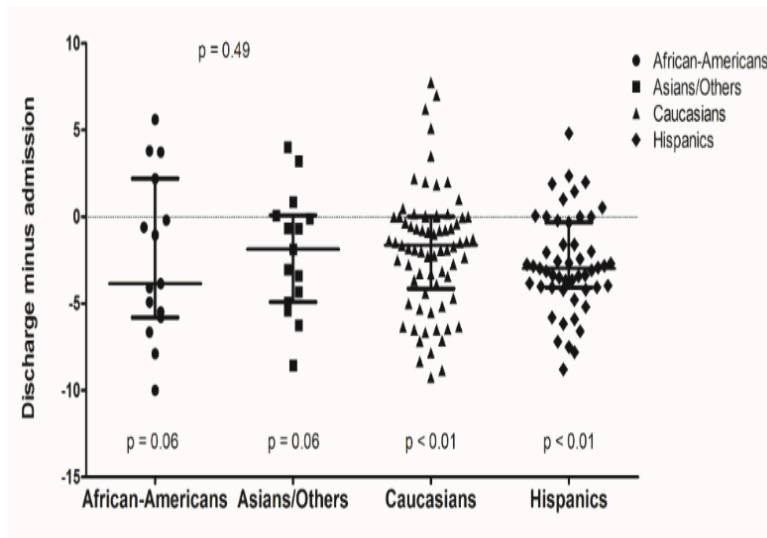


Figure 2. Average opioids prescribed. The difference between reduction of pain was insignificant across different racial groups. (Chung et al, 2016)

In pediatric populations, studies were found to indicate a difference in response to treatment based on race or ethnicity. In a comprehensive review of current literature, Hispanic children were significantly more likely to take part in a hospice program for palliative care compared to Caucasian children (Johnson, 2013). Despite being enrolled in hospice, Thienprayoon and colleagues found that the majority of children in hospice did not continue care (Thienprayoon et al, 2013). The types of diagnoses often yielded differences in the likelihood of patient's families choosing to take part in hospice care (Thienprayoon et al, 2013). Patients with conditions such as brain tumors were more

likely to enroll in hospice, compared to patients undergoing treatment for cancers such as leukemia (Thienprayoon et al, 2013). This discrepancy could be the result of patients' families perceptions of the prognosis of the patients' diseases and whether the cancer was thought to be treatable compared to a less treatable tumor.

Between Hispanic Spanish-speaking patients and Caucasian English-speaking patients, the differences in the experience of hospice care were a relevant concern. The differing concerns and reasons for satisfaction or dissatisfaction in hospice care demonstrated the unique traits of each group. When choosing to leave hospice care, Hispanic families emphasized the importance of returning to their homes with their children (Thienprayoon et al, 2016). For Hispanic patients being treated for cancer, many were often referred to hospice care by non-physician hospital staff rather than by their oncologists (Kreling et al, 2010). According to Kreling and colleagues, Hispanic caregivers were often in states of denial and did not want to confront the reality of their family member's serious illness (Kreling et al, 2010). In contrast, Caucasian patients were primarily concerned about how the symptoms of the illnesses could be managed, which often prompted them to exit from hospice care and return to a hospital setting, where patients could receive more comprehensive care and maximal pain management (Thienprayoon et al, 2016). Moreover, there was a fundamental difference in the factors in which the patients and their families placed the most value. Caucasian families placed higher value on financial factors, and they had more awareness and concern for insurance-related issues and the potential for loss of coverage (Thienprayoon et al, 2016). On the other hand, Hispanic caregivers seemed more concerned about staying with their

children and also experienced loneliness due to being apart from their families who were abroad (Thienprayoon et al, 2016).

Overall, the perceptions of pain, treatment, and outcomes are fundamentally determined by the interaction of many factors. Of all of the suggested influential factors on the pain and treatment experience, ethnicity, and more broadly race, has become a fundamental topic in assessing and influencing outcomes for patients. With differences in perception of pain by different groups, it is difficult to determine a systematic way to treat individuals in a consistent and effective manner. Patients and providers are affected, often unknowingly due to misunderstandings, lack of understanding, and accepted stereotypes. Whether it is due to under-prescribing or overtreatment because of preconceived idea of what patients need, patients may be suffering and providers' and healthcare innovators' intentions to treat patients may be ineffective or incomplete.

Specific Aims

The aims of this thesis include:

1. Identifying the variable experience by patients of different ethnicities and races
2. Analyzing coping mechanisms and the results of those methods.
3. Reviewing the consequences of the provider's influence on the pain experience of patients.

Pain Perception

It is often noted that some people perceive pain differently from others. Society labels certain ethnic groups to have stereotypical responses to stimuli with overt or understated reactions. Whether this is truly applicable to pain perception is debatable. Fundamentally, the question remains about whether people do, in fact, experience pain differently and whether providers have an influence on this perception. In older studies, it was shown that providers typically did not rate patient's pain differently even when they were of different ethnicities and races. Todd, Lee and Hoffman showed no significant difference between Hispanic and non-Hispanic Caucasian patients in regards to their perceived pain in data collected from an emergency room (Todd, Lee, & Hoffman, 1995). Furthermore, there was no significant difference in terms of the physician's estimates and the patient's own estimates of their pain (Todd, Lee, & Hoffman, 1995).

Reported Pain in Patients

Despite studies showing that there were typically no discrepancies in provider observations of pain based on the patient's ethnicity, there is been a growing literature more recently that has found a significant difference. Amongst different racial groups, African-American and Hispanic individuals demonstrated a decreased tolerance to pain relative to non-Hispanic Caucasian subjects (Rahim-Williams et al, 2007). Among Asian women, different ethnicities had differences in their perceived pain following a Caesarean section surgery for childbirth (Tan et al, 2008). Indian women reported higher pain compared to Chinese and Malay women (Tan et al, 2008). Another study found that

there were differences in how women perceived the intensity of their pain during labor that was influenced by their own ethnicity and also by the ethnicities of the women who were assisting them (Olayami, 2009).

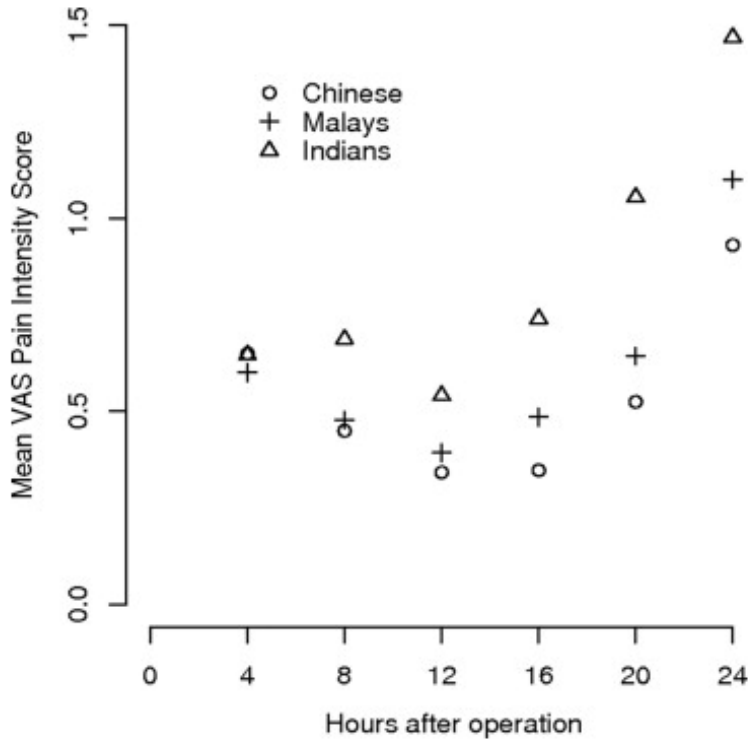


Figure 3. Pain intensity following Caesarean section births. In the first 24 hours after birth, Indian women reported the highest intensity of pain followed by Malay women and Chinese women (Tan et al, 2008).

