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Perceived Injustice Predicts Stress and Pain in Adults with Sickle Cell Disease

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Abstract

Background—Research evidence shows that perceived injustice is a context-based unfair treatment that has negative influence on health outcomes.

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Aims—We examined the contribution of patients' perceived injustice regarding interactions with healthcare providers to stress and pain in adults with sickle cell disease (SCD).

Design—This study was a cross-sectional correlational pilot study.

Setting—Included in the study were adults with SCD who received their care from a university-affiliated Comprehensive Sickle Cell Clinic.

Participants/Subjects—Participants were 52 adults whose mean age was 34 ± 11 years (minimum [min] 20 years, maximum [max] 70 years). Most of the patients were African Americans ($n = 48$, 92%) and female ($n = 41$, 79%). Forty-eight patients (92%) reported having a high school diploma or higher.

Methods—Participants completed the perceived injustice questionnaire, perceived stress questionnaire, and the *PAINReportIt*, which includes questions to measure pain and demographics. We analyzed the data using the linear regression analyses.

Results—Perceived injustice from doctors was a significant predictor of perceived stress, $p < .001$ and pain, $p = .002$. Perceived injustice from nurses also was a significant predictor of perceived stress, $p < .001$ and pain, $p = .02$. The procedural, distributive, and informational domains of perceived injustice attributed to both doctors and nurses consistently predicted patients' perceived stress, but only the procedural and distributive domains of perceived injustice consistently predicted patients' pain.

Conclusions—Findings suggest that perceived injustice was negatively associated with stress and pain in adults with SCD and warrant further investigation in a larger sample.

Keywords

perceived injustice; sickle cell disease; pain management; model of perceived unfairness; perceived stress

Introduction

Sickle cell disease (SCD) is an inherited blood disorder that afflicts about 100,000 people in the United States, and pain is its hallmark symptom. But, the contribution of perceived injustice to the inadequate control of pain in adults with SCD is unknown. Perceived injustice is a perceived unfairness of the treatment that a person receives from others deemed important (e.g., friend, spouse, employer, or healthcare provider) and is based on one's perception that others breached agreements (formal or informal) made between them (Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Elovainio et al., 2009; Jackson, Kubzansky, & Wright, 2006). Perceived injustice is a multidimensional concept comprised of four domains: procedural, distributive, interpersonal, and informational (Table 1) (Colquitt, 2001) and could be a concept within the Model of Perceived Unfairness (Jackson et al., 2006). The Model of Perceived Unfairness posits that perception of unfairness, such as perceived injustice, initiates stress responses, which over time may accumulate to adversely affect health (Jackson et al., 2006) such as intensifying the pain of SCD (Figure 1). To our knowledge, there has been no systematic study of perceived injustice by people with SCD. Researchers have focused some attention on the influence of perceived injustice on stress

and pain, (Judge & Colquitt, 2004; McParland & Knussen, 2010; Sullivan et al., 2008) but not in those with SCD. The purpose of this pilot study was to examine the association of perceived injustice with stress and pain experiences in adults with SCD.

Sickle cell pain is recurrent, unpredictable, and disabling; for many, it requires frequent contact with healthcare providers. Pain was the key reason for the 109,344 SCD emergency department (ED) encounters and hospitalizations between 2005 and 2006 in the United States (Brousseau, Owens, Mosso, Panepinto, & Steiner, 2010). As groups, African Americans with SCD had 7-30 times higher hospitalization rate and 2-6 times higher rate of ED visits than African Americans without SCD (Shankar et al., 2005). Further, 33.4% of patients with SCD are rehospitalized within 30 days of discharge (Brousseau et al., 2010). Extensive use of acute care services is common for some adults with SCD who have pain and likely includes many instances of ineffective interactions with healthcare providers (Johnson, Saha, Arbelaez, Beach, & Cooper, 2004; Ratanawongsa et al., 2009). Patients' experiences with ineffective interactions with healthcare providers may be stressful and may also be perceived as unjust. For example, many hematologists and ED physicians are reluctant to use opioids for control of SCD pain because they believe that SCD patients abuse drugs, which leads them to not believe the patient's report of pain (Haywood et al., 2009; Labbe, Herbert, & Haynes, 2005; Shapiro, Benjamin, Payne, & Heidrich, 1997; Wright & Adeosum, 2009; Zempsky, 2009). Patients could perceive this provider reluctance and belief as unjust. Understanding the relationships among perceived injustice, stress, and SCD pain could lead to interventions for reducing the \$2.4 billion annual SCD-associated healthcare costs (Lanzkron, Carroll, & Haywood, 2010).

Perceived injustice is not a new concept. Perceived injustice, perceived discrimination, and prejudice are forms of unfairness (Jackson et al., 2006). Perceived injustice is less studied in relation to health outcomes, especially in the United States where researchers have almost exclusively focused on perceived discrimination (Jackson et al., 2006) due to the history of slavery and racism in the United States. Studies of perceived injustice are more prevalent in Europe. Early studies examining the influence of perceived injustice on health issues focused on sleep disorders (Elovainio et al., 2009; Elovainio, Kivimaki, Vahtera, Keltikangas-Jarvinen, & Virtanen, 2003), cardiovascular diseases (Elovainio et al., 2006; Kivimaki et al., 2005), psychological and psychiatric disorders (Francis & Barling, 2005; Rousseau, Salek, Aube, & Morin, 2009), heavy drinking (Kouvonen et al., 2008), and sickness absence (Kivimaki, Elovainio, Vahtera, & Ferrie, 2003).

Of particular interest to our work are the studies that examined the relationship of perceived injustice to psychological (stress) and physiological (pain) consequences. Investigators examining stress reported that perceived injustice was related to stress in a sample of faculty members from 23 universities in the United States (Judge & Colquitt, 2004). Similarly, Francis and Barling (2005) found that perceived injustice was independently related to psychological strain in government employees (Francis & Barling, 2005). Others report a similar effect of perceived injustice on psychological distress in workers at a correctional institution (Rousseau et al., 2009). Regarding pain, investigators found that the perception of injustice predicted frequent headaches in middle- and secondary-school adolescents and it was an independent predictor of frequent headaches (Santinello, Vieno, & De Vogli, 2009).

