WebLog Journal of Psychiatry and Behavioral Sciences

Review Article
Published: 14 Sep, 2026

Hidden Dimensions of Suffering Using a Theoretical Framework of Supersymmetry to Model Structural Determinants of Chronic Pain in Black Men

Christopher L. Edwards[1,2,3,12], Jasmine Benner[2,4], Kyla Whitten[1,2], Alexis Guess[2,4], John J. Sollers[1,2,3], Amber Kalu[1,2,3], Ayden Israel Kalu[2], Beyonnshea Lucus[1,2,3], Jessica Miller[2,10], Brianna Jones[2], Deja Hughes[1,2], Megan Anderson[1,2], Ashley S. Membreno Lopez[1,2], John J. Sollers III[1,2,3], Lavila Jackson[1,2], Noah Peliter[1,2], Kaiyah Brown[1,2,3], Isabella Maymi[1,2], Alicia Peltier[1,2], Janice Collins-McNeil[2,5], Goldie S. Byrd[2,6], Keith E. Whitfield[2,7], Camela S. Barker[2], Shiv Sudhakar[2,8], Jonathan N. Livingston[1,2,3], Elwood L. Robinson[2,9], Glenda L. Knight[2], Alvin Killough[2,11], Leo Jarmin[2], Stephanie Johnson[2], Lauren Durant[2,12], Dwayne Brandon[1,2,3], Malik Muhammad[2], Roland Thorpe[2,7], Anjeleigh Partridge[12], Kelsey Rothenberg[12], India Reid[12], Lauren Durant[12] and Dionne Harrison[12]

[1]North Carolina Central University, Department of Psychology, Durham, North Carolina, USA

[2]NCCU Kylyn Love/Edwards Psychoneuroendocrine and Rare Diseases Laboratory, Durham, North Carolina, USA

[3]NCCU Sollers Psychophysiology Laboratory, Durham, North Carolina, USA

[4]NCCU BBRI, Durham, North Carolina, USA

[5]NCCU School of Nursing, North Carolina, USA

[6]Wake Forest University, Winston-Salem, North Carolina, USA

[7]John Hopkins School of Public Health, Baltimore, Maryland, USA

[8]California Northstate University, California, USA

[9]Winston-Salem State University, Winston-Salem, North Carolina, USA

[10]Fielding Graduate University, California, USA

[11]Diversity Squared, USA

[12]B and D Integrated Health Services, North Carolina, USA

WebLog Open Access Publications
Article ID : wjpbs.2026.i1401
Author : Dr. Christopher L. Edwards, Ph.D.

OPEN ACCESS

Correspondence:
Dr. Christopher L. Edwards, Ph.D., Clinical Psychologist/ Psychoneuroendocrinologist, North Carolina Central University, Department of Psychology Director, Psychoneuroendocrine and Rare Diseases Laboratory, Taylor Education Building, Rm 315, Durham, NC 27710, North Carolina, United States, E-mail: cedwards@nccu.edu

Received Date: *08 Sep 2026*
Accepted Date: *12 Sep 2026*
Published Date: *14 Sep 2026*

Citation:
Edwards CL, Benner J, Whitten K, Guess A, Sollers JJ, Kalu A, et al. Hidden Dimensions of Suffering Using a Theoretical Framework of Supersymmetry to Model Structural Determinants of Chronic Pain in Black Men. WebLog J Psychiatry Behav Sci. wjpbs.2026.i1401. https://doi.org/10.5281/zenodo.22938708

ISSN 3071-4400

Abstract

Chronic pain in Black men remains poorly explained by biomedical models that treat tissue pathology as the primary driver of symptom severity and treatment outcome. Decades of clinical evidence document that Black men are underassessed for pain, undertreated with analgesics, disproportionately suspected of drug seeking, concentrated in occupations that accelerate joint degeneration, and served by a health workforce with limited racial concordance. These forces do not act as isolated variables added onto a biomedical baseline. They behave as interacting fields that shift the observable clinical picture in ways a single tissue-based diagnosis cannot capture. This paper proposes a theoretical framework, inspired by the mathematics of supersymmetry and the hidden sector concept associated with the work of theoretical physicist Sylvester James Gates, in which chronic pain in Black men is understood as the visible projection of a higher dimensional structure of social and structural forces. We describe this model explicitly as a conceptual and heuristic analogy rather than a quantitative or predictive equation, and we ground each element of the framework in established epidemiological and clinical literature on pain disparities. Implications for clinical training, pain assessment protocols, and future interdisciplinary research are discussed.