Chung and colleagues found that Asians are the most pain sensitive using the VAS compared to Caucasian, African-American, and Hispanic participants (Chung et al, 2016). After receiving palliative care for illnesses that were life limiting, the difference between ethnic groups' ratings of pain at admission and at discharge, remained

significant only for Caucasian, Hispanic, and Asian individuals (Chung et al, 2016). Life limiting conditions included cancer in addition to non-oncologic illnesses such as chronic obstructive pulmonary disease (COPD) and congestive heart failure (Chung et al, 2016). The fact that patients of certain ethnicities and cultures are more likely to have certain illnesses is also interesting. For example, African-American children are more likely to have asthma than Caucasian children (Lieu, 2002).

Morris and colleagues showed that pain tolerance was decreased in African-American pubescent children relative to the Caucasian pubescent children after a repeated stimulus was applied (Morris et al, 2015). Moreover, African-American participants reported greater pain than the Caucasian participants even at baseline (Morris et al, 2015). From this higher baseline, after slope analysis was conducted for each group, it was apparent that the Caucasian participants had a greater increase in pain stimuli before their perceived pain increased, compared to the African-American participants (Morris et al 2015). According to Morris and colleagues, this was an indication that African-Americans did not undergo temporal summation of secondary pain in the same way as Caucasian participants (Morris et al, 2015). Caucasian participants, by increasing their pain scores, showed that they were temporally tallying each of the pain stimuli before increasing their overall perceived pain ratings (Morris et al, 2015). In another study conducted by Morris and colleagues, pain modulation that is conditioned seemed different between African-American individuals and non-Hispanic Caucasian individuals. Pain was measured on a scale of 0 to 10 after administration of a thermode (Morris et al, 2015). African-American individuals had a greater response to conditioning, resulting in

decreased perceived pain (Morris et al, 2015). Moreover, there was a significant difference between the African-American and Hispanic participants' average pain ratings between two racial groups (Morris et al, 2015). The greater decrease African-American participants' in their pain ratings following being conditioning indicated that this group was more receptive and responsive to the conditioning compared to the Caucasian participants (Morris et al, 2015).

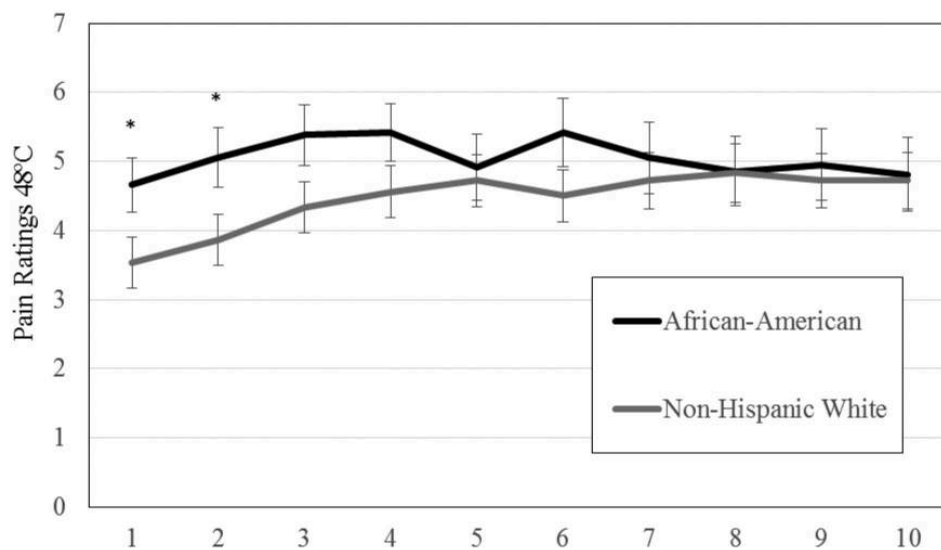


Figure 4. Temporal summation differences between African-American and Non-Hispanic Caucasian subjects. Initial pain ratings between African-American and Caucasian subjects were different. African-American subjects showed significantly higher pain ratings for only the first two time points. In contrast, the Caucasian subjects had a lower baseline pain score but did increase their pain ratings with repeated stimuli indicating that they were temporally summing the stimuli (Morris et al, 2015).

Physiology

Patients of different ethnic and racial backgrounds also have demonstrated more specific trends in perceived pain. Studies have come to the conclusion that there are differences in various physiologic components between ethnicities. Patients who were all subject to a stimulus that elicited a reflex response had reactions that seemed specific to each ethnic group (Campbell et al, 2008). Non-Hispanic African-American participants had a lower threshold at which a reaction to the reflex was elicited (Campbell et al, 2008). Patients verbally reported similar responses when reaching their threshold levels indicating they were interpreting stimuli to be similar even when there was a difference in the threshold level (Campbell et al, 2008). Recently, other studies have also supported this finding. Non-Hispanic Caucasian patients were shown to have a decreased response to pain compared to African-American, Asian and Hispanic subjects (Ostrom et al, 2017). However, these more recent studies have been limited to studying differences in responses to pain that is below threshold (Ostrom et al, 2017). According to Ostrom and colleagues, the difference is not due to inherent qualitative difference in nociceptors nor is it a result of differential tissue physiology (Ostrom et al, 2017). Rather, the difference lies in the fact that there is a differential processing that patients undergo (Ostrom et al, 2017).

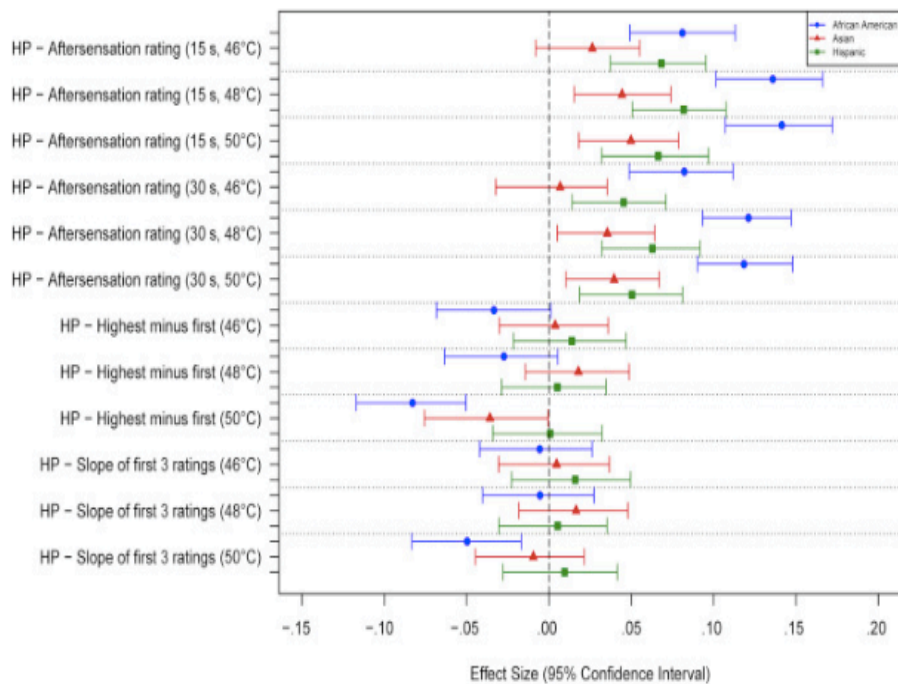


Figure 5. Threshold of pain amongst Asian, Caucasian, and African-American

patients. African-American patients had the lowest pain threshold followed by

Caucasian and Asian participants. Positive effect side indicates greater pain sensitivity for subjects (Ostrom et al, 2017).

African-American patients have shown a greater response to pain on the forearm than on the lower extremities (Riley et al, 2014). Compared to non-Hispanic Caucasian patients, African-American patients had a heightened sense of awareness and perception of pain (Riley et al, 2014). Heat and cold tolerance had similar effects on the patients, where non-Hispanic African-American patients had a heightened response to stimuli and greater perceived pain (Riley et al, 2014). In a study conducted by Ahn and colleagues of patients with knee osteoarthritis of the knee, Asians reported a significantly higher pain

intensity level compared to non-Hispanic Caucasian patients in their study (Ahn et al, 2017). In this study, stimuli were applied to the knee joints (Ahn et al, 2017). Pain sensitivity was also significantly higher in Asian patients relative to Caucasian patients (Ahn et al, 2017). This increased sensitivity to the stimuli was not isolated to the affected knee (Ahn et al, 2017). Rather, there was similarity in the sensitivity to pain in both legs (Ahn et al, 2017). When comparing differences within the Asian group, different ethnicities also had different responses to pain. Indians reported significantly more knee pain compared to both Chinese and Malays in a cross-sectional study conducted to measure the prevalence of knee pain amongst Malaysians (Chia et al 2016).