The findings of the association between perceived injustice and poor health outcomes in the work setting were so compelling that healthcare settings investigators took notice as evidenced by studies of perceived injustice in people with a medical conditions (McParland & Knussen, 2010; Sullivan et al., 2009).

Recently, some researchers began to focus on the influence of perceived injustice on health outcomes among people with medical conditions (McParland & Knussen, 2010; Sullivan et al., 2009). In patients with whiplash, perceived injustice was an independent predictor of post-traumatic stress symptoms (Sullivan et al., 2009). Similarly, in a sample of patients with chronic pain, the researchers found that perceived injustice was related to psychological wellbeing (McParland & Knussen, 2010). Investigators reported that perceived injustice not only was related to whiplash chronic pain severity, but also prospectively predicted work related disability at 1-year follow-up when controlling for initial pain severity (Sullivan et al., 2009).

Although these studies were pertinent and made great strides in bringing this important concept of perceived injustice to the healthcare settings, there were limitations. McParland and Knussen (2010) used a qualitative approach to study perceived injustice in her patient population (McParland & Knussen, 2010). Sullivan and associates used a one-dimensional perceived injustice measure he developed specifically for patients with whiplash injury (Sullivan et al., 2009). Although investigators conducted both research studies in chronic pain patient populations, it is difficult to compare their findings or those from work settings given differences in study designs and measures of perceived injustice.

Patients with SCD are an ideal population for studying perceived injustice in the healthcare setting using the multidimensional perceived injustice measure. First, patients with SCD have a lifelong illness with unpredictable, disabling, and severe pain complications. Many of them have frequent encounters with healthcare providers to obtain pain treatment. During these encounters, the healthcare provider should engage patients to elicit data from the patients about their current pain level, medications, and issues with the current treatment regimen (procedural; pain assessment and management process). Also, the patient and the provider must engage in a back and forth interactions (interpersonal), which involve the patient's request for information and the provider giving responses (informational). The three preceding processes are important steps to inform the fourth and the final process outcome, the prescription of adequate pain medications (distributive). Given the implicit agreement between the patient and provider (an important person to the patient who seeks pain relief), patients may perceive unfair treatment during any or all of these four parts of the encounter that are represented by the domains of perceived injustice as measured by the Perceived Injustice Questionnaire (PIQ-R) (Colquitt, 2001).

Considering the lifetime of pain related to SCD, the perception of unfair treatment may become a source of stress for the patient, which could initiate responses intensifying their pain. Investigators found that in patients with SCD, there is a positive association between stress and pain (Gil et al., 2004; Porter et al., 1998). Understanding the influence of perceived injustice on increased stress and pain of SCD will provide evidence for interventions to directly confront an issue that may contribute to the inadequate pain control

that is so common among African American adults with SCD. Such understanding could also help guide development of educational interventions for patients to cope with the stress that pain engenders, as well as interventions for effective therapeutic communication skills that could be used by healthcare providers and health systems to reduce their unintended contributions to increased patient stress. Unfortunately, we found no studies of stress, pain and perceived injustice among patients with SCD. Therefore, it is unknown if this area of research warrants investigation. The specific aim of this pilot study was to examine the relationship of perceived injustice with perceived stress and pain in adults with SCD. We hypothesized that patients who report perceived injustice from doctors or nurses would also report greater perceived stress and pain than patients who did not report perceived injustice. In addition, we controlled for age and gender because research has shown them to be confounding variables in patients with pain (Brousseau et al., 2010; Cronan, Serber, Walen, & Jaffe, 2002; Sanders, Labott, Molokie, Shelby, & Desimone, 2010; Tripp, VanDenKerkhof, & McAlister, 2006).

Material and Methods

Design

This study was a cross-sectional correlational pilot study. The Institutional Review Board at an urban university in the Midwest approved the study.

Participants

Included in the study was a convenience sample of adults with SCD who received their care from the university-affiliated Comprehensive Sickle Cell Clinic. Inclusion required the following: a) diagnosis of sickle cell disease; b) use of opioids for pain crisis per patient report; c) speak and read English; and d) age 18 years or older. Criteria excluded patients who were: a) legally blind or b) physically unable to complete study questionnaires, some of which were computer-based.

Participants were 52 adults whose mean age was 34 ± 11 years (minimum [min] 20 years, maximum [max] 70 years). Most of the patients were African Americans ($n = 48$, 92%) and female ($n = 41$, 79%). Forty-eight patients (92%) reported having a high school diploma or higher. In Table 2, we present patients' detailed socio-demographic information.

Procedures

During a scheduled clinic appointment at the university Sickle Cell Center, for the subjects who were completing the final data collection point for a longitudinal study, which involved the patients completing the computerized questionnaire, PAINReportIt® (Huang et al., 2003; Wilkie et al., 2001; Wilkie et al., 2003), were asked if they would be willing to complete three additional questionnaires regarding their pain treatment experiences. Therefore, no third party was involved in the recruiting process. Specifically, the research specialist for the longitudinal study asked patients known to be eligible for this new study if they would be willing to complete three additional questionnaires regarding their pain treatment experiences. We obtained consent and then asked them to complete the three paper-based questionnaires. All eligible patients approached participated in the study. Patients who had

not come to scheduled clinic appointments but were admitted to the hospital were approached in the hospital to complete the three questionnaires. Thirty-nine (75%) of the 52 patients in this pilot study completed the questionnaires at the Sick Cell Clinic, 9 (17%) completed them on the inpatient units just before they were discharged from care for an acute pain episode, and for 4 (8%) subjects took the questionnaires home, completed them, and returned them either by mail or at their next clinic visit a week later.

Measures

Perceived Injustice Questionnaire-Revised (PIQ-R)—The Perceived Injustice Questionnaire (PIQ-R) is a 20-item tool that measures unfair treatment in four domains: procedural injustice; distributive injustice; interpersonal injustice; and informational (Colquitt, 2001). Although the original instrument was developed to measure organizational justice, the items were crafted in such a manner that they can be adapted for any research population; specifically, words that can be replaced appear in parentheses. Greenberg (1993a) suggested this approach and Colquitt (2001) operationalized the approach in his confirmatory factor analysis study for the multidimensional perceived injustice measure used in this study. The rationale for this approach was to allow the perceived injustice measure to be convertible and therefore adaptable and useful in varied contexts of research interests (Colquitt, 2001; Greenberg, 1993a). The first author obtained permission from the instrument developer to adapt the instrument for use in patients with SCD.

