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Confronting Racism in All Forms of Pain Research: Reframing Study Designs

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Abstract: **This second paper in a 3-part series on antiracism in pain research across the translational spectrum focuses on study design factors. Although objectivity is a cornerstone value of science, subjectivity is embedded in every step of the research process as investigators make choices about who they collaborate with, which research questions they ask, how they recruit participants, which research tools they use, and how they analyze and interpret data. We present theory and evidence from disciplines such as sociology, medical anthropology, statistics, and public health to discuss 4 common study design factors, including 1) the dominant biomedical narrative of pain that restricts funding and exploration of social indicators of pain, 2) low diversity and inclusion in pain research enrollment that restricts generalizability to racialized groups, 3) the use of "race" or "ethnicity" as a statistical variable and proxy for lived experiences (eg, racism, resilience), and 4) limited modeling in preclinical research for the impact of social factors on pain physiology. The information presented in this article is intended to start conversations across stakeholders in the pain field to explore how we can come together to adopt antiracism practices in our work at large to achieve equity for racialized groups.**

Perspective: ***This is the second paper in a 3-part series on antiracism in pain research. This part identifies common study design factors that risk hindering progress toward pain care equity. We***

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suggest reframes using an antiracism framework for these factors to encourage all pain investigators to collectively make strides toward equity.

Key words: *Racism, antiracism, pain disparities, pain care equity, methods.*

Across healthcare fields, scholars have called for a shift toward antiracism in research praxis to achieve health equity.[24,40,98,128] This shift calls on us to challenge the fundamental values of science and recognize the historical influences that still loom large over the research enterprise, including the field of pain. One of the fundamental values in science is objectivity.[57] Consequently, researchers often aim to keep their scientific endeavors separate from their personal beliefs (eg, dissociating their role as a scientist from their role as an advocate for patients). Subjectivity, however, is embedded in every step of the research process[135] – from the choices we make in identifying and conceptualizing scientific questions, designing a study's methods, and describing findings in scientific narratives – making true objectivity in science unattainable. Additionally, advocacy is inherent in all pain research that strives to improve the quality of care and eliminate individuals' suffering from pain. Our call for a shared commitment to antiracism in pain research is simply an expansion of this existing advocacy so that it actively includes the pain care needs of marginalized communities that have been ignored in our work at large.

The present article is the second paper in a 3-part series on antiracism in pain research (see Morais et al[94] and Hood et al[70] for the first and third papers in the series, respectively). We first define key terms that will help investigators adopt an antiracism framework for their research. Second, we discuss concerns related to the tension between subjectivity/advocacy and science. Third, we describe preclinical and clinical study design elements identified by the *Antiracism CoaliTION in Pain Research* (ACTION-PR) and discussed with 39 pain disparities experts in think tanks held in the Fall of 2020 (see Morais et al[94] for details). Topics addressed in this article include: 1) the dominant biomedical metanarrative of pain, 2) significant underrepresentation of study participants from racialized groups, 3) the use of "race"/ethnicity as a statistical variable, and 4) limited modeling of social factors' impact on pain physiology in preclinical studies. Finally, we provide example methods and scenarios to reframe these study design choices to be consistent with an antiracism framework.

Key Definitions

Language shapes individuals' world views.[79,112] Shifting from language that blames individuals to language that holds systems of oppression accountable is a foundational step in the shift toward antiracism in pain research (see Hood et al[70] for a detailed explanation) Table 1 defines 5 commonly used terms or approaches in research, provides suggested paradigm shifts, and explains the rationale for these shifts. There are 2 notable replacement terms (ie, *racialized groups* and *social indicators of health*) used throughout the present article and warrant additional explanation below.

When referring to groups facing societal oppression based on physical characteristics associated with the construct of "race," this series uses the term *racialized groups.* Racialization occurs when individuals create social groupings to differentiate among individuals with physical characteristics and/or other perceived behavioral traits that are similar to or different from their own.[68] Historically, White Europeans racialized individuals who did not have similar physical features to their own as a way of "othering" and ascribing these groups' inferior positions in society. Evolving "race" categories on the US Census over time demonstrates that racialization is a dynamic, sociopolitical process. Shifting from terms such as *people of color* to *racialized groups* emphasizes the action of 1 group's societal oppression of another and is intentional language for why diverse, panethnic communities are grouped together in discussion. Racism is a dominant form of social oppression that impacts racialized groups in Western, educated, industrialized, rich, and democratic (WEIRD) countries. In the Global South, other factors such as colorism, ethnicity, religion, caste, etc., are used to oppress groups. Although this article focuses on racism and its impact on the pain experiences of racialized groups, the study design factors and reframes discussed below are still relevant to how investigators in the Global South can change their work to benefit oppressed groups in their particular society.