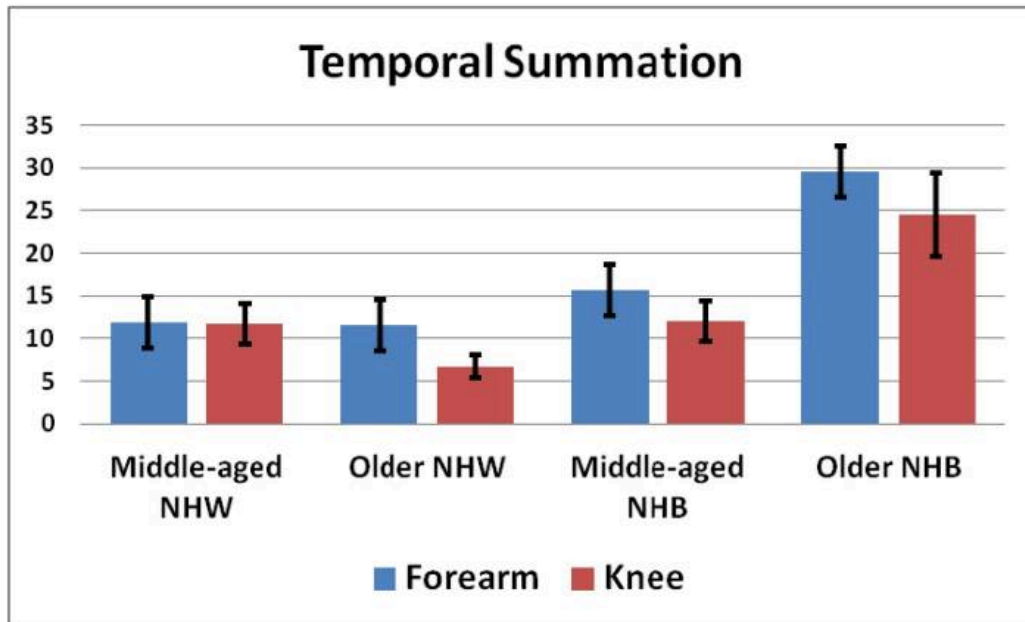


Figure 6. Differences in temporal summation of stimuli for knee and forearm. Non-Hispanic African-Americans reported higher temporal summation for both knee and forearm stimuli. This difference in temporal summation was more defined between the older populations of patients. Middle-aged non-Hispanic Caucasians and older non-Hispanic Caucasians showed similar levels of temporal summation. Older non-Hispanic African-Americans had the highest level of temporal summation especially in the forearm region (Riley et al, 2014)

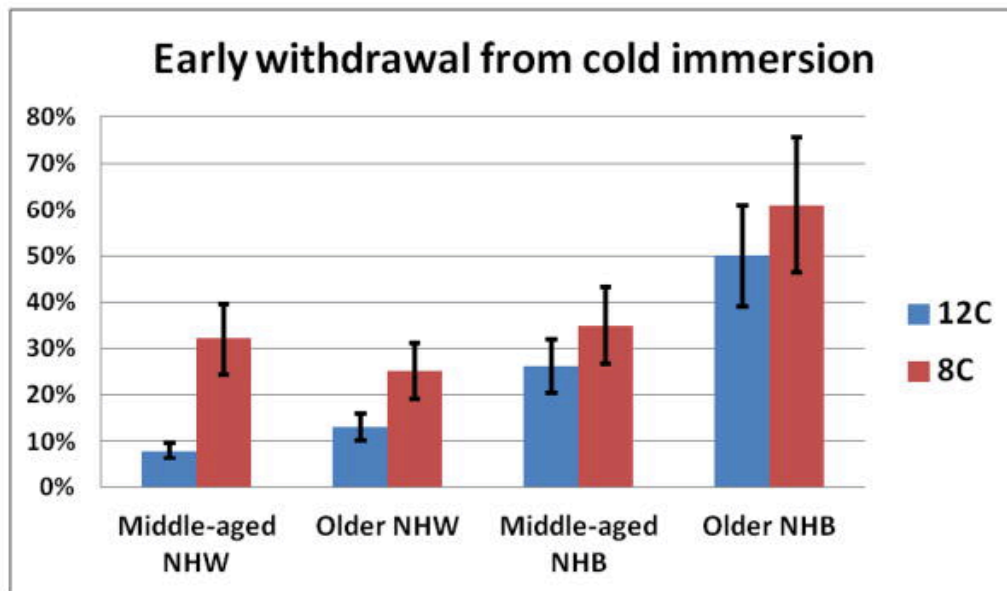


Figure 7. Racially driven rates of withdrawal for temperature stimuli. Non-Hispanic African-Americans had a higher percentage of withdrawing for both the cold and hot temperatures compared to non-Hispanic Caucasian individuals. Older non-Hispanic African-Americans showed the highest percentage of early withdrawal for the temperature stimuli (Riley et al, 2014).

When compared to Caucasian women, African-American women seemed to demonstrate higher daily vulvar pain amongst patients diagnosed with the condition provoked vestibulodynia (PVD) (Brown et al, 2016). However, after controlling for other factors in a multivariate analysis, there was actually no significant difference between the Caucasian and the African-American women (Brown et al, 2016). Not only were the pain ratings often different amongst different races and ethnicities, the actual manifestations and onset of many diseases were highly correlated with the race and

ethnicity of the individual. When evaluated across ethnicities and races, there were differences in the prevalence of arthritis within the various populations (Bolen et al, 2010). In particular, Asian-Pacific Islander populations and Hispanic populations had a significantly lower risk of developing arthritis compared to Caucasian patients (Bolen et al, 2010). In addition, American Indians/Alaskan natives had a significantly higher risk of developing arthritis (Bolen et al, 2010). Furthermore, cortisol levels have been shown to have a flatter slope for both Hispanic and African American individuals relative to Caucasian participants (DeSantis et al, 2007). These are additional examples of physiologic differences between various ethnicities, which may help explain the difference in pain responses.

The Intrinsic Identity's Influence

Greater demographic differences in responses to pain are generally seen in women than men (Ostrom et al, 2017). Although the differences may have the potential to be due to societal stereotypes, women have been shown to be more pain sensitive than men (Ostrom et al, 2017). For studies that have been conducted with female participants, the results are often consistent with some general themes. Pertaining to pain tolerance, African-American women were more sensitive to pain than non-Hispanic Caucasian women (Klatzkin et al, 2007). Moreover, the outcomes were often influenced by the patients' past medical history (Klatzkin et al, 2007). There is additional complexity when looking at the interaction of race and history of mental illness. Women with history of mental illness were unexpectedly more tolerant to ischemic pain and reported lower pain

than women who did not have a history of mental illness (Klatzkin et al, 2007).

According to Riolo and colleagues, Caucasian individuals are more likely to suffer from major depression, while African American individuals were more likely to suffer from dysthymic disorder, which presents as chronic depression of lesser intensity (Riolo et al, 2005).