Keywords: Chronic Pain; Black Men; Health Disparities; Social Determinants of Health; Theoretical Modeling

Introduction

Chronic pain occupies a peculiar position in American medicine. It is simultaneously one of the most common reasons patients seek care and one of the least reliably assessed and treated conditions, particularly for Black men [1]. The standard biomedical account of pain, in which a nociceptive signal

originating in damaged tissue travels along a fairly linear pathway to conscious perception, has long been recognized as inadequate even for majority populations [2]. For Black men specifically, the gap between tissue pathology and lived pain experience is widened further by a set of forces that are social, institutional, and historical rather than purely physiological. These forces include clinician bias in pain assessment, disproportionate suspicion of medication seeking behavior, structural barriers to consistent primary and specialty care, occupational exposure to joint degrading labor, and a chronic physiological burden associated with sustained exposure to racism and economic precarity.

The Journal of the National Medical Association has long served as a venue for confronting these disparities directly, and the present paper is offered in that tradition, with the specific aim of introducing a conceptual vocabulary capable of holding multiple interacting causal forces in view simultaneously rather than treating them as a list of separately tabulated risk factors. Existing frameworks for understanding health disparities, including the socioecological model widely used in public health, are valuable but tend to present structural, interpersonal, and individual factors as adjacent layers rather than as forces that actively couple to and distort one another in real time within a single clinical encounter. What is often missing from the disparity's literature is not additional documentation of the problem, which is by now extensive and consistent, but a way of thinking about how these documented forces combine.

This paper does not attempt to resolve that gap with a new instrument or a new clinical trial. Instead, it proposes a way of thinking about the problem borrowed from an unlikely source, the mathematics of theoretical physics, and specifically the work on supersymmetry and hidden structure associated with physicist Sylvester James Gates. Gates and his collaborators developed a graphical and algebraic technology known as the adinkra to reveal symmetries in the equations of supersymmetric physics that are not visible in the equations themselves, symmetries that exist, in a sense, in dimensions beyond ordinary spacetime [3]. We propose that this same conceptual move, the recognition that an observable outcome may be the projection of forces operating in dimensions that are not directly visible in the clinical encounter, offers a useful heuristic for thinking about chronic pain in Black men. We are explicit throughout that this is a structural metaphor intended to organize clinical and scientific thinking, not a literal physical claim and not a quantitative predictive model.

The present framework grows directly out of an existing program of clinical and empirical research on pain among Black patients and Black men specifically, and this paper is best understood as a theoretical extension of that program rather than a freestanding exercise [4]. Earlier work within this program has examined the psychosocial treatment of pain in sickle cell disease, a condition that disproportionately affects Black patients in the United States and that has historically been complicated by clinician suspicion of drug seeking during vaso-occlusive pain crises [5]. Related work has shown that the clinical presentation of sickle cell pain is frequently reframed by providers through a lens of somatization rather than being accepted at face value, a pattern that anticipates the broader argument of this paper that visible pain reports are routinely reinterpreted through forces that have little to do with the underlying tissue pathology [6]. Still earlier work examined how race and coping style shape the relationship between laboratory pain perception and clinical pain report among patients with osteoarthritis, finding that this relationship is not stable across racial groups, an empirical anticipation of the divergence this paper attributes to hidden coupling terms [7]. Foundational work on cognitive behavioral approaches to persistent pain assessment and treatment further established that pain cannot be adequately understood through symptom report alone, but must be situated within the coping strategies and psychosocial context of the patient [8]. The present paper builds on this body of work by proposing an explicit conceptual structure, borrowed from theoretical physics, for organizing the hidden variables that this research program has documented individually across many separate studies and conditions.

Any theoretical reframing of chronic pain in Black men must be built on the substantial empirical record documenting how race shapes pain assessment and treatment in the United States. In one of the most widely cited studies in this literature, Hoffman and colleagues found that a meaningful proportion of white laypeople and medical trainees endorsed false beliefs about biological differences between Black and white bodies, such as the belief that Black skin is thicker than white skin, and that endorsement of these beliefs was associated with lower pain ratings and less accurate treatment recommendations for Black patients [1]. This finding helped explain a body of earlier work showing that Black and Hispanic patients were substantially less likely than white patients to receive analgesia for comparable injuries, including a landmark emergency department study in which Hispanic patients with long bone fractures were roughly twice as likely as white patients to receive no pain medication at all [9].