We adapted the questions by replacing the words in parentheses with the appropriate word for our study (see Table 1). For example, if the original item was “Have those (procedures) been applied consistently, we replaced “procedure” with our term to read, “Have those (pain treatment regimens) been applied consistently?” To assess the face validity of the modified items, we gave our modified items to an expert panel comprised of healthcare providers (doctors, nurses, and a social worker) who cared for patients with SCD and a pain scientist. Based on their feedback, we replaced some words with those suggested by the group.

To assess content validity of our revised items, the first through fourth authors evaluated the revised items to ascertain that we adequately incorporated all the feedback from the expert panel. Then, the first and third authors evaluated the consistency of the revised items with the original developer’s recommendations for item revision to assure the items retain their semantic relationship to the original validated items (Colquitt, 2001). This process resulted in two versions of the instrument that differed only by the context orientation; one version focused on doctors (20 items) and one version focused on nurses (20 items). As perceived injustice is context specific and doctors and nurses serve different roles in treating the pain of patients with SCD, the expert panel recommended the two versions to identify the contributions of the two provider groups to perceived injustice separately and therefore, to enhance the relevance of our findings for clinical practice in the context of their different roles.

Response choices for all items are 1 (*to a small extent*) to 5 (*to a large extent*). The PIQ-R ratings for doctors and nurses were scored separately. An overall perceived injustice score was computed by averaging the 20 items for each version. Lower scores indicate perceived injustice while higher scores indicate perceived justice. The internal consistency reliabilities

(alpha) of the subscales were $r=.78$ (procedural), $r=.92$ (distributive), $r=.79$ (interpersonal), and $r=.79$ (informational) in a university sample (Colquitt, 2001). In our sample, the internal consistency reliabilities of the PIQ-R-Doctors subscales were $r=.85$ (procedural), $r=.87$ (distributive), $r=.89$ (interpersonal), and $r=.90$ (informational). The internal consistency reliabilities of the PIQ-R-Nurses subscales were $r=.87$ (procedural), $r=.91$ (distributive), $r=.90$ (interpersonal), and $r=.93$ (informational).

Perceived Stress Questionnaire-General (PSQ-General)—The PSQ-General is a 30-item tool that measures general perceived stress (Levenstein et al., 1993). Response options are 1 (*almost never*) to 4 (*usually*). An overall perceived stress index (PSI) score is computed by subtracting 30 from the raw score and dividing it by 90 (Levenstein et al., 1993). Higher scores are indicative of greater perceived stress. PSQ-General has demonstrated good test-retest reliability of .82 and showed good construct validity ($r = .73$) with Cohen's Perceived Stress Scale (Levenstein et al., 1993). In our SCD sample the Cronbach's alpha for the PSQ-General was .89.

Composite Pain Index (CPI)—We collected pain data using the PAINReportIt® (Huang et al., 2003; Wilkie et al., 2001; Wilkie et al., 2003) software program (Nursing Consult LLC, Seattle, WA). There are additional details about the data collection process (Wilkie et al., 2010). Included in the PAINReportIt® is a computerized version of the McGill Pain Questionnaire (MPQ) (Melzack, 1975), a well validated multidimensional tool that measures pain location, intensity, quality, and pattern, all of which contribute to the CPI. PAINReportIt® was recently validated in a SCD sample from another study (Jha et al., 2010).

To tabulate the CPI the individual scores for each of the four pain dimensions are converted to a value that is proportional to the possible score and the four values are summed: (a) number of pain sites (ranges 0-22); (b) average pain intensity (scored using current, least and worst pain in the previous 24 hours, ranges 0-10); (c) pain rating index-total [PRIT] (from the MPQ, pain quality, ranges 0-78); and (d) pain pattern (ranges 0-6, (Wilkie et al., 2010). CPI scores range from 0 to 100. Concurrent validity for the CPI was supported by moderately strong correlations among the four component scores, and its construct validity was supported by a one-factor solution when the four scores were subjected to principal components analysis in a previous study (Wilkie et al., In review). The CPI was also sensitive as an intervention outcome measure (Wilkie et al., In review).

Demographic Characteristics—We used the PAINReportIt® to collect demographic data including age, gender, **race**/ethnicity, marital status, level of education, and annual family income. We abstracted genotype from the medical record.

Statistical Analyses

The pain data collected with the PAINReportIt® were exported from the Access tables to statistical software R (RCoreTeam, 2013). Descriptive statistics included means, standard deviations, frequencies, and percentages. Linear regression analyses were conducted to determine the relationship of perceived injustice with stress and CPI before and after

controlling for age and gender but not genotype given its distribution in this small sample. Significance was set at an alpha of .05.

Results

Description of Study Variables

The mean of the perceived injustice-doctors total score (ranges 1-5) was $3.68 \pm .79$ (min 1.85, max 5.0). The mean of the perceived injustice-nurses total score (ranges 1-5) was $3.52 \pm .86$ (min 1.05, max 5.0). The mean of the perceived stress index score (ranges 0-1) was $.40 \pm .14$ (min .09, max .68). The CPI mean score (**ranges 0-100**) was 43.39 ± 14.37 (min 15.06, max 86.50) and represents pain slightly less than half of the highest possible score for this measure. Other descriptive statistics of the study variables are presented in Table 3.

Relationship between Perceived Injustice and Perceived Stress or Pain

Perceived Injustice Total, Perceived Stress, and Pain—In bivariate analyses, the perceived injustice-doctors total score was a significant predictor of both perceived stress (*unstandardized coefficient* $B=-0.09$, $t(48) = -4.36$, $p<.001$) and CPI (*unstandardized coefficient* $B=-7.47$, $t(48) = -3.20$, $p = .002$). Further, the perceived injustice-nurses total score was a significant predictor of perceived stress scores ($B=-0.09$, $t(48) = -4.75$, $p <.001$) and CPI ($B=-5.27$, $t(48) = -2.33$, $p = .02$).