Further, this article reviews foundational theory and evidence to emphasize the need to research the social factors that influence pain. *Social determinants of health* (SDoH) is a term used by the World Health Organization and US Center for Disease Control to describe the causal effect of social and environmental conditions on health.[15] A *determinant* has been defined as "a determining factor or agent; a ruling antecedent, a conditioning element; a defining word or element."[29] Although the term SDoH has been applied to refer to both mutable and immutable factors,[132] it has been criticized for implying fixedness of social/environmental conditions and de-emphasizing the protective role of resilience.[118] This series uses *social indicators of health* as an imperfect step away from deterministic language, given that an *indicator* has been defined as "anything used in a scientific experiment to indicate the presence of a substance or quality."[30] No substitute term for SDoH has yet been universally adopted, and we encourage suggestions for an updated term that emphasizes that social/environmental conditions can change across

the lifespan, respond to interventions, or be mitigated through resilience factors (eg, social contributors to pain, social predictors of pain, etc.).

Subjectivity and Advocacy in Science

Subjectivity and advocacy are often considered sources of bias in science. Underlying this concern is the aspiration for science to be fundamentally devoid of these factors and that introducing subjectivity and advocacy into the research process will influence findings. However, subjectivity and advocacy are inextricable components of science. For example, studies examining peer reviewer agreement highlight the subjective nature of science; inconsistency in ascribing strengths and weaknesses to grant applications among reviewers cannot solely be explained by variability in scale use.[39,104] An antiracism framework acknowledges that 1) subjectivity is embedded in the research process, and 2) advocacy makes our work more meaningful to patients and advances health equity.

First, as an example of subjectivity in data collection, consider the 1790−1810 iterations of the US Census, a decennial survey used to count the US population. During the US's establishment, delegates sought to collect "objective" data on the number of inhabitants within districts to apportion political representation.[111] They faced several study design choices, including: 1) how do household members get enumerated? and 2) what is the value of each enumeration? They decided that designated Census enumerators would determine the number of members in each household. Enumerators would code each household member using "race" categories, including "free" persons and "slaves" (applied to Black individuals who were enslaved).[107] Finally, they decided that "free" persons would count as 1 household member, Indigenous individuals would not be included in counts, and "slaves" would count as three-fifths of a household member.[21] These subjective design choices resulted in "objective" data that helped entrench systemic racism in US society. To this day, aspects of the current Census' design result in "objective" data that adversely impact racialized groups (eg, prison gerrymandering,[125] debate over adding a citizenship question[7]).

Second, advocacy has been successfully infused into research to improve health equity by pushing for changes in established methods. For example, although cardiovascular disease is one of the leading causes of death worldwide, a societal misperception was that it mostly affects cisgender men. One key driver of this misperception was the prevailing research, which only used male mice/cells or cisgender human men. Scientists highlighted the danger of underdiagnosing cardiovascular disease symptoms among cisgender women.[23,80] With research findings that had poor generalizability to cisgender women, calls were made for biomedical research to consider assigned sex at birth and gender identity in study designs. Ultimately, this advocacy led to the creation of policies that include sex- and gender-based analyses in study designs from the US National Institutes of Health, Canadian Institutes of Health Research, and the European Research Council.[134] Although future work is needed to understand the presentation of cardiovascular disease symptoms among transgender and gender diverse individuals, this example shows that advocacy does not diminish the rigor or objectivity of science. On the contrary, it improves its rigor, generalizability, and importance.

An antiracism framework encourages researchers to embrace the subjectivity and advocacy that already exists in science. By embracing these factors, researchers can engage in critical self-reflection on how our training and sociocultural worldview feed into our subjective design choices and who is included in our advocacy. Organizations, such as the US National Pain Advocacy Center and Global Alliance of Partners for Pain Advocacy, exist for the very purpose of bringing together scientists, clinicians, policy makers, and patients to advocate for evidence-based policies that yield equitable pain care.

Our call for a shared commitment to antiracism in pain research aligns with previous efforts to address health inequities. Whereas *nonracism* refers to passive opposition to ideologies and behaviors that perpetuate racialized inequities,[81] *antiracism* refers to ideologies and behaviors that affirm and seek to enable equity across groups.[12] Ongoing antiracism education, cultural humility, and self-reflection on how the investigative team's actions might perpetuate pain inequities are foundations for antiracism in pain research praxis and can be implemented at every career stage and data collection milestone. As discussed in Morais et al,[94] the ACTION-PR intentionally calls for a *shared commitment* to antiracism rather than *guiding principles* or *regulations.* The study design factors and reframes discussed below should not be interpreted as fixed, all-inclusive guidelines or rules, nor are we suggesting that certain study designs should be "forbidden." Our suggestions are not "all-or-nothing" (ie, they are not intended to suggest that only studies that incorporate all reframes are considered "antiracist"). Instead, the reframes are proposed as a compass for investigators who are committed to improving pain care for marginalized groups and highlight potential areas for growth and change from current dogma. For some researchers, certain reframes proposed below might replace their current practices. For others, these reframes might lead to studies that complement their existing work. We view these study design factors and reframes as starting points for investigators to consider; importantly, the suggestions for antiracism research praxis throughout this series should be revisited regularly to determine their utility.