Subsequent research has extended these findings from the emergency department into chronic pain management more broadly. A systematic review and meta-analysis of analgesic treatment disparities found consistent undertreatment of Black patients across multiple pain conditions and care settings [10]. More recent work using large administrative datasets has confirmed that Black patients presenting with abdominal pain are significantly less likely than white patients to receive either opioid or non-opioid analgesia, even after adjustment for clinical severity [11]. Racial disparities are not limited to undertreatment alone. Black patients who report unmet pain treatment preferences during emergency department visits are also more likely to be perceived through the lens of substance misuse, a pattern that has been linked to worse downstream outcomes including elevated risk of subsequent opioid misuse when legitimate pain goes unaddressed [12].

Beyond the clinical encounter itself, Black men disproportionately occupy jobs characterized by heavy lifting, repetitive kneeling and squatting, prolonged standing, and whole body vibration, all of which are established occupational risk factors for knee and hip osteoarthritis [13, 14]. Systematic reviews of occupational exposure literature have found that workers in construction, manual labor, food processing, and similar sectors face substantially elevated risk of hip and knee osteoarthritis compared with workers in sedentary occupations, with some unskilled labor categories showing nearly double the relative risk [14]. Because occupational segregation by race remains pronounced in the American labor market, this occupational risk gradient falls disproportionately on Black men, compounding a joint disease burden that then intersects with the assessment and treatment disparities already described.

Layered atop these occupational exposures is a physiological burden that has been described in the literature as weathering, the

cumulative wear on biological systems produced by chronic exposure to social and economic adversity [15]. Allostatic load, the wear and tear that results from repeated activation of stress response systems, has been shown to accumulate more rapidly among Black Americans than white Americans at equivalent ages, a pattern that helps explain earlier onset of a range of chronic conditions [15, 16]. A related and long studied construct, John Henryism, describes a high effort coping style in which sustained determination to overcome structural barriers through individual effort appears to carry its own physiological cost, a pattern with direct relevance to chronic disease outcomes among Black men and one that further complicates any attempt to treat allostatic load as a single uniform quantity [17]. Disease-specific work examining African American men with prostate cancer has similarly shown that self-efficacy, rather than disease severity alone, meaningfully shapes quality of life and functional outcome, reinforcing the broader pattern that psychosocial variables operate alongside biomedical ones rather than beneath them [18]. None of these forces operate in isolation. A Black man working a physically demanding job with inadequate insurance, seen by a workforce with limited racial concordance, and carrying an elevated allostatic load from decades of structural stress exposure, presents to a pain clinic or emergency department as a single clinical picture. But that single picture is the composite outcome of several interacting systems that the standard biomedical chart cannot easily disentangle.

The Limits of Linear Models

The conventional clinical approach to chronic pain treats the patient's presentation as largely explicable by a small number of directly measurable variables, namely imaging findings, reported pain intensity, and functional limitation. This approach implicitly assumes that the relationship between underlying pathology and observed suffering is stable and comparable across patients, so that a given degree of joint degeneration should predict a roughly similar clinical picture regardless of who is sitting in the exam room. The disparities literature summarized above demonstrates that this assumption does not hold. Two patients with equivalent radiographic findings can receive markedly different pain assessments and treatment recommendations depending on the assessor's beliefs and the patient's race [1]. A linear, single dimension model of pain, one that runs directly from tissue damage to symptom to treatment, cannot account for this divergence because it has no place to locate the forces that produce it.

This is precisely the kind of explanatory gap that has historically motivated the search for hidden variables and additional dimensions in physics. When observed phenomena cannot be reconciled with the predictions of an existing low dimensional theory, physicists have repeatedly found it productive to ask whether unseen structure, operating in dimensions or sectors not directly accessible to ordinary observation, might be shaping what is observed [19]. We propose that a version of this reasoning, treated strictly as metaphor, is clinically productive for chronic pain in Black men.