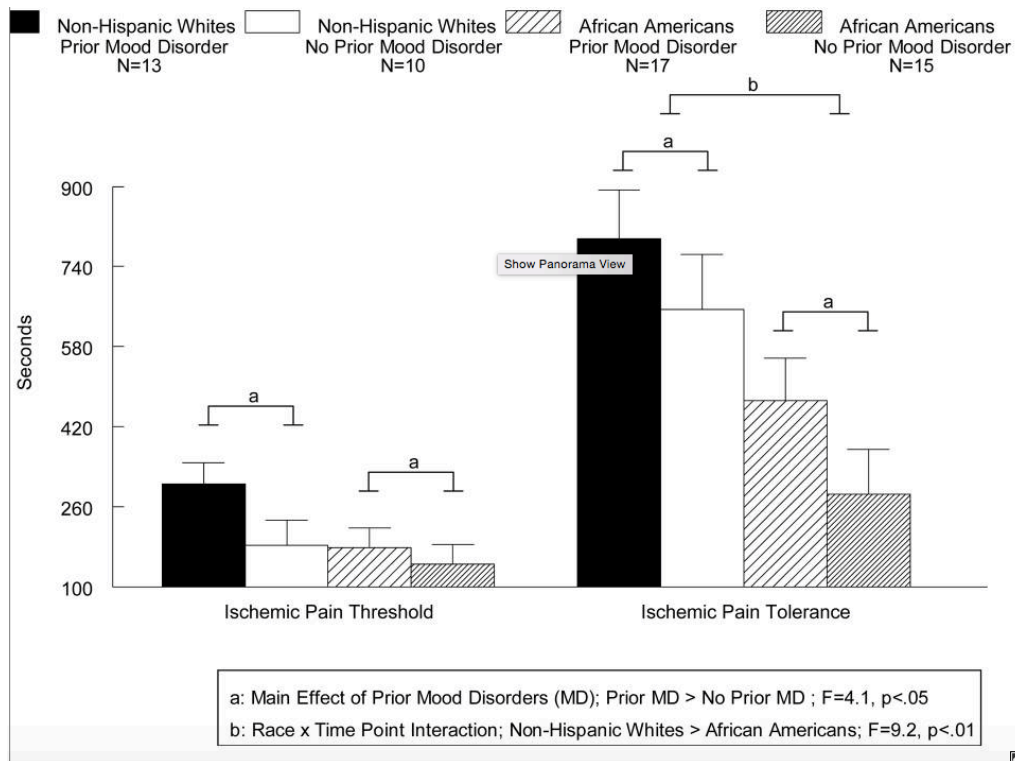


Figure 8. Pain thresholds and the interaction between race and history of mental illness. There was a higher ischemic pain threshold for non-Hispanic Caucasian women with a history of mental illness. Also, pain tolerance was higher for non-Hispanic Caucasian individuals who had prior mental illness compared with non-Hispanic Caucasian women without a mental illness history (Klatzkin et al, 2007)

In comparing mental illness and physical illness, patients from different racial backgrounds had differing views. When looking at psychological disturbances, such as sleeping problems and depression, Hispanic patients placed a higher value on mental illness and showed a preference for other conditions that had the potential to lead to earlier mortality compared to psychological illnesses compared to non-Hispanic Caucasian subjects (Craig et al, 2014). In comparison to non-Hispanic Caucasian patients, non-Hispanic patients, non-Hispanic African-American patients placed more value and importance on illnesses that could lead to early death compared to other physical impairments such as difficulty climbing the stairs or mental illness (Craig et al, 2014). Comparing preferences of end-of life treatment, African-American individuals sought life-prolonging treatments more than Hispanic and Caucasian individuals (Barnato et al, 2009).

The ethnicity of the caregiver is also an influential factor on the direction of treatment. Hispanic patients reported a preference for treatments that would lessen pain (Thienprayoon et al, 2016). Patients from multi-ethnic backgrounds have been shown to value a more holistic approach to their care, which includes being more informed and participating in their treatment plan (Van Keer et al, 2015). In contrast, providers often have a more systematic approach to treatment placing more importance on structured communication, and following required protocols and regulations, while driving the overall decision of the treatment course (Van Keer et al, 2015). Of course, there is no

single, universal right answer for how each patient should be treated and the differences that have been discussed indicate a major challenge for patients and how they can effectively work with their providers to maximize outcome and optimize their own well-being (Van Keer et al, 2015).

Coping with Pain

African-American and Asian groups showed significantly greater pain sensation to the same stimulus when compared to Caucasians (Fabian et al, 2011). The underlying biology is unclear, but it has been hypothesized to be linked to catastrophizing, which is when individuals exaggerate and anticipate that a situation is worse than it is (Fabian et al, 2011). Catastrophizing was often linked with perceptions of greater pain in elderly populations (Andruszkiewicz et al, 2017). For many patients, the methods for catastrophizing could be a key predictor of the pain experience. Compared to Caucasians and Asians, African-American individuals were significantly more likely to demonstrate catastrophizing (Fabian et al, 2011). However, the results were limited to certain types of catastrophizing such as situational catastrophizing, but not standard types (Fabian et al, 2011).

Methods of Coping and Quality of Life

When facing a terminal diagnosis, patients are often confronted with the daunting choice of selecting the best care for themselves. Studies have shown that race definitely manifests a key part in this decision. For children with asthma, Hispanic and African-

American children were less likely to be using an inhaler (Lieu, 2002). Rather, African-American patients utilized nebulizers, which is another inhalation device, which requires a power source(Lieu, 2002). Compared with Caucasian patients, Hispanic and African-American patients were more likely to choose treatments that would be considered more aggressive, when given a terminal diagnosis (Smith et al, 2008). Furthermore, Hispanic and African-American patients preferred not to be informed of the reality of their terminal health (Smith et al, 2008). African-American patients were more likely to continue end-of-life care compared to Caucasians following end-of-life discussions with their physicians (Mack et al, 2010). Interestingly, despite the fact that more African-American patients had the desire to follow through with end-of-life care, Caucasian patients are more likely to receive it (Loggers et al, 2009). In contrast to the Caucasian patients, Hispanic and African-American patients were much more likely to engage in religious practices that provided them another avenue for coping (Smith et al, 2008).

Between Caucasian and African-American individuals, African Americans had less control over their perceived pain (Tan et al, 2005). Moreover, African-American patients have demonstrated a higher level of psychological depression associated with pain (Table 2) even after the pain stimulus has been reduced (Tan et al, 2005).

Furthermore, among hemophiliac patients undergoing treatment, non-Caucasian patients reported lower levels of quality of life compared with Caucasian patients (McLaughlin, 2016).

Outcome Variables	White Mean (SD)	Black Mean (SD)	t ¹	t ²
MPI Pain Severity	5.01 (0.91)	5.34 (0.73)	-4.11***	—
CES-D	27.11 (11.74)	31.58 (12.51)	-3.55***	-2.73**
RMDQ	15.73 (5.03)	17.88 (4.37)	-4.58***	-2.99**
MPI Interference	5.01 (0.84)	5.21 (0.92)	-2.21*	-0.43

**P* < 0.05;

***P* < 0.01;

****P* < 0.001.

Table 2. Pain and its association with depression. African-American patients reported higher pain severity, interference and depression compared Caucasian patients. Greater reported pain was associated with higher frequency of depression (Tan et al, 2005).

Trends in Drugs, Dosing and Side Effects

When assessing the doses of morphine received following surgical procedures, Tan and colleagues found significant differences among the ethnic groups that were assessed (Tan et al, 2008). Pain measures and morphine usage were assessed for a sample of Chinese, Malay, and Indian patients who had undergone Caesarean section with a spinal anesthesia (Tan et al, 2008). Indians, compared to Malay and Chinese patients, reported the highest level of morphine usage (Tan et al, 2008). There were similar differences in the doses received for each time period following the procedure which was statistically significant (Tan et al, 2008). The amount of morphine consumed seemed to be correlated with the fact that Indian patients had a higher perception of pain relative to the other groups of women (Tan et al, 2008). In another study, however, Malays used the

most opioids postoperatively compared to Indians and Chinese patients despite Indian patients reporting greater pain than Malay patients (Chia et al, 2016).

There have also been documented differences in the amounts of opioids that are administered according to geographic region. In a study of African, Central and South American, and Indian children undergoing cleft lip repair, Central and South American children were given the lowest doses of fentanyl compared to Indian and African children for perioperative pain management (Rabbitts et al, 2012). As has been described, African-American patients have been found to report greater pain relative to other patients, which may lead to a higher opioid dose being prescribed by providers (Sadhasivam et al, 2012). Intraoperatively, pain was managed with similar doses of medication in African and India, while in South and Central America, children received significantly less fentanyl (Table 3) (Rabbitts et al, 2012). In the recovery room, each group received similar amounts of the fentanyl for pain control (Rabbitts et al, 2012).