Study Design Factor 1: A Dominant Biomedical Metanarrative of Pain Eclipses Research on the Social Indicators of Pain

Metanarratives are overarching theories or interpretations of circumstances that structure people's

beliefs.[90] In medicine, metanarratives 1) center on understanding mechanisms of health and disease, 2) are informed by foundational publications, conference proceedings, and/or providers' case examples, and 3) drive the direction of funding priorities and subsequent research efforts.[75,121] Hansen et al[63] importantly describe how they can also lead to normalized, embedded practices in research that maintain health inequities. In the field of pain, metanarratives in the 19th and 20th centuries applied a traditional biomedical framework to explain pain as a phenomenon solely caused by pathophysiologic and biochemical processes.[49] Although the biopsychosocial model of pain[34,129] is now broadly accepted, the biomedical metanarrative of pain is still prioritized in our field. For example, across 3 workshops dedicated to developing funding priorities for the US National Institutes of Health (NIH) Helping End Addiction Long-Term (HEAL) Initiative in 2017, attendees identified medication development for opioid use disorder, nonaddictive pain treatments, and neurobiological pain mechanisms as key areas to allocate funds. As a response to feedback on this initial biomedical emphasis, the NIH Office of Behavioral and Social Sciences Research later worked to develop social and behavioral HEAL funding opportunities for fiscal year 2019.[113]

This example highlights an important drawback to a dominant biomedical metanarrative – it minimizes the importance of psychosocial factors in the pain experience, in turn funneling funding to biomedically-focused studies as a field norm. Our intent in describing this drawback is not to criticize or minimize the numerous, critical contributions from biomedical pain research. However, we cannot deny that it has predominantly enrolled middle-class, non-Hispanic White (NHW) participants from WEIRD countries, inadvertently prioritizing the pain experiences of this sociodemographic group and limiting our knowledge of systematic factors that impact pain experiences beyond this group.

WEIRD society's structures inequitably benefit White individuals and disenfranchise racialized groups. Globally, social oppression – which may be based on a number of intersecting factors, including colorism, caste systems, and religion – are the drivers of inequities. The experiences of racism, social oppression, and/or political exclusion are chronically stressful. The physiological effects of these factors have been documented in other health fields, including increases in cortisol, changes in neurophysiology, and increased risk of DNA methylation (epigenetic changes).[1,5,6,65,101,126] Without considering the influence of social factors on physiological and psychological processes in a biopsychosocial model, the biomedical metanarrative risks that the field will develop pain biomarkers and treatments that do not apply to socially and politically oppressed groups, exacerbating pain inequities. Further, a biomedical metanarrative conflates "race" with genetic ancestry and explains racialized pain disparities as arising from biological – rather than sociopolitical – factors.[114]

Antiracism Reframe 1: Design Studies that Reflect a Biopsychosocial Metanarrative of Pain

Study designs following a biopsychosocial metanarrative of pain consider how interactions among biological, psychological, and social factors contribute to pain outcomes. Psychological components of pain and their interaction with biological functions have been increasingly represented in pain research since the biopsychosocial model was proposed; however, concerted efforts across the field to integrate social indicators of health have lagged. Social indicators of health are considered the "upstream" causes[51] of health disparities that fall along sociopolitically constructed categories. To paraphrase critical scholars, disparities in health are "biological reflections of social inequality."[67,105] Social indicators are shaped by power structures and result in the avoidable and inequitable distribution of disease burden to members of minoritized groups.[16,91] Examples of such conditions that have the potential to change across the lifespan include economic instability, limited education opportunities, reduced healthcare access, unfavorable neighborhood conditions, lack of community support, and discriminatory interpersonal exchanges.