Hidden Sectors and the Architecture of Supersymmetry

In theoretical physics, supersymmetry proposes a relationship between two broad classes of particles, bosons and fermions, in which each particle in one class has a partner in the other class related by a mathematical symmetry [20]. The full structure of this symmetry is not visible in the equations describing any single particle in isolation. It becomes visible only when the underlying algebraic relationships connecting multiple particles are mapped. Gates and his collaborator Michael Faux developed a graphical tool called the adinkra specifically to make these otherwise hidden relationships visible, representing supersymmetric multiplets as networks of nodes and connecting edges whose geometry encodes information that is not apparent from the equations alone.[3] The broader physics literature has extended this idea to the concept of a hidden sector, a set of fields and interactions that do not couple directly to the particles of ordinary matter but that can still shift the observable properties of a physical system through indirect coupling [21].

We find this architecture useful as a conceptual scaffold, not because chronic pain literally involves particles or extra spatial dimensions, but because it offers vocabulary for phenomenon clinicians already recognize intuitively without a formal language to describe it. The pain a Black man reports in a clinical encounter is the visible particle. The forces that shape how that pain is perceived, assessed, and treated, including clinician bias, occupational history, insurance status, provider availability, and cumulative physiological stress burden, function like a hidden sector. They do not appear directly on an imaging study or a standard intake form, yet they couple to the visible presentation and substantially alter its trajectory.

A Multidimensional Framework for Clinical Presentation

Building on this analogy, we propose that the clinical presentation of chronic pain in each Black man can be conceptually decomposed into a directly observable component and a set of coupled but less visible structural components. The directly observable component includes the reported pain intensity, the imaging or examination findings, and the functional limitation documented in a clinical note. The less visible components include the clinician's implicit and explicit beliefs about the patient's pain, formed within a broader social context of false beliefs about racial biology that remain surprisingly persistent among trained clinicians [1]. They include the patient's occupational exposure history, often absent from a standard pain intake form despite its established relationship to joint disease [14]. They include insurance status and access to a racially concordant provider, both of which shape whether a patient returns for consistent follow up care rather than presenting repeatedly in crisis. And they include the patient's cumulative allostatic load, a physiological substrate that is rarely measured in routine practice but that plausibly lowers the threshold at which tissue pathology becomes disabling pain [15, 16].

These hidden components are not static background characteristics but active variables that appear to shift in strength depending on context, much as a coupling constant in a physical system can vary depending on the surrounding field configuration. A Black man evaluated in a well-resourced academic pain clinic staffed by physicians trained in structured, validated pain assessment protocols may experience a comparatively weak coupling between his race and his treatment outcome, while the same man evaluated in a resource constrained emergency department during an overnight shift may experience a much stronger coupling, receiving a markedly different level of care for what is otherwise the same underlying degree of tissue pathology. This context dependence is itself an important feature of the framework, because it explains why disparities research consistently finds meaningful variation in bias across settings and providers rather than a single uniform effect, and it suggests that intervention at the level of setting and system design may be at least as

important as intervention at the level of individual clinician attitudes.

None of these hidden components can be read directly off a radiograph. Each of them nonetheless couples to the visible clinical presentation, shifting its severity, its interpretation by providers, and its treatment trajectory. A clinician who evaluates only the visible dimension, tissue pathology and reported symptoms, is in the position of a physicist attempting to fully characterize a particle while remaining blind to the hidden sector fields that are shifting its observed mass and behavior. The result is a systematically distorted picture, one in which the same underlying degree of joint damage produces divergent clinical outcomes depending on which hidden structural forces are coupled to a given patient.

Symmetry Breaking as a Model for Divergent Outcomes

A further concept from the physics of symmetry offers additional interpretive value. In many physical systems, an underlying symmetry that would in principle produce identical outcomes for interchangeable components is broken by the presence of an external field or interaction, producing observably different behavior among particles that are otherwise identical [20]. We suggest that something analogous occurs in the clinical encounter. Two men with structurally identical knee osteoarthritis, one Black and one white, begin from what should be an equivalent starting point with respect to the underlying tissue pathology. The introduction of an external field, in this case the field of racialized clinical judgment and structural disadvantage documented extensively in the literature already reviewed, breaks this underlying symmetry and produces divergent outcomes in pain assessment, analgesic prescription, and long-term functional trajectory [1, 11].