	Africa		India		Central/South America		p-value*
	mcg	mcg/kg	mcg	mcg/kg	mcg	mcg/kg	
Initial intraoperative	26 ± 17	2.7 ± 1.2	34 ± 20	2.5 ± 1.3	23 ± 18	1.4 ± 0.7	< 0.001
Subsequent intraoperative	12 ± 17	1.3 ± 1.9	26 ± 28	1.8 ± 1.6	9 ± 17	0.6 ± 0.9	< 0.001
Total intraoperative	39 ± 24	4.1 ± 2.4	60 ± 41	4.3 ± 2.2	32 ± 28	2.0 ± 1.2	< 0.001
Recovery room	8 ± 15	0.9 ± 1.5	6 ± 11	0.6 ± 1.6	12 ± 18	0.7 ± 0.5	0.4
Total perioperative	47 ± 35	4.9 ± 3.5	67 ± 42	4.9 ± 2.9	44 ± 39	2.6 ± 1.4	< 0.0001

*Fentanyl use in mcg/kg used for analysis

Table 3. Regional differences in prescribed opioids. Perioperative dosing of the opioid fentanyl was significantly different amongst the three regions. Patients in Africa and India received significantly higher doses intraoperatively (Rabbitts et al, 2012).

The differences in how patients respond to opioids are also very relevant. Caucasian children were given lower doses of opioids relative to African-American children following tonsillectomy surgery (Sadhasivam et al, 2012). After receiving the higher doses of opioids, Caucasians children had more adverse affects (Sadhasivam et al, 2012). In controlled studies, when administered morphine, a higher percentage of Caucasian children had side effects compared to Hispanic children (Jimenez et al, 2012). Although Jimenez and colleagues hypothesized that this difference is primarily due to differences in DNA polymorphisms, this has not been confirmed in other studies (Jimenez et al, 2012).

Identity and the Psychological Experience of Pain

As has been shown, differential experiences of pain have been documented amongst patients from different racial backgrounds (Cykert et al, 1999). Of all the studied demographic factors, ethnicity was the only factor to show a significant relationship in how individuals with lung disease rated their perceived physical function limitation scores, which indicated their feelings of limitations due to their illness, measured as a health utility score (Cykert et al, 1999). Compared to Caucasian participants, African-American patients reported higher health utility scores (Table 4) for all three scenarios given (Cykert et al, 1999). Thus, African-American patients demonstrated that they may be able to better cope with their life circumstances compared to the Caucasian participants (Cykert et al, 1999).

Bivariate Analysis of Predictors of Limited Physical Function Expressed as Health Utility Scores with 95% Confidence Intervals (0 = Death, 1 = Normal Health)

Characteristic	Limitations in Activities of Daily Living	Bed-to-Chair Ambulation Only	Permanent Nursing Home Placement
Race			
African American	0.39 (\pm 0.18)*	0.39 (\pm 0.18)*	0.37 (\pm 0.18)*
White	0.13 (\pm 0.06)	0.11 (\pm 0.05)	0.10 (\pm 0.05)
Marital status			
Married	0.13 (\pm 0.05)	0.11 (\pm 0.05)	0.10 (\pm 0.05)
Single	0.30 (\pm 0.14)	0.28 (\pm 0.14)	0.27 (\pm 0.14)
Gender			
Female	0.25 (\pm 0.09)*	0.23 (\pm 0.09)*	0.29 (\pm 0.09)
Male	0.09 (\pm 0.06)	0.08 (\pm 0.05)	0.15 (\pm 0.06)
Insurance status			
Medicare	0.20 (\pm 0.11)	0.20 (\pm 0.11)	0.20 (\pm 0.11)
Private	0.18 (\pm 0.08)	0.15 (\pm 0.07)	0.13 (\pm 0.07)
Self-rated health			
Fair or less	0.16 (\pm 0.08)	0.15 (\pm 0.08)	0.16 (\pm 0.08)
Good or better	0.22 (\pm 0.10)	0.20 (\pm 0.10)	0.16 (\pm 0.09)
Education			
Less than high school	0.23 (\pm 0.13)	0.22 (\pm 0.13)	0.20 (\pm 0.13)
High school	0.17 (\pm 0.12)	0.16 (\pm 0.13)	0.13 (\pm 0.12)
More than high school	0.17 (\pm 0.09)	0.13 (\pm 0.07)	0.14 (\pm 0.07)

*Statistically significant difference ($p < .05$) using the Mann-Whitney U test.

Table 4. Race-related differences in utility. Higher utility scores indicated good health, while lower utility scores indicated feeling close to death. African-American patients had higher utility scores compared to Caucasian participants for all three measures of discomfort, which included limitations to activities of daily living, bed-to-chair motility, and becoming confined to a nursing home (Cykert et al, 1999).

It appears that ethnic identity may also have a significant impact on how individuals process pain. In comparison to a Caucasian group, non-Caucasian groups

demonstrated lower thresholds in pain perception, for example, lower stimuli led to an indication of pain (Rahim-Williams et al, 2007). Using the multi-ethnic group identity measure, both Hispanic and African-American patients had a stronger ethnic identity relative to the Caucasian participants, and ethnic identity was associated with greater pain perception (Rahim-Williams et al, 2007). African-American patients have been shown to have the strongest ethnic identity (Rahim-Williams et al, 2007). Although this does not prove direct causation, it does appear that the pain experience may indeed be mediated by the patient's personal identity and perception of themselves (Rahim-Williams et al, 2007). Reports of stronger ethnic identity, however, are not equivalent to the actualization of that identity and the confidence that comes from it. With actualization of identity, patients are able to successfully integrate their racial group identity and idea of self-identity (Chae and Walters, 2009). According to Chae and Walters, patients who were able to reach the stage of actualization in terms of their identity amongst their peers, were better able to cope with their pain and reported lower pain values despite feelings of racial discrimination (Chae and Walters, 2009). In Chae and Walters' study, patients who did not achieve actualization of their identity were not as adept at coping with perceived discrimination and consequently reported a higher level of pain (Chae and Walters, 2009). With greater actualization of their own identity amongst their peers, patients are not as influenced by perceptions of discrimination, which have been associated with poor pain outcomes and heightened sensitivity, leading to higher pain response ratings to stimuli (Chae and Walters, 2009).

Ethnicity		Cold Pain Range	Heat Pain Range	Ischemic Pain Range
African American	MEIM Total	-.29*	-.19	-.31**
	Affirmation and Belonging	-.29*	-.13	-.26*
	Identity Achievement	-.20	-.13	-.22
	Ethnic Behaviors	-.30*	-.24	-.34**
Hispanic American	MEIM TOTAL	-.37*	-.30*	-.23
	Affirmation and Belonging	-.36**	-.22	-.29*
	Identity Achievement	-.26*	-.34**	-.16
	Ethnic Behaviors	-.33**	-.10	-.10
Non-Hispanic White	MEIM TOTAL	-.13	-.16	-.10
	Affirmation and Belonging	-.04	-.20	-.15
	Identity Achievement	-.20	-.12	-.09
	Ethnic Behaviors	.03	-.03	.08

*
p <.05

**
p ≤.01

Table 5. Ethnicity, identity and pain. African-Americans had the strongest multi-group ethnic identity followed by Hispanics and lastly by non-Hispanic Caucasian individuals. Affirmation and belonging, in addition to engaging in ethnic behaviors, were negatively correlated with pain tolerance. African-American individuals reported more discomfort to pain stimuli (Rahim-Williams et al, 2007).