In the multivariate analyses controlling for age and gender, the perceived injustice-doctors total score remained a significant predictor of perceived stress ($B=-0.09$, $t(46) = -3.95$, $p <.001$) and CPI ($B=-7.82$, $t(46) = -3.11$, $p = .003$). The perceived injustice-nurses total score also remained a significant predictor of perceived stress ($B=-.09$, $t(46) = -4.49$, $p <.001$) and CPI ($B=-5.22$, $t(46) = -2.21$, $p = .03$) after adjusting for age and gender.

Perceived Injustice Domains, Perceived Stress, and Pain—For doctors, the bivariate (Table 4) and multivariate (Table 5) regression coefficients and *t*-test statistics for the relationship between the perceived injustice-doctors domain scores and perceived stress, and CPI showed that: 1) the procedural, distributive, interpersonal, and informational injustice domains were significantly associated with perceived stress; and 2) the procedural, distributive, and informational injustice domains were significantly associated with CPI.

For nurses, the bivariate (Table 4) and multivariate (Table 6) regression coefficients and *t*-test statistics for the relationship between the perceived injustice-nurses domain scores and perceived stress, and CPI showed that: 1) the procedural, distributive, and informational injustice domains were significantly associated with stress; and 2) the procedural and distributive injustice domains were significantly associated with CPI.

Discussion

Our findings regarding the relationships between perceived injustice and perceived stress or pain, as measured by the CPI, in adults with SCD are consistent with the propositions of the Model of Perceived Unfairness, a conceptual model that stimulated the idea for this pilot study. We showed statistically significant relationships between the perceived injustice total

scores, perceived stress, and the CPI. Patients who reported perceived injustice were more likely to report greater perceived stress and pain. Further, our multivariate results showed that for both perceived injustice domains-doctors and perceived injustice domains-nurses, procedural, distributive, and informational injustice were consistent predictors of perceived stress whereas procedural and distributive injustice were consistent predictors of pain.

To our knowledge, this is the first report of a relationship between perceived injustice and perceived stress in adults with SCD. That is, SCD patients who reported perceived injustice also reported higher perceived stress level. The magnitude of this relationship is large as illustrated by the *unstandardized coefficient B and standard deviations for this relationship*. On average, a patient reporting a perceived injustice score (either doctor or nurse) of 1 (high injustice) would have a perceived stress score of 0.36 (61% of the range of observed perceived stress scores in this sample) higher than a patient reporting a perceived injustice score of 5 (low injustice). These findings provide evidence to suggest that in this SCD sample perceived injustice had an important relationship with perceived stress, as posited by the Model of Perceived Unfairness (Jackson et al., 2006).

This finding supports the research published on the effects of perceived injustice as a psychological stressor (Elovainio et al., 2009) in work setting samples: 1) government employees (Francis & Barling, 2005); 2) workers at a correctional facility (Rousseau et al., 2009); and 3) university faculty members (Judge & Colquitt, 2004). Although these studies were conducted in healthy subjects at work settings and ours was done in a clinic setting in a sample with a serious genetic condition, findings are consistent.

Studies of perceived injustice in patients with chronic pain also support the relationship between perceived injustice and psychological stress (McParland & Knussen, 2010; Sullivan et al., 2009). Our study was conducted in patients with SCD dealing with an inherited lifelong genetic disease that could be potentially stressful due to its pain complications and the inadequate control of that pain. Stress responses precipitated by the perception of injustice during clinical encounters for SCD pain control could potentially add to the adverse health burden experienced by patients with SCD. Future prospective studies are needed to systematically delineate the adverse influence of perceived injustice on stress in the SCD population. If confirmed in a larger sample representative of adults with SCD across the United States, it is intuitive that coping interventions would be one logical patient-oriented approach to help mitigate the initiation of stress responses after a patient experiences perceived injustice. Other patient-oriented interventions could be developed to assist patients to advocate for health systems to reduce the behavior perceived as unjust.

To our knowledge, this is the first report of an association between perceived injustice and CPI, a multidimensional pain outcome measure, in adults with SCD. The magnitude of the relationship between perceived injustice and the CPI was large. For example, a 1-point change in perceived injustice-nurses total score was associated with an almost 7.5-point change (10.5% of observed range) in the CPI score whereas a 1-point change in perceived injustice-doctors total score was associated with about 5.3 points (7.4% of observed range) of change in the CPI.

These findings suggest an important relationship between perceived injustice and health outcomes, such as pain as posited by the Model of Perceived Unfairness (Jackson et al., 2006). They support the body of literature on the influence of perceived injustice on pain (Santinello et al., 2009; Sullivan et al., 2008) and other health outcomes (Elovainio et al., 2006; Elovainio, Kivimaki, & Vahtera, 2002; Gimeno et al., 2010; Kivimaki et al., 2003; Kivimaki et al., 2005). Clearly, evidence from this and other studies suggest that perceived injustice is associated with negative effects on health outcomes including pain. We have confidence in the interpretation of our findings because these relationships remained significant after we adjusted for the influence of age and gender; these covariates usually confound the relationship between variables in many patient populations including patients with pain (Cronan et al., 2002; Tripp et al., 2006), including SCD pain (Brousseau et al., 2010; Ezenwa et al., in press; Sanders et al., 2010).

Findings regarding the relationship among the perceived injustice domains and perceived stress and pain are also important, and warrant further discussion. The bivariate and multivariate findings consistently showed that procedural and distributive injustice domains were significant predictors of perceived stress and the CPI in both doctor and nurse scales. Our evidence suggests that patients with SCD who reported these instances of injustice also reported increased stress and pain intensity. Others have reported similar relationships about health outcomes in healthy populations (Elovainio et al., 2006; Kivimaki et al., 2003). For example, Kivimaki and colleagues (2003) found that in both men and women who work in an environment perceived to have unjust procedures, policies, and cultures are at greater risk of reporting minor psychiatric morbidity (Kivimaki et al., 2003).