When social indicators of pain have been considered to date, they have largely been conceptualized on an individual or interpersonal level (eg, provider bias)[10,77] and much less work has been done to understand community and societal conditions. As demonstrated in the US National Institute of Minority Health and Health Disparities (NIMHD) Research Framework, social indicators of health operate at various levels (ie, individual, interpersonal, community, and societal) and domains (ie, biological, behavioral, physical/built environment, sociocultural environment, healthcare system) of influence. Given this multidimensionality, an antiracism framework in pain research still considers biological and psychological factors as important contributors to pain experiences and treatment responses across humans. However, it holds that racialized pain disparities arise from the impact of social indicators (ie, racism) on biological/psychological factors and rejects the notion that they arise from innate differences in genetics/biology or stereotyped group traits. In other words, it sees racism as the fundamental cause of racialized pain inequities. Shifting from a biomedical metanarrative to one that considers how social indicators interact with biological and psychological factors presents new opportunities for uncovering pain mechanisms for a diverse population beyond middle-class, NHW individuals in WEIRD societies.

An example of this reframe applies to the way metanarratives drive our conceptualization of sickle cell disease (SCD). SCD is the most common genetic disorder worldwide that can affect all individuals but has the highest prevalence among individuals of African ancestry.[18] A Eurocentric biomedical metanarrative often occurs, which conflates the heredity of SCD that is based on genetic ancestry with racialized identity to explain

SCD as a condition that "affects Black people" and has been used by some to argue the existence of biological races. An antiracism reframe using a biopsychosocial metanarrative separates racialized identity from ancestry to understand that sickle cell trait served as a protective function in areas where malaria is endemic (eg, sub-Saharan Africa, India)[25,35] and that people from these regions are racialized in WEIRD countries or experience colorism in the Global South. In WEIRD countries, individuals with SCD who are racialized as Black face the burden of a history of colonization, enslavement, and/or segregation with ongoing social practices that limit access to healthcare, impact psychological wellbeing, and maintain disparities.[36,44,106] Inequities in SCD prevalence and care due to social oppression is also observed within India, wherein people from socioeconomically disadvantaged castes – often ranked as such due to skin color – are most burdened.[69] An antiracism reframe further considers institutional forces, such as funding disparities that decrease research productivity and limit novel drug development for the SCD population compared to nonracialized health conditions (eg, cystic fibrosis).[36]

Due to the broad effects of racism, social indicators covary, are interdependent, and tend to be mutually reinforcing across time.[50] For the latter reason, research across the translational spectrum on the social indicators of pain would be further advanced by understanding individuals' lived experiences across the lifespan. Preliminary evidence suggests that the accumulation of social injustice is associated with enhanced laboratory and clinical pain[17,92,93,100,133,136] (potentially through increased allostatic load burden), but there remains a gap in understanding how changes in social indicators from childhood to adulthood influence trajectories of pain and its psychological/biological predictors.[108]

Scholars criticizing research on the social indicators of health have noted that this work is often unable to be tested in causal paradigms and that it is ideologically motivated.[54] The field's ability to robustly reframe pain research questions in the context of a biopsychosocial metanarrative, then, first calls on investigators, reviewers, editors, and clinicians to acknowledge the abundant literature documenting the sociopolitical, historical, and physical environmental influences on health, which undercut charges of mere ideological motivation. It also encourages funders to regularly publish opportunities that will shape investigators' areas of inquiry to those most important to racialized groups (for a recent example, see the US NIH's funding announcement, RFA-NS-22-002).

Further, it is possible that biomarker discovery and analgesics developed while ignoring the influence of social indicators might not be valid for individuals who are systematically oppressed by such factors, ultimately running a high risk of racialized patients being further denied adequate pain treatment. Although current calls for pain biomarker discovery and validation advocate for the inclusion of participants from diverse populations,[28] these recommendations do not include endpoints or measures that reflect patients' diverse identities or provide guidance on how to incorporate social indicators into biomarker development. Researchers conducting translational work aimed at developing biomarkers or analgesics are strongly encouraged to consider social indicators and their psychological consequences in study design choices, moving toward a true biopsychosocial metanarrative. For example, sociocultural pain neuroscience has emerged as a subfield that addresses how sociocultural factors (including racism) intersect with individuals' values/beliefs and modulate pain neurobiology to yield diverse pain experiences.[3] Concerted efforts, such as work in this subfield to integrate diverse psychosocial factors in biomedical pain research, will help us understand how to best intervene on pain inequities.

Study Design Factor 2: Study Samples Often Have Low Numbers of Participants From Racialized Groups

The inclusion of racialized groups in pain research is imperative for generalizability beyond NHW individuals. However, these groups have been largely underrepresented in most pain research produced from WEIRD countries. Efforts to encourage more inclusive research in these countries have consequently been implemented. For example, the US NIH Revitalization Act of 1993 was introduced to promote the inclusion of racialized groups in clinical research,[58] and the "Outreach Notebook for the Inclusion, Recruitment, and Retention of Women and Minority Subjects in Clinical Research" is a complementary document designed to help investigators diversify study samples.[110] The Revitalization Act requires NIH-funded investigators in