Measure	African American			Hispanic			Non-Hispanic White		
	Female	Male	Group	Female	Male	Group	Female	Male	Group
Threshold									
IPTH (sec)	191.1 (167.6)	248.8 (217.5)	208.3 (186.2)	166.0 (169.5)	187.5 (145.8)	175.5 (158.5)	141.0 (131.2)	214.5 (177.8)	185.3 (162.9)
CPTH (sec)	12.0 (10.3)	16.6 (12.3)	13.6 (11.0)	13.5 (17.7)	29.2 (55.2)	20.5 (36.5)	16.6 (13.4)	21.5 (15.6)	19.8 (15.1)
HPTH (°C)	42.0 (3.02)	42.3 (3.5)	42.1 (3.2)	40.1 (3.4)	42.9 (3.0)	41.4 (3.5)	40.7 (3.2)	42.2 (2.9)	41.7 (3.2)
PPTHM (kg)	2.6 (0.8)	3.3 (1.4)	2.89 (1.1)	2.4 (0.7)	4.2 (1.6)	3.2 (1.5)	2.4 (0.8)	3.6 (1.3)	3.2 (1.4)
PPHTT (Kg)	5.4 (1.9)	6.7 (2.4)	5.9 (2.2)	4.9 (1.6)	7.2 (2.2)	6.0 (2.2)	5.2 (2.4)	7.7 (2.0)	6.7 (2.5)
Tolerance									
IPTO (sec)	355.3 (252.5)	630.2 (235.5)	446.4 (275.5)	439.8 (297.1)	492.9 (251.9)	463.4 (277.1)	445.7 (243.3)	625.8 (265.2)	550. (268.3)
CPTO* (sec)	31.7 (25.3)	66.1 (83.5)	42.6 (54.0)	50.5 (79.6)	101.8 (110.4)	73.3 (97.1)	88.3 (99.3)	162.4 (124.8)	133.1 (120.3)
HPTO* (°C)	45.4 (2.3)	47.5 (2.4)	46.2 (2.5)	44.9 (2.9)	47.5 (2.5)	46.1 (3.0)	46.3 (2.2)	48.6 (2.2)	47.6 (2.5)
Pain Range									
ISPR (sec)	175.8 (204.8)	415.8 (264.2)	257.7 (249.5)	280.7 (241.1)	307.5 (234.0)	292.5 (236.3)	304.6 (199.3)	416.8 (229.3)	365.8 (222.0)
CPR* (sec)	19.6 (19.3)	49.5 (80.0)	29.7 (50.2)	36.9 (70.1)	75.3 (102.4)	53.6 (87.0)	71.7 (90.3)	140.8 (117.8)	113.3 (112.0)
HPR* (°C)	3.4 (1.4)	5.1 (2.7)	4.1 (2.3)	4.8 (2.3)	4.5 (2.7)	4.7 (2.5)	5.5 (2.7)	6.3 (3.0)	6.0 (3.0)

*p < .05 (African Americans =Hispanics < non-Hispanic Whites)

IPTH = Ischemic Pain Threshold

CPTH = Cold Pain Threshold

HPTH = Heat Pain Threshold

PPTHM = Pressure Pain Threshold Masseter

PPHTT = Pressure Pain Threshold Trapezius

HPTO = Heat Pain Tolerance

IPTO = Ischemic Pain Tolerance

CPTO = Cold Pain Tolerance

ISPR = Ischemic Pain Range

CPR=Cold Pain Range

HPR=Heat Pain Range

Table 6. Comparison between Hispanic and Non-Hispanic Pain Thresholds. African American participants had a significantly lower pain threshold for all measures compared to Hispanic and non-Hispanic Caucasian participants (Rahim-Williams et al, 2007).

Provider Bias and its Effects

The interaction between patients with their providers is complex. Providers may have preconceived ideas on how to treat individuals while patients might also have prejudice against their providers. Effective and optimal care can further be compromised due to stereotypes and other extraneous factors leading to differential offerings of general health screenings to patients and the potential for more serious discrepancies in care (Franks, Fiscella, & Meldrum, 2005).

Providers' Influence over Wait Times and Pain

Hospital wait times can vary for groups depending on many factors, including adequate personnel on staff and the quality of the facility where treatment is being administered. However, when a difference in patient wait times appears to be based on ethnicity or race, questions may arise on intrinsic bias that both healthcare providers and the patients themselves may have. In a study conducted by James, Bourgeois, and Shannon, there was a significant difference in the wait times in an emergency room between Hispanic, African-American, and Caucasian patients (James, Bourgeois, & Shannon, 2005). According to the study (Tables 7 and 8), Caucasian patients waited the least amount of time for triage, while Hispanic patients waited the longest (James, Bourgeois, & Shannon, 2005). Many subtle biases could account for this difference including socioeconomic bias that remains for certain ethnic groups. This outcome has been further supported in dental office studies, controlled for other factors that could also influence wait times (Okunseri et al, 2013).

Variable	Unadjusted % Change in Wait Time (95% CI)	P Value	Adjusted % Change in Wait Time (95% CI)	P Value
Gender		.74		.36
Male	Referent		Referent	
Female	-1 (-6 to 4)		-2 (-7 to 2)	
Race/ethnicity		<.01		.01
NHW	Referent		Referent	
NHB	23 (9-38)		6 (-3 to 16)	
HW	45 (29-64)		18 (6-30)	
Geographic region		<.01		<.01
Northeast	Referent		Referent	
Midwest	-32 (-17 to -43)		-21 (-9 to -32)	
South	-6 (-22 to 12)		6 (-8 to 21)	
West	-12 (-30 to 12)		-9 (-24 to 10)	
Metropolitan status		<.01		<.01
MSA	Referent		Referent	
Non-MSA	-49 (-40 to -56)		-41 (-35 to -47)	
Hospital ownership*		.22		<.01
Nonprofit organization	Referent		Referent	
Government	-19 (-36 to 3)		-22 (-9 to -34)	
Proprietary	-8 (-25 to 12)		-13 (-26 to 2)	
Payment source		<.01		.03
Private insurance	Referent		Referent	
Government	10 (1-21)		4 (-3 to 13)	
Self-pay	12 (0-27)		4 (-6 to 15)	
Other	29 (11-50)		24 (6-44)	
Unknown	13 (4-22)		17 (1-35)	
Triage status		<.01		<.01
<15 min	Referent		Referent	
15-60 min	125 (90-167)		108 (73-149)	
>1-2 h	227 (171-296)		183 (131-246)	
>2-24 h	267 (200-348)		224 (164-298)	
Unknown	112 (70-164)		91 (53-138)	
Disposition		<.01		.04
Discharged	Referent		Referent	
Admitted	-31 (-16 to -43)		-20 (-6 to -32)	
Other	-5 (-14 to 5)		-4 (-11 to 3)	

MSA indicates Metropolitan Statistical Area, as defined by the US Office of Management and Budget.
 * Ownership assigned on the basis of the SMC Hospital Market Database (SMC Marketing Group, Chicago, IL).

Table 7. Emergency room wait times and demographic factors. Various factors, including ethnicity that influenced patient wait times in the emergency room. Non-Hispanic Caucasian patients had the shortest wait times followed by non-Hispanic African-American patients. Hispanic patients had the longest wait times of the three groups (James, Bourgeois, & Shannon, 2004).

Category	Frequency	Geometric mean wait time, min	SE	p-value
Payer Type				
Self-pay	882	28.2	1.7	<.0001
Medicaid	801	30.8	3.6	
Private insurance	667	25.4	5.2	
Medicare	144	27.6	1.6	
Other	100	30.4	1.9	
Unknown	179	28.6	2.9	
Sex				
Female	1463	28.7	1.3	0.55
Male	1310	29.0	1.5	
Triage category (urgency)				
<15 min	226	14.9	1.9	<.0001
15-60 min	845	26.8	1.4	
1 hour-2 hours	706	35.0	2.2	
>2 hours-24 hours	643	36.4	2.0	
Unknown/no triage	353	23.7	2.5	
Age Group (years)				
0-4	142	26.9	4.1	<.0001
5-18	255	28.8	2.2	
19-33	1322	28.9	1.4	
34-52	853	29.3	1.7	
53-72	157	27.0	3.6	
73 and over	44	32.6	6.6	
Race/Ethnicity				
Hispanic	285	32.1	3.5	<.0001
Non-Hispanic Black	683	35.3	2.3	

Category	Frequency	Geometric mean wait time, min	SE	p-value
Non-Hispanic White	1710	26.5	1.1	
Other	95	26.1	3.7	
Patient Stated Reason for Visit				
Dental reason	1717	29.0	1.2	0.56
Non-dental reason	1056	28.7	1.7	

Table 8. Comparison between non-Hispanic Caucasian, Hispanic, and African-American patient wait times. Non-Hispanic Caucasians had the shortest wait times relative to Hispanic and African-American patients. African-American patients had the longest wait times (Okunseri et al, 2013).