Surprisingly, interpersonal injustice domain scores consistently predicted stress scores but not pain scores in both bivariate and multivariate analyses for doctors. In contrast, interpersonal injustice domain scores consistently did not predict stress or pain scores in both bivariate and multivariate analyses for nurses. These findings are contradictory to report from others, especially regarding the relationship of interpersonal injustice domain to stress (Judge & Colquitt, 2004). Further, informational injustice domain scores consistently predicted stress and pain scores in both bivariate and multivariate analyses for doctors. In contrast, informational injustice domain scores consistently predicted stress scores but consistently did not predict pain scores in both bivariate and multivariate analyses for nurses. Our findings relating to interpersonal and informational injustice domains are similar to the findings of others conducted in work settings (Elovainio et al., 2002; Kivimaki et al., 2003). In these studies, relational (interpersonal and informational) injustice domain less strongly predicted minor psychiatric morbidity than the procedural injustice domain (Elovainio et al., 2002; Kivimaki et al., 2003).

Interpersonal and informational injustice domains did not predict stress and pain in the direction expected in our study. It is possible that in this small sample, interpersonal and informational injustice behaved differently because the majority of the patients (75%) were recruited from the sickle cell clinic where patients may have long-term relationships with their healthcare providers. Future investigation on the relationship of perceived injustice domains on stress and pain in patients with SCD recruited from different healthcare settings (ED, acute care center, and inpatient) could help to clarify these findings. Nonetheless, the

consistent significant findings related to other perceived injustice domains provide evidence to guide the development of pain management interventions for providers caring for patients with SCD. Interventions for providers could promote therapeutic communication skills during clinical encounters. Improving providers' therapeutic communication could lead to decreased stress and improved pain control for people with SCD. As well provider-oriented interventions could be developed to bring awareness to and reduction of other behaviors contributing to perceived injustice.

Although our findings are promising, they have some limitations. The study was conducted in only one hospital affiliated with an academic institution from the Midwest. Findings are not generalizable to other settings and regions within the United States. The study was a cross-sectional, correlational study; we cannot make any claims about causation in patients with SCD. The sample size was small and that limits conclusions about the findings, but was sufficient to ascertain whether subjects would be interested in this sensitive topic. Further, data obtained through self-report measures could be biased due to social desirability effects wherein patients respond to the questions in a way they think the researchers favor instead of providing accurate responses.

The study findings have implications for research and practice. In terms of research implications, the findings suggest that perceived injustice may be an important variable whose influence on health outcomes deserves further explorations. Effort could be devoted toward establishing the causal relationships among perceived injustice, stress, and pain using prospective experimental designs. For example, in a future prospective experimental study of a protocol with a perceived injustice scenario presented as a stressor, investigators could determine whether the perceived injustice stressor initiated stress responses, which could be measured as cortisol, a biomarker of the stress response to validate the self-report measure of stress and discern whether the stress responses intensified the self-reported pain. Further characterizations of the dimensions of the perceived injustice questionnaire are needed to inform future experimental studies on this topic. Additionally, because the Model of Perceived Unfairness could include perceived injustice and perceived discrimination, the exploration of the characteristics of perceived injustice could be extended by examining the correlations between scores from the multidimensional perceived injustice questionnaire and a newly developed multidimensional perceived discrimination questionnaire comprised of measures of everyday discrimination, lifetime discrimination, lifetime burden of discrimination, and effect of skin color (Sims et al., 2012; Sims, Wyatt, Gutierrez, Taylor, & Williams, 2009). The evidence should help researchers discern the true nature of the relationship between scores from both instruments, and whether they are measuring the same things or not. More research attention should be given to using the perceived injustice measure in several patient populations as opposed to its heavy use in healthy populations in work settings. Efforts could also focus on exploring intervention targets to reduce the effects of perceived injustice on health.

With respect to practice implications, findings suggest that healthcare providers need to be aware of their attitudes and behaviors, as well as patients' perceptions of them, during clinical encounters with patients. Hurried patient-provider interactions even from a well-meaning provider could constitute injustice in one or all the four domains of injustice:

procedural, distributive, interpersonal, and informational injustice. It is important for providers to recognize that their attitudes and behaviors toward patients could be interpreted as injustice and therefore could have an impact on stress and pain, either to increase or decrease the pain. Approaches are needed to facilitate such recognition and could decrease patients' perceptions of injustice, reduce stress, and improve pain control. Provider educational interventions on proper therapeutic communication skills could improve practice in this regard.

Conclusions

In conclusion, we examined the association of perceived injustice with stress and pain in this pilot study of patients with SCD. Findings are consistent with the Model of Perceived Unfairness, a conceptual framework that stimulated our study, and suggest a negative association of perceived injustice with stress and pain in patients with SCD. Findings warrant further investigation in a larger sample using a study design to examine causal relationships among perceived injustice, perceived stress and pain of SCD.

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References

- Brousseau DC, Owens PL, Mosso AL, Panepinto JA, Steiner CA. Acute care utilization and rehospitalizations for sickle cell disease. *Journal of the American Medical Association*. 2010; 303(13):1288–1294. 10.1001/jama.2010.378 [PubMed: 20371788]
- Colquitt JA. On the dimensionality of organizational justice: A construct validation of a measure. *Journal of Applied Psychology*. 2001; 86(3):386–400. [PubMed: 11419799]
- Colquitt JA, Conlon DE, Wesson MJ, Porter CO, Ng KY. Justice at the millennium: A meta-analytic review of 25 years of organizational justice research. *Journal of Applied Psychology*. 2001; 86(3): 425–445. [PubMed: 11419803]
- Cronan TA, Serber ER, Walen HR, Jaffe M. The influence of age on fibromyalgia symptoms. *Journal of Aging and Health*. 2002; 14(3):370–384. [PubMed: 12146512]
- Elovainio M, Ferrie JE, Gimeno D, De Vogli R, Shipley M, Brunner EJ, Kivimaki M, et al. Organizational justice and sleeping problems: The Whitehall II study. *Psychosomatic Medicine*. 2009; 71(3):334–340. [PubMed: 19251877]
- Elovainio M, Kivimaki M, Puttonen S, Lindholm H, Pohjonen T, Sinervo T. Organisational injustice and impaired cardiovascular regulation among female employees. *Occupational and Environmental Medicine*. 2006; 63(2):141–144. [PubMed: 16421394]
- Elovainio M, Kivimaki M, Vahtera J. Organizational justice: Evidence of a new psychosocial predictor of health. *American Journal of Public Health*. 2002; 92(1):105–108. [PubMed: 11772771]
- Elovainio M, Kivimaki M, Vahtera J, Keltikangas-Jarvinen L, Virtanen M. Sleeping problems and health behaviors as mediators between organizational justice and health. *Health Psychology*. 2003; 22(3):287–293. [PubMed: 12790256]