This framing carries a specific clinical implication. It suggests that efforts to reduce pain disparities should not focus solely on the visible dimension, adjusting how a given pain score is interpreted, but should also attend to the coupled hidden dimensions that are producing the divergence in the first place. Curricular interventions that directly challenge false beliefs about racial differences in pain tolerance have shown promise in reducing bias among trainees, precisely because they intervene on one of the hidden coupling terms rather than on the visible symptom report alone [1, 22].

Intersecting Axes of Race, Gender

The disparities described above are not distributed evenly even within groups defined by race alone, and a full account of chronic pain in Black men requires situating their experience relative to Black women and to white men and women rather than treating Black men as an undifferentiated subset of a larger minority population. Green and colleagues, in an early comparative study of young Black and white adults presenting for pain management, found that Black patients reported greater pain severity and greater pain related disability than white patients despite receiving less aggressive treatment, a pattern that held across pain conditions rather than being confined to a single diagnosis [23]. Separate work examining prehospital analgesia has shown that gender also independently predicts undertreatment, with women less likely than men to receive analgesia for comparable extremity injuries, suggesting that gender and race operate as at least partially distinct coupling terms rather than a single undifferentiated axis of bias [24].

For Black men specifically, the coupling of race with a set of gendered stereotypes about stoicism, criminality, and drug seeking appears to compound the undertreatment already documented for Black patients generally. Clinicians who hold implicit associations between Black masculinity and aggression or substance misuse may be more likely to interpret a Black man's request for adequate analgesia as evidence of medication seeking rather than as a legitimate report of unmanaged pain, a dynamic consistent with the broader finding that racial bias in pain perception predicts racial bias in treatment recommendation accuracy [1]. This is precisely the kind of interaction effect that a single dimension model, one that considers race or gender or occupation independently rather than as coupled fields acting on the same patient simultaneously, is poorly equipped to represent. Within the hidden sector framing proposed here, race and gender function as separate but interacting fields whose combined coupling to the visible clinical presentation is not simply additive, an idea that maps loosely onto the well-established physical principle that multiple interacting fields can produce emergent effects not predictable from any single field considered in isolation.

Racial Concordance and the Structure of Care

A further hidden dimension shaping the pain experience of Black men is the composition of the physician workforce itself. Black physicians remain substantially underrepresented relative to the Black share of the American population, and Black men are among the most underrepresented groups within American medical schools. This workforce imbalance means that most clinical encounters between Black male patients and their physicians occur across a racial divide that has been repeatedly shown to affect communication quality, diagnostic trust, and treatment adherence in the general disparities literature summarized above [22, 25]. Encounters between patients and providers of different backgrounds require an additional interpretive labor from the patient, who must communicate the reality of an internal, unobservable state such as pain to a listener who may not share, and may implicitly discount, the patient's frame of reference. This interpretive burden operates as an additional hidden variable that is rarely made explicit in clinical training but that plausibly shapes how convincingly a given pain report is received.

The persistence of this dynamic across settings, from the emergency department literature reviewed above to longitudinal chronic pain cohorts, indicates that racial concordance functions less like a matter of individual clinician preference and more like a structural feature of the care system that consistently shifts the coupling between visible symptom report and clinical response. This reinforces the broader argument of this paper, namely that any adequate account of chronic pain in Black men must include forces operating outside the examination room itself, in the composition of the workforce, the design of training curricula, and the historical conditions that have produced both.

Site-Specific Illustrations from Sickle Cell Disease

Sickle cell disease offers a particularly clear illustration of the hidden dimensions described throughout this paper, because it is a condition that disproportionately affects Black patients in the United States and that has been documented for decades to generate exactly the kind of divergence between underlying pathology and clinical response that a single dimension model cannot explain. Patients presenting in vaso-occlusive pain crisis report pain that

has an unambiguous physiological basis, yet this pain has frequently been reinterpreted by providers through a lens of somatization or suspected drug seeking rather than accepted as a direct report of an underlying hematologic event [6]. Programs of psychosocial intervention developed specifically for pain management in sickle cell disease have shown that region of pain, associated sleep disruption, and psychological distress interact in ways that a purely nociceptive model fails to capture, findings that emerged from structured clinical research within an ethnically congruent patient sample rather than from theoretical speculation [5, 26, 27]. Related work examining the psychological correlates of sickle cell pain among Black women has similarly found that depression and caregiving burden shape the functional impact of pain independent of its physiological severity, reinforcing the broader point that a single visible pain score cannot stand in for the full clinical picture [28].