Inconsistent perceptions of the patient's pain experience by providers have led to a greater question of how to effectively treat patients. In a study conducted between a sample of Jewish and Bedouin new mothers on the first day after delivery, patients reported similar levels of pain experienced during labor (Sheiner et al, 1999). This level remained fairly consistent for the different stages of labor and for the reported pain on the day following parturition (Sheiner et al, 1999). Despite similar patient reports of pain, however, when assessed by Jewish providers, the providers reported lower pain intensity for the Bedouin women when compared to the Jewish patients (Sheiner et al, 1999). There was 60% concordance between the Jewish patients' and providers' assessments of their pain, while there was only 30% concordance between Bedouin patients' and their Jewish providers' assessment of pain (Sheiner et al, 1999). Furthermore, there was a divide in terms of the pain relief that the women were offered. When compared to Jewish women, the Bedouin patients were offered epidurals less frequently than the Jewish women (Sheiner et al, 1999). This difference may be influenced by a perception by the providers that the Bedouin women were experiencing less pain than the Jewish women (Sheiner et al, 1999).

Differences in Medication Prescribing by Providers

Other studies have found a discrepancy in the amounts of pain medication prescribed to certain ethnicities compared to other ethnicities. In one study at the University of California, San Diego, the amount of prescribed narcotics following surgery was assessed for patients categorized into four ethnic groups: Asian, African

American, Hispanic, and Caucasian (Ng et al, 1996). In comparison to Hispanic patients, the investigators found that Caucasians were prescribed a higher amount of postoperative narcotics (Ng et al, 1996). African-American patients were prescribed more than Asian patients (Ng et al, 1996). Of all the groups, Hispanic patients were prescribed the lowest amount of narcotics (Figure 9). In addition, Weisse and colleagues found that female physicians often prescribed more opioids to African-American patients compared to male physicians, who prescribed more to Caucasian patients (Weisse et al, 2001).

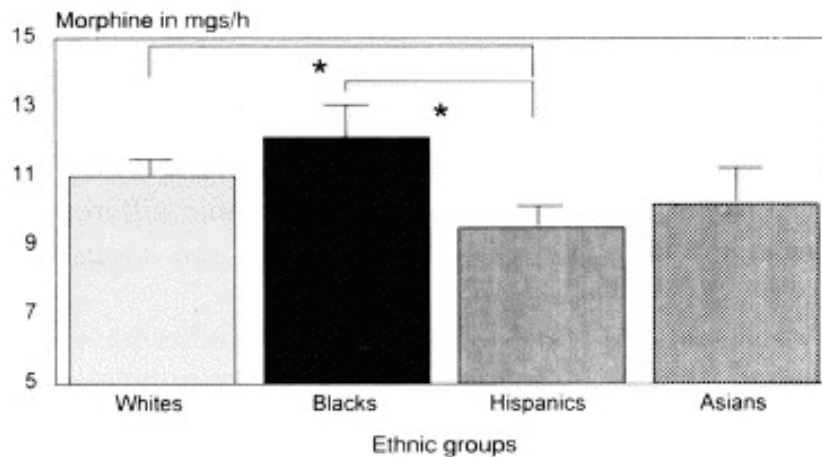


Figure 9: Differential prescribing of morphine. African-American patients were prescribed the highest doses of opioids relative to Caucasian, Hispanics, and Asian patients (Ng et al, 1996).

When prescribing narcotics, it has also been found that there are dosing differences between physicians when prescribing to different ethnicities. The gender of not only the patients but of the physicians has been shown to heavily influence dosing (Weisse, Sorum, & Dominguez 2003). In contrast to the findings in 2001 by Weiss and

colleagues, female providers were more likely to prescribe a lower dosage of narcotics for African-American patients compared to Caucasian patients (Weisse, Sorum, & Dominguez 2003). Male physicians were more likely to prescribe a higher dosage for African-American patients than for their Caucasian patients (Weisse, Sorum, & Dominguez 2003). This trend is troublesome, because some physicians intend to systematically follow protocols or guidelines for prescribing that are provided by their hospital or state, but are still likely to be influenced by underlying bias or judgment of their patients' perceived pain (Kilaru et al, 2014).

Other studies have found conflicting results. Dickason and colleagues found that patients being treated for migraines received similar opioid prescriptions regardless of their race (Dickason et al, 2015). However, Singhal and colleagues found a difference in opioid prescriptions that were given depending on the patient's race (Singhal et al, 2016). These results were highly dependent on not only on the race of the patients but also on the indication for opioid treatment (Singhal et al, 2016). For example, African-American patients were less likely to be prescribed opioids when they visited the emergency department compared to non-Hispanic Caucasian patients (Singhal et al, 2016). This trend was most evident for patients who were treated for abdominal and back pain (Singhal et al, 2016). However, this trend was not consistent when assessing for other etiologies of pain, including, dental pain, and kidney stones (Singhal et al 2016).

In addition to differential prescribing by providers, studies have shown that there is indeed a difference between differing patient ethnicities regarding the types of treatment and testing that are offered (Franks, Fiscella, & Meldrum, 2005). Pap smears,

counseling for smoking cessation, and mental health were all interventions that Caucasian patients were more likely to be offered compared patients who were African-American (Franks, Fiscella, & Meldrum, 2005). In contrast, African-American patients had a higher chance to be offered eye exams than Caucasian patients (Franks, Fiscella, & Meldrum, 2005). In a study of Caucasian, African-American, Hispanic, and Asian groups of patients in an emergency room, Caucasian patients were most likely to be prescribed opioids for pain compared to the other groups (Pletcher et al, 2008). The difference between the African-American, Hispanic and Asian patients was also significant (Pletcher et al, 2008). Rather than being prescribed opioids, non-opioid pain medications were more likely to be prescribed for the non-Caucasian groups assessed (Pletcher et al, 2008). Overall, the total analgesia prescribed, including non-opioid and opioid pain medication were similar (Pletcher et al, 2008). This trend was also demonstrated in children being treated for appendicitis (Goyal, 2015). More Caucasian children were prescribed opioids compared to African-American children (Goyal 2015). However, this difference was not statistically significant (Goyal, 2015).

The Influence of Providers' Perception of Coping Strategies

Coping strategies are influenced by the perception of bias that patients may feel exhibited by their providers. Ezenwa and Fleming found significant differences between African-American and Caucasian patients regarding how individuals with non-malignant chronic pain were able to manage their pain (Ezenwa and Fleming 2012). The authors concluded that the relative degree of discrimination or bias that the patients felt

influenced how well they perceived themselves to be able to overcome their pain (Ezenwa and Fleming, 2012). Moreover, in comparing quality of life, African-Americans indicated a lower score than Caucasians (Ezenwa and Fleming, 2012). Thus, a form of hopelessness emerges from perceived discrimination, and this in turn leads to reduced coping skills and less effective means of managing pain (Ezenwa and Fleming 2012). Hausmann and colleagues proposed that the discrimination that individuals perceived was significantly associated with worse health status for both Caucasian and African-American patients but not for Hispanic patients (Hausmann et al, 2008).

Macintosh and colleagues found that racial minorities were more likely to perceive discrimination when evaluating their healthcare (Macintosh et al, 2013). Minorities were classified as individuals who were not non-Hispanic Caucasians and included Asian and African-American groups (Macintosh et al, 2013). The racial majority, Caucasians, received significantly more vaccinations than the minority groups further suggesting biased treatment (Macintosh et al, 2013). In addition, those who identified as Caucasian were more likely to report greater socioeconomic advantage and fewer feelings of discrimination (Cormack, Harris & Stanley, 2013). Individuals who felt less discrimination reported better psychological and physical health (Cormack, Harris & Stanley, 2013).

Discussion

There is conflicting evidence regarding whether patients perceive pain differently depending on ethnicity. Several studies have found that patients of different ethnicities

do have differences in their perceived pain. African-American patients were shown to exhibit higher levels of perceived pain relative to Caucasian patients (Rahim-Williams et al, 2007). Even patients of the same race may have differences depending on their geographic regions of origin and ethnicity (Chia et al, 2016). The interaction of awareness of disease or source of pain, ethnicity and perceived pain is also complex. While elderly Caucasian patients with cancer were found to have a better understanding of their disease compared to elderly African-American patients with cancer, both groups experienced pain similarly (Baker et al, 2014). If both groups had similar levels of understanding their disease, they may have had differential perceptions of pain.