- Ezenwa MO, Molokie RE, Wang ZJ, Yao Y, Suarez ML, Angulo V, Wilkie DJ. Outpatient Pain Predicts Subsequent 1-Year Acute Healthcare Utilization among Adults with Sickle Cell Disease. in press.
- Francis L, Barling J. Organizational Injustice and Psychological Strain. *Canadian Journal of Behavioral Science*. 2005; 37(4):250–261.
- Gil KM, Carson JW, Porter LS, Scipio C, Bediako SM, Orringer E. Daily mood and stress predict pain, health care use, and work activity in African American adults with sickle-cell disease. *Health Psychology*. 2004; 23(3):267–274. [PubMed: 15099167]
- Gimeno D, Tabak AG, Ferrie JE, Shipley MJ, De Vogli R, Elovainio M, Kivimaki M, et al. Justice at work and metabolic syndrome: The Whitehall II study. *Occupational and Environmental Medicine*. 2010; 67(4):256–262. [PubMed: 19819861]
- Greenberg J. The Intellectual Adolescence of Organizational Justice: You've Come A Long Way, Maybe. *Social Justice Research*. 1993a; 6(1):135–148.
- Haywood C Jr, Beach MC, Lanzkron S, Strouse JJ, Wilson R, Park H, Segal JB, et al. A systematic review of barriers and interventions to improve appropriate use of therapies for sickle cell disease. *J Natl Med Assoc*. 2009; 101(10):1022–1033. [PubMed: 19860302]
- Huang HY, Wilkie DJ, Zong SP, Berry D, Hairabedian D, Judge MK, Chabal C, et al. Developing a computerized data collection and decision support system for cancer pain management. *Computers, Informatics, Nursing*. 2003; 21(4):206–217.
- Jackson B, Kubzansky LD, Wright RJ. Linking Perceived Unfairness to Physical Health: The Perceived Unfairness Model. *Review of General Psychology*. 2006; 10(1):21–40.
- Jha A, Suarez ML, Ferrans CE, Molokie R, Kim YO, Wilkie DJ. Cognitive testing of PAINReportIt in adult African Americans with sickle cell disease. *Computers, Informatics, Nursing*. 2010; 28(3): 141–150.10.1097/NCN.0b013e3181d7820b
- Johnson RL, Saha S, Arbelaez JJ, Beach MC, Cooper LA. Racial and ethnic differences in patient perceptions of bias and cultural competence in health care. *J Gen Intern Med*. 2004; 19(2):101–110. [PubMed: 15009789]
- Judge TA, Colquitt JA. Organizational justice and stress: the mediating role of work-family conflict. *Journal Applied Psychology*. 2004; 89(3):395–404.
- Kivimaki M, Elovainio M, Vahtera J, Ferrie JE. Organisational justice and health of employees: Prospective cohort study. *Occupational and Environmental Medicine*. 2003; 60(1):27–33. discussion 33–24. [PubMed: 12499453]
- Kivimaki M, Ferrie JE, Brunner E, Head J, Shipley MJ, Vahtera J, Marmot MG. Justice at work and reduced risk of coronary heart disease among employees: The Whitehall II Study. *Archives of Internal Medicine*. 2005; 165(19):2245–2251. [PubMed: 16246990]
- Kouvonen A, Kivimaki M, Elovainio M, Vaananen A, De Vogli R, Heponiemi T, Vahtera J, et al. Low organisational justice and heavy drinking: A prospective cohort study. *Occupational and Environmental Medicine*. 2008; 65(1):44–50. [PubMed: 17626137]
- Labbe E, Herbert D, Haynes J. Physicians' attitude and practices in sickle cell disease pain management. *J Palliat Care*. 2005; 21(4):246–251. [PubMed: 16483093]
- Lanzkron S, Carroll CP, Haywood C Jr. The burden of emergency department use for sickle-cell disease: An analysis of the national emergency department sample database. *American Journal of Hematology*. 2010; 85(10):797–799. [PubMed: 20730795]
- Levenstein S, Pranter C, Varvo V, Scribano ML, Berto E, Luzi C, Andreoli A. Development of the Perceived Stress Questionnaire: A new tool for psychosomatic research. *Journal of Psychosomatic Research*. 1993; 37(1):19–32. [PubMed: 8421257]
- McParland JL, Knussen C. Just world beliefs moderate the relationship of pain intensity and disability with psychological distress in chronic pain support group members. *European Journal of Pain*. 2010; 14(1):71–76.10.1016/j.ejpain.2008.11.016 [PubMed: 19121590]
- Melzack R. The McGill Pain Questionnaire: Major properties and scoring methods. *Pain*. 1975; 1(3): 277–299. [PubMed: 1235985]
- Porter LS, Gil KM, Sedway JA, Ready J, Workman E, Thompson RJ Jr. Pain and stress in sickle cell disease: An analysis of daily pain records. *International Journal of Behavioral Medicine*. 1998; 5(3):185–203. [PubMed: 16250701]