Two site-specific manifestations of pain in Black men further illustrate why an exclusively biomedical model is inadequate. Priapism, a painful and potentially urologically damaging complication of sickle cell disease disproportionately experienced by Black men, has received comparatively little sustained clinical attention relative to its physical and psychological burden, and ongoing work continues to document its chronic pain dimensions within this population [29]. Anal pain without an identifiable malignant cause presents a related but distinct challenge, compounded in Black men by the additional stigma historically attached to anorectal complaints and by clinician unfamiliarity with its medical, surgical, and behavioral management, a gap that recent clinical work has begun to address directly [30]. Both conditions occupy anatomic and diagnostic territory that is rarely discussed openly in clinical training, and both illustrate a further hidden dimension not yet named in this paper, namely stigma attached to the anatomic site of pain itself, which can suppress help seeking long before a patient ever reaches the examination room where the other hidden dimensions described above come into play.

Illustrative Composite Vignette

To make the framework concrete, consider a composite and entirely hypothetical case constructed for illustrative purposes only, drawing on patterns broadly consistent with the literature reviewed above rather than describing any actual patient. A 47-year-old Black man has worked for two decades as a warehouse loader, an occupation involving frequent heavy lifting and prolonged standing on concrete surfaces, both established risk factors for knee osteoarthritis [13, 14]. He presents to a community clinic with progressive bilateral knee pain that has begun to interfere with his ability to work full shifts. His visible clinical presentation, a moderate degree of joint space narrowing on radiograph and self-reported pain intensity in the moderate to severe range, would on a purely biomedical reading suggest a standard treatment pathway of anti-inflammatory medication, physical therapy referral, and eventual consideration of surgical evaluation.

The hidden dimensions of his presentation complicate this pathway considerably. He is uninsured between jobs and cannot easily sustain a physical therapy course requiring repeated co-payments. He has previously been treated at an emergency department for an acute flare and reports that his pain was met with skepticism and a comparatively conservative prescription, an experience broadly consistent with the undertreatment patterns documented in the literature [9, 11]. He has no primary care physician who shares his racial or cultural background, and he reports a general reluctance to appear as though he is seeking medication, a hesitance plausibly shaped by awareness of how Black men are frequently perceived in clinical encounters [1]. His decades of physically demanding, low wage labor have plausibly elevated his allostatic load in ways that are never directly measured in his chart [15, 16]. None of these hidden factors would appear on a standard radiology report, yet each of them measurably shapes whether his knee pain is taken seriously, treated adequately, and followed longitudinally, or instead becomes one more entry in the well documented pattern of chronic, undertreated pain among Black men in physically demanding occupations. This vignette is offered purely to illustrate how the multiple hidden dimensions described above might jointly shape a single clinical trajectory. As a hypothetical vignette, although likely often experienced, it is not yet a validated case study. Hence, generates no numerical prediction.

Clinical and Policy Implications

A framework of this kind, even when explicitly metaphorical, has practical implications for clinical training and system design. Pain assessment protocols could be restructured to explicitly document occupational exposure history, insurance continuity, and access to racially concordant care alongside the standard measures of pain intensity and functional limitation, making at least some of the hidden coupling terms visible on the chart rather than leaving them entirely implicit. Medical education could expand efforts, building on work already underway following the publication of Hoffman and colleagues, to directly address false beliefs about racial differences in pain physiology during training rather than assuming that clinical experience alone will correct them [1, 22]. Health systems serving large populations of Black men in physically demanding occupations could develop targeted screening for early joint disease, recognizing that occupational exposure functions as one of the strongest and most measurable hidden dimensions shaping eventual pain burden [13, 14].

At the level of policy, the persistent pattern of undertreatment documented across decades of research, spanning emergency medicine, chronic pain management, and now large scale administrative data analyses, suggests that the problem is not a matter of individual clinician error correctable through isolated interventions [1, 9, 11]. It is better understood as a structural coupling that operates consistently across settings and requires structural rather than purely individual solutions, including systematic bias auditing of treatment recommendations, expanded investment in the pipeline of Black physicians, and insurance reform that reduces the discontinuity of care associated with unmet pain treatment preferences [12].