However, in the midst of all the evidence demonstrating that there is an actual difference in perceived pain between patients of different ethnicities and races, there have been some studies, that show contradictory evidence, so that no definite conclusions can be made. Sheiner and colleagues found that both Bedouin women and Jewish women had similar perceptions of pain during childbirth, but their physicians' assessments of their pain differed significantly (Sheiner et al, 1999). This discrepancy has the potential to impede successful treatment. Patients may not receive adequate treatment because their providers may not deem it necessary. Furthermore, patients may not even seek treatment due to feelings of discrimination, to avoid further negative experience (Jacobs et al, 2014). Women who had perceptions of discrimination were less likely to receive screenings for both breast and cervical cancers (Jacobs et al, 2014). This avoidance of care due to perceived discrimination or, and possibly unconscious physician biases, is alarming, as consistent follow-up for evaluation and treatment has been shown to improve the pain

experience. Patients who followed their recommended treatment plans reported lower ratings of chronic pain than patients who did not follow through with their treatment plans (McLaughlin, 2014). Discrimination, of course, is not limited to race and ethnicity but can be due to gender, religion, sexual orientation, and many other factors, making the analysis more complex.

Coping methods that individuals use are also often driven by ethnicity in addition to other factors. Although this cannot be generalized, patients sometimes make healthcare decisions that may be harmful to their health. Lieu and colleagues showed that Hispanic and African-American patients with asthma were less likely to use their inhalers (Lieu, 2002). Furthermore, actualization of ethnic identity can have an impact on how patients manage pain. Patients, who had reached the stage of actualization of their ethnic identities were not as easily influenced by perceptions of discrimination and overall were better able to cope with pain (Chae and Walters, 2009)

It is also important to assess the factors that may have led to the widespread opioid epidemic, which involves a treatment option that was intended to help patients cope with pain. It is often assumed that factors such as ethnicity are predictors for whether a patient is at risk of developing dependence and ultimately an addiction to opioids. Many studies have indeed found trends that may partly influence how opioids are most appropriately prescribed. For example, because certain ethnic groups have been found to report greater perceived pain, they may require more pain medication. Indian patients reported higher pain levels and required higher doses of opioids to treat pain (Tan et al, 2008). However, addiction itself may not be as directly linked to ethnicity. In

particular, studies that assessed patients with opioid addiction found that prior substance abuse, including alcohol and other drug abuse, increases the risk of developing opioid addiction, while no association with ethnicity was found (Ives et al, 2006).

Providers are often faced with the challenging task of treating patients whom they may not understand or with whom they may be unable to relate. There are nuances within cultures that can make this a sensitive issue and sometimes lead providers to withdraw and dodge more in-depth interactions with patients. While this may not fit the definition for discrimination, this behavior may still drive the differential treatment of patients. Providers, themselves may feel uneasy about unfamiliar potential interactions with their patients of different ethnicities (Milberg, Torres, & Ågård, 2016). Physicians providing end-of life care for patients in Sweden indicated that there were specific challenges that they considered when planning for evaluations of patients of different ethnicities (Milberg, Torres, & Ågård, 2016). In particular, anticipation for difficulty with communication was a significant concern (Milberg, Torres, & Ågård, 2016). In a field where communication directly affects patients' quality of life, it is understandable that providers would make additional efforts to improve their interactions with patients, in order to avoid issues with poor communication as much as possible. Expressions of emotion by patients and their families also led providers to feel anxious about future interactions (Milberg, Torres, & Ågård, 2016). In Sweden, most providers did not have prior experiences, interacting with ethnically diverse patients, but often still, had preconceived ideas about what the interactions would be like (Figure 10) (Milberg, Torres, & Ågård, 2016). At the same time, health care providers maintained a genuine

desire to provide care for their patients, but were not always effective in providing comprehensive care (Milberg, Torres, & Ågård, 2016). Because success of treatment for pain is highly dependent on adherence to recommended treatments, it is important for providers to be aware of ways in which patients can be treated in a more individualized manner.

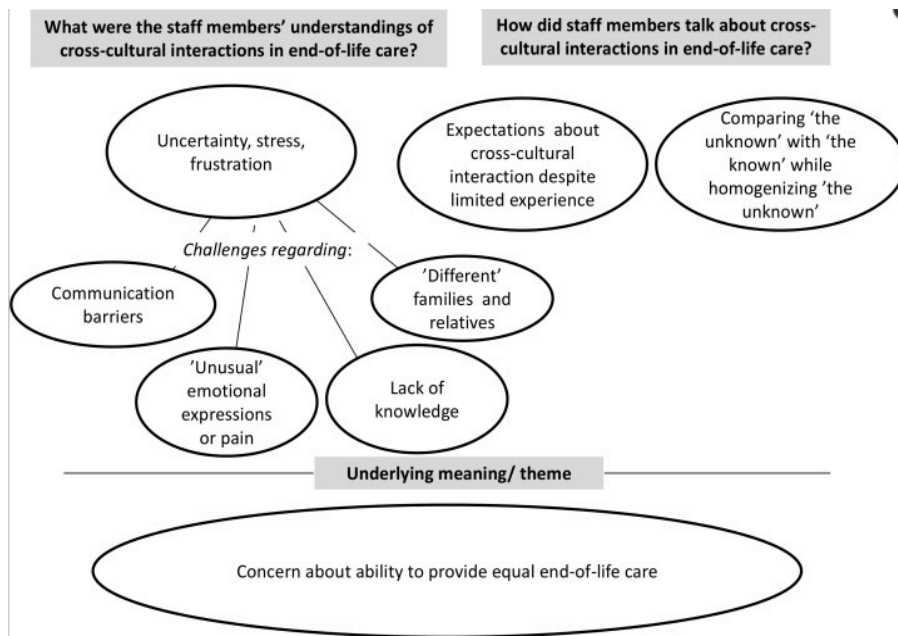


Figure 10. Provider views on minority patient interactions. Providers had various preconceived, views and biases about interactions with patients from ethnically diverse backgrounds (Milberg, Torres, & Ågård, 2016).

Although providers primarily determine medical treatment recommendations, a positive interaction between the patient and that will ultimately allow for the development of a more prolific and proactive encounter between the two parties. Thus,

training to learn methods for improved interactions between providers and patients has led to more studies and debate over what methods would provide the most benefit for everyone. After undergoing coursework and training for the care of a diverse patient population, nurses appreciated that their understanding of different ethnic groups had improved (Chevannes, 2002). Moreover, following training, providers gained confidence in caring for different ethnic groups more effectively (Chevannes, 2002). However, even after training, it was rare to see the principles learned being applied to actual practice (Chevannes, 2002). This leads to questions about how training can be successfully implemented and integrated more fluidly into a real-life clinical setting (Chevannes, 2002).

Conclusion

Although numerous studies have been conducted to investigate the issues of ethnicity, race, and their effects on pain and health, most studies have been limited to predominantly African-American and non-Hispanic Caucasian subjects. This curtails the generalizability of the results. Most studies that included Asian patients compared ethnic groups within the Asian race and, again, cannot be used to make conclusions about interracial trends. Furthermore, investigator bias may lead to debate regarding the reliability of the prior studies that have been conducted. Weisse, Fisher, and Foster found that study participant and investigator race and gender also influenced the reports of pain (Weiss, Foster, & Fisher, 2005).

Studies have been conducted showing a relationship between race, prevalence of certain illnesses and responses to pain. However, the exact causal relationship is yet to be identified. This may be partially due to the fact that even today, the cause of pain is sometimes unclear. Additional studies that focus on genetic factors, including DNA polymorphisms, are important for connecting the differential biologies that may affect different ethnicities' pain responses. Despite the evidence presented, it is difficult to definitely confirm a causal relationship between ethnicity and perception of pain beyond the stereotypes, partially due to many confounding factors. Focusing innovative treatments exclusively based on ethnicity could hinder much needed progress in the management of pain. Treatment programs should be developed to integrate patients' multiple dimensions including gender and ethnicity. Continuing opportunities for patient education are also promising. Ultimately, ethnicity does seem to be one of the many determining factors in the pain experience.

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CURRICULUM VITAE