- Ratanawongsa N, Haywood C Jr, Bediako SM, Lattimer L, Lanzkron S, Hill PM, Beach MC, et al. Health care provider attitudes toward patients with acute vaso-occlusive crisis due to sickle cell disease: development of a scale. *Patient Educ Couns*. 2009; 76(2):272–278.10.1016/j.pec.2009.01.007 [PubMed: 19233587]
- RCoreTeam. R: A Language and Environment for Statistical Computing. Vienna, Austria: 2013. Retrieved from <http://www.R-project.org>
- Rousseau V, Salek S, Aube C, Morin EM. Distributive justice, procedural justice, and psychological distress: The moderating effect of coworker support and work autonomy. *Journal of Occupational Health Psychology*. 2009; 14(3):305–317.10.1037/a0015747 [PubMed: 19586224]
- Sanders KA, Labott SM, Molokie R, Shelby SR, Desimone J. Pain, coping and health care utilization in younger and older adults with sickle cell disease. *Journal of Health Psychology*. 2010; 15(1): 131–137.10.1177/135910530934555415/1/131 [PubMed: 20064892]
- Santinello M, Vieno A, De Vogli R. Primary headache in Italian early adolescents: The role of perceived teacher unfairness. *Headache: The Journal of Head & Face Pain*. 2009; 49(3):366–374.
- Shankar SM, Arbogast PG, Mitchel E, Cooper WO, Wang WC, Griffin MR. Medical care utilization and mortality in sickle cell disease: A population-based study. *American Journal of Hematology*. 2005; 80(4):262–270. [PubMed: 16315251]
- Shapiro BS, Benjamin LJ, Payne R, Heidrich G. Sickle cell-related pain: perceptions of medical practitioners. *J Pain Symptom Manage*. 1997; 14(3):168–174. [PubMed: 9291703]
- Sims M, Diez-Roux AV, Dudley A, Gebreab S, Wyatt SB, Bruce MA, Taylor HA, et al. Perceived discrimination and hypertension among African Americans in the Jackson Heart Study. *American Journal of Public Health*. 2012; 102(Suppl 2):S258–265.10.2105/AJPH.2011.300523 [PubMed: 22401510]
- Sims M, Wyatt SB, Gutierrez ML, Taylor HA, Williams DR. Development and psychometric testing of a multidimensional instrument of perceived discrimination among African Americans in the Jackson Heart Study. *Ethnicity & Disease*. 2009; 19(1):56–64. [PubMed: 19341164]
- Sullivan MJ, Adams H, Horan S, Maher D, Boland D, Gross R. The role of perceived injustice in the experience of chronic pain and disability: Scale development and validation. *Journal of Occupational Rehabilitation*. 2008; 18(3):249–261. [PubMed: 18536983]
- Sullivan MJ, Thibault P, Simmonds MJ, Milioto M, Cantin AP, Velly AM. Pain, perceived injustice and the persistence of post-traumatic stress symptoms during the course of rehabilitation for whiplash injuries. *Pain*. 2009; 145(3):325–331. [PubMed: 19643543]
- Tripp DA, VanDenKerkhof EG, McAlister M. Prevalence and determinants of pain and pain-related disability in urban and rural settings in southeastern Ontario. *Pain Research Management*. 2006; 11(4):225–233. [PubMed: 17149455]
- Wilkie DJ, Huang HY, Berry DL, Schwartz A, Lin YC, Ko NY, Fitzgibbon D, et al. Cancer symptom control: Feasibility of a tailored, interactive computerized program for patients. *Family & Community Health*. 2001; 24(3):48–62. [PubMed: 11563944]
- Wilkie DJ, Judge MK, Berry DL, Dell J, Zong S, Gillespie R. Usability of a computerized PAINReportIt in the general public with pain and people with cancer pain. *Journal of Pain and Symptom Management*. 2003; 25(3):213–224. [PubMed: 12614956]
- Wilkie DJ, Kim YO, Molokie RE, Suarez ML, Ngamkham S, Wang ZJ. Composite Pain Index (CPI): Reliability, Validity, and Sensitivity of a New Multidimensional Outcome Measure. In review.
- Wilkie DJ, Molokie R, Boyd-Seal D, Suarez ML, Kim YO, Zong S, Wang ZJ, et al. Patient-Reported Outcomes: Nociceptive and Neuropathic Pain and Pain Barriers in Adult Outpatients with Sickle Cell Disease. *Journal of National Medical Association*. 2010; 102:18–27.
- Wright K, Adeosun O. Barriers to effective pain management in sickle cell disease. *Br J Nurs*. 2009; 18(3):158–161. [PubMed: 19223799]
- Zempsky WT. Treatment of sickle cell pain: fostering trust and justice. *Jama*. 2009; 302(22):2479–2480. [PubMed: 19996405]

Highlights

- Perceived injustice was negatively associated with stress and pain in adults with sickle cell disease
- Perceived injustice from doctors or nurses was a significant predictor of perceived stress and pain
- The procedural, distributive, and informational domains of perceived injustice attributed to both doctors and nurses consistently predicted patients' perceived stress
- Procedural and distributive domains of perceived injustice consistently predicted patients' pain.

Figure 1. Model of Perceived Unfairness for Stress and Pain of Sickle Cell Disease

Table 1

Definition of Perceived Injustice Domains; and Exemplar Items of the Original and Modified Measures ©
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Domain	Definition/description	Original item	Modified item
Procedural	The justice of the processes that lead to decision outcomes. Procedural justice is fostered through voice during a decision-making process or influence over the outcome (Thibaut & Walker, 1975. As cited in Colquitt, 2001, p.386) or “by adherence to fair process criteria, such as consistency, lack of bias, correctability, representation, accuracy, and ethicality” (Leventhal, 1980; Leventhal et al., 1980. As cited in Colquitt, 2001, p.386)	The following items refer to the procedures used to arrive at your (outcome). To what extent: Have those procedures been applied consistently?	To what extent: Have those (pain treatment regimens) been applied consistently? ©
Distributive	The justice of decision outcomes. “Distributive justice is fostered where outcomes are consistent with implicit norms for allocation, such as equity or equality (Colquitt, 2001, p. 386). “Distributive justice exists to the extent that the allocation of an outcome is consistent with the goals of a particular situation, such as maximizing productivity or improving cooperation” (Deutsch, 1975; Leventhal, 1976. As cited in Colquitt 2001, p.389).	The following items refer to your (outcome). To what extent: Does your (outcome) reflect the effort you have put into your work?	To what extent: Does your (pain relief) reflect the effort you have put into getting it? ©
Interpersonal	“Interpersonal treatment people receive as procedures are enacted” (Bies & Moag, 1986. As cited in Colquitt, 2001, p.386). “Interpersonal justice is fostered when decision makers treat people with respect and sensitivity” (Colquitt, 2001, p.386).	The following items refer to (the authority figure who enacted the procedure). To what extent: Has (he/she) treated you in a polite manner?	To what extent: Have (doctors) treated you in a polite manner? © To what extent: Have (nurses) treated you in a polite manner? ©
Informational	“The justice of the perceived adequacy of explanations. Explanations were perceived to be more adequate when they were reasonable, timely, and specific (Colquitt, 2001, p. 390).	The following items refer to (the authority figure who enacted the procedure). To what extent: Were (his/her) explanations regarding the procedures reasonable?	To what extent: Were (doctors) explanations regarding the pain treatment regimens reasonable? © To what extent: Were (nurses) explanations regarding the pain treatment regimens reasonable? ©