Occupational health policy represents a further point of leverage that is often absent from discussions of pain equity. Because heavy manual labor, repetitive kneeling, and prolonged standing are established and modifiable risk factors for knee and hip osteoarthritis, workplace ergonomic interventions and mechanical lifting aids in sectors that disproportionately employ Black men could plausibly reduce the incidence of joint disease before it ever reaches a pain clinic [13, 14]. Addressing this hidden dimension at its source, rather than only at the point of clinical presentation, would represent a meaningfully different and arguably more upstream intervention than adjustments to bedside pain assessment alone. A comprehensive approach to pain equity for Black men will ultimately need to intervene simultaneously on several of the hidden dimensions described in this paper rather than treating any single one as sufficient on its own.

Limitations

This framework is presented explicitly as a conceptual and pedagogical device rather than a quantitative or predictive model. We have deliberately avoided constructing a formal equation purporting to calculate a numerical pain disparity score, because we do not believe the current state of evidence supports assigning precise numerical weights to constructs as heterogeneous as clinician bias, occupational exposure, and allostatic load, and because a false appearance of mathematical precision could itself obscure rather than clarify the underlying social reality. The analogy to supersymmetry and hidden sectors is offered as a way of organizing existing, well documented empirical findings into a coherent conceptual structure, not as a claim that the mathematics of theoretical particle physics governs human pain perception in any literal sense.

The framework also does not yet incorporate several variables likely to be clinically relevant, including genetic and epigenetic contributions to pain sensitivity, the specific mechanisms by which discrimination is physiologically transduced into altered pain thresholds, and the substantial heterogeneity among Black men with respect to socioeconomic status, geographic region, and occupational category. Future empirical work, ideally longitudinal and multi-site, would be needed to determine whether structured documentation of the hidden dimensions proposed here meaningfully improves pain assessment accuracy or treatment equity in practice. Such work might begin modestly, for example by testing whether adding structured fields for occupational exposure and insurance continuity to a standard pain intake form changes downstream treatment patterns, before attempting anything as ambitious as a formal predictive model. We regard this incremental, empirically anchored path as considerably more valuable to patients than a premature quantitative formalism, however elegant such a formalism might appear on paper.

Conclusion

Chronic pain in Black men cannot be adequately understood through a model that treats tissue pathology as the sole or primary determinant of clinical presentation. Decades of evidence, including findings generated within the author's own program of clinical research on pain in Black patients and in sickle cell disease specifically, demonstrate that clinician bias, occupational exposure, insurance and access barriers, cumulative physiological stress burden, and site-specific stigma all shape the pain that ultimately presents in a clinical encounter, often in ways that are not directly visible on standard assessment tools [1, 4, 6, 10, 11, 14, 15]. Borrowing conceptual structure from the physics of hidden sectors and symmetry breaking, work closely associated with the career of theoretical physicist Sylvester James Gates, offers clinicians and researchers a vocabulary for taking these hidden forces seriously as active, coupled contributors to observed suffering rather than background noise to be adjusted away. The goal of this framework is not to reduce human pain to an equation but to insist that the forces shaping it, however difficult to measure directly, are structurally real and clinically consequential, and that meaningful progress on pain equity for Black men will require making those hidden dimensions visible rather than assuming they can be safely ignored.