Table 2

Patients' Socio-demographic Characteristics (N= 52)

Variable	Number (%)
Age group	
18-25	13 (25.0)
26-45	31 (59.6)
46	8 (15.4)
Gender	
Female	41 (78.8)
Male	11 (21.2)
Race/Ethnicity	
African American	48 (92.3)
Hispanic	1 (1.9)
Other	3 (5.8)
Education	
High school	48 (92.3)
Unknown	4 (7.7)
Sickle cell genotype	
SS	42 (80.8)
SC	6 (11.5)
Other	4 (7.7)

Note: SS = hemoglobin SS, SC = hemoglobin SC

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Table 3

Descriptive Statistics for Study Measures (N=52)

Measure	Mean	SD	Median	IQR	Range
Perceived Injustice- Doctors	3.68	0.79	3.71	0.98	[1.85, 5]
Perceived Injustice- Nurses	3.52	0.86	3.54	1.16	[1.05, 5]
Perceived Stress Index	0.40	0.14	0.42	0.17	[0.09, 0.68]
Composite Pain Index	43.39	14.37	43.22	22.11	[15.06, 86.50]

Note. IQR = interquartile range

Table 4

Bivariate Regression Analyses for the Relationship among Perceived Injustice Domains, Perceived Stress, and CPI (N =52)

Dependent Variable	Predictor Variable (doctors)	B	SE	t	p
Perceived Stress	Procedural Injustice	-.08	.02	-4.23	<.001
	Distributive Injustice	-.06	.02	-3.36	.002
	Interpersonal Injustice	-.05	.02	-2.55	.01
	Informational injustice	-.07	.02	-3.68	<.001
CPI	Procedural Injustice	-7.89	2.04	-3.88	<.001
	Distributive Injustice	-4.51	1.96	-2.30	.03
	Interpersonal Injustice	-3.50	2.18	-1.61	.11
	Informational injustice	-4.77	1.98	-2.40	.02
Dependent Variable	Predictor Variable (nurses)	B	SE	t	p
Perceived Stress	Procedural Injustice	-.09	.02	-4.93	<.001
	Distributive Injustice	-.07	.02	-3.98	<.001
	Interpersonal Injustice	-.03	.02	-1.84	.07
	Informational Injustice	-.07	.02	-4.36	<.001
CPI	Procedural Injustice	-5.33	2.15	2.48	.02
	Distributive Injustice	-4.59	1.83	-2.50	.02
	Interpersonal Injustice	-1.63	1.94	-.84	.40
	Informational Injustice	-3.34	1.82	-1.83	.07

Note: CPI =Composite Pain Index

Table 5
Multivariate Regression Analyses of the Relationship between Perceived Injustice-Doctors Domains and Stress, and Pain Adjusting for Age and Gender (N=52)

Dependent Variable	Predictor Variable	B	SE	t	p
Perceived Stress	Age	-.00	.00	-0.65	.52
	Gender	.01	.04	0.34	.74
	Procedural Injustice-doctors	-.08	.02	-3.84	<.001
Perceived Stress	Age	-.00	.00	-.0.62	.54
	Gender	.01	.05	0.12	.90
	Distributive Injustice-doctors	-.06	.02	-2.92	.005
Perceived Stress	Age	-.00	.00	-.86	.40
	Gender	.02	.05	0.47	.64
	Interpersonal Injustice-doctors	-.05	.02	-2.16	.04
Perceived Stress	Age	-.00	.00	-.80	.43
	Gender	.04	.04	0.96	.34
	Informational Injustice-doctors	-.07	.02	-3.47	.001

Dependent Variable	Predictor Variable	B	SE	t	p
CPI	Age	.06	.17	0.39	.70
	Gender	-.63	4.40	-0.14	.89
	Procedural injustice-doctors	-8.12	2.15	-3.77	<.001
CPI	Age	.03	.18	.15	.88
	Gender	-1.26	4.80	-.26	.80
	Distributive Injustice-doctors	-4.65	2.12	-2.20	.03
CPI	Age	-.02	.19	-.10	.92
	Gender	.01	4.91	0.00	1.0
	Interpersonal Injustice-doctors	-3.43	2.34	-1.47	.15
CPI	Age	-.00	.18	-.01	.99
	Gender	1.52	4.82	.31	.75
	Informational Injustice-doctors	-4.87	2.11	-2.30	.03

Note: CPI =Composite Pain Index

Table 6

Multivariate Regression Analysis of the Relationship between Perceived Injustice-Nurses Domains and Stress, and Pain Adjusting for Age and Gender (N=52)

Dependent Variable	Predictor Variable	B	SE	t	P
Perceived Stress	Age	-.00	.00	-0.98	.33
	Gender	.02	.04	0.49	.63
	Procedural Injustice-nurses	-.09	.02	-4.65	<.001
Perceived Stress	Age	-.00	.00	-0.96	.34
	Gender	.03	.04	0.78	.44
	Distributive Injustice-nurses	-.06	.02	-3.76	<.001
Perceived Stress	Age	-.00	.00	-1.31	.20
	Gender	.02	.05	0.47	.64
	Interpersonal Injustice-nurses	-.03	.02	-1.66	.10
Perceived Stress	Age	-.00	.00	-0.99	.33
	Gender	.03	.04	0.83	.41
	Informational Injustice-nurses	-.07	.02	-4.16	<.001

Dependent Variable	Predictor Variable	B	SE	t	P
CPI	Age	-.03	.18	-.17	.87
	Gender	-.14	4.75	-0.03	.98
	Procedural Injustice-nurses	-5.27	2.23	-2.36	.02
CPI	Age	-.02	.18	-0.11	.91
	Gender	0.84	4.75	0.18	.86
	Distributive Injustice-nurses	-4.58	1.91	-2.39	.02
CPI	Age	-.08	.18	-.45	.66
	Gender	-.04	4.99	-0.01	.99
	Interpersonal Injustice-nurses	-1.51	1.99	-0.76	.45
CPI	Age	-.05	.18	-0.25	.80
	Gender	0.57	4.89	.12	.91
	Informational Injustice-nurses	-3.28	1.90	-1.73	.09

Note: CPI =Composite Pain Index