References

1. Hoffman KM, Trawalter S, Axt JR, Oliver MN. Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites. Proc Natl Acad Sci U S A. 2016; 113(16): 4296-4301.
2. Engel GL. The need for a new medical model: a challenge for biomedicine. Science. 1977; 196(4286): 129-136.
3. Faux MG, Gates SJ Jr. Adinkras: a graphical technology for supersymmetric representation theory. Phys Rev D. 2005; 71(6): 065002.
4. Edwards C.L, Fillingim R.B, Keefe F. Race, Ethnicity, and Pain. Pain, 2001; 94(2), 133-137.
5. Edwards LY, Edwards CL. Psychosocial treatments in pain management of sickle cell disease. J Natl Med Assoc. 2010; 102(11): 1084-1094.
6. Wellington C, Edwards CL, McNeil J, et al. Somatization in the conceptualization of sickle cell disease. J Natl Med Assoc. 2010; 102(11): 1079-1083.
7. France CR, Keefe FJ, Emery CF, et al. Laboratory pain perception and clinical pain in postmenopausal women and age-matched men with osteoarthritis: relationship to pain coping and hormonal status. Pain. 2004; 112(3): 274-281.
8. Keefe FJ, Jacobs M, Edwards C. Persistent pain: cognitive-behavioral approaches to assessment and treatment. Semin Anesth. 1997; 16(2): 117-126.
9. Todd KH, Samaroo N, Hoffman JR. Ethnicity as a risk factor for inadequate emergency department analgesia. JAMA. 1993; 269(12): 1537-1539.
10. Meghani SH, Byun E, Gallagher RM. Time to take stock: a meta-analysis and systematic review of analgesic treatment disparities for pain in the United States. Pain Med. 2012; 13(2): 150-174.
11. Singhal A, Tien YY, Hsia RY. Racial-ethnic disparities in opioid prescriptions at emergency department visits for conditions commonly associated with prescription drug abuse. PLoS One. 2016; 11(8): e0159224.
12. Nguemeni Tiako MJ, Engel-Rebitzer E, Friedman A, et al. Racial disparities in unmet pain treatment preference, pain treatment satisfaction and subsequent opioid misuse: a secondary analysis of a national multisite RCT. J Gen Intern Med. Published online June 25, 2025.
13. Jensen LK. Hip osteoarthritis: influence of work with heavy lifting, climbing stairs or ladders, or combining kneeling and squatting with heavy lifting. Occup Environ Med. 2008; 65(1): 6-19.
14. Yucesoy B, Charles LE, Baker B, Burchfiel CM. Occupational and genetic risk factors for osteoarthritis: a review. Work. 2015; 50(2): 261-273.
15. Geronimus AT, Hicken M, Keene D, Bound J. "Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. Am J Public Health. 2006; 96(5): 826-833.
16. McEwen BS. Protective and damaging effects of stress mediators. N Engl J Med. 1998; 338(3): 171-179.
17. Bennett GG, Merritt MM, Edwards CL, Whitfield KE, Brandon DT, Tucker RD. Stress, coping, and health outcomes among African Americans: a review of the John Henryism hypothesis. Psychol Health. 2004; 19(3): 369-383.
18. Campbell LC, Keefe FJ, McKee DC, et al. Prostate cancer in African Americans: relationship of patient and partner self-efficacy to quality of life. J Pain Symptom Manage. 2004; 28(5): 433-444.
19. Green MB, Schwarz JH, Witten E. Superstring Theory. Cambridge, UK: Cambridge University Press; 1987.
20. Gates SJ Jr, Grisaru MT, Rocek M, Siegel W. Superspace: One Thousand and One Lessons in Supersymmetry. Reading, MA: Benjamin/Cummings; 1984.
21. Kane G. Modern Elementary Particle Physics. Cambridge, UK: Cambridge University Press; 2017.
22. US Department of Health and Human Services. Report of the Secretary's Task Force on Black and Minority Health. Washington, DC: US

Government Printing Office; 1985.

23. Green CR, Baker TA, Sato Y, Washington TL, Smith EM. Race and chronic pain: a comparative study of young Black and White Americans presenting for management. J Pain. 2003; 4(4): 176-183.

24. Michael GE, Sporer KA, Youngblood GM. Women are less likely than men to receive prehospital analgesia for isolated extremity injuries. Am J Emerg Med. 2007; 25(8): 901-906.

25. Green CR, Anderson KO, Baker TA, et al. The unequal burden of pain: confronting racial and ethnic disparities in pain. Pain Med. 2003; 4(3): 277-294.

26. Barker CS, Edwards CL, Bryson WJ, et al. Sleep and chronic pain in an ethnically congruent sample of adult patients with sickle cell disease. Cienc Conducta. 2012; 27: 35-50.

27. Price SJ, Alessi LYE, Wood M, et al. Region of pain, healthcare utilization, and psychological functioning in adult patients with sickle cell disease. Cienc Conducta. 2012; 27: 51-64.

28. Hawkins T, Wood M, Byrd G, et al. Investigating the relationship between children, depression, and pain in African American women with sickle cell disease. J Hematol Oncol Res. 2014; 1(2): 14-23.

29. Brooks MM, Sollers JJ III, Rosales J, et al. Chronic pain and priapism among adult Black males with sickle cell disease. Manuscript submitted for publication, 2025.

30. Edwards CL, Pratt LR, Williams KL, et al. Medical, surgical, and behavioral management of non-carcinogenic anal pain in Black men. Gastroenterology. In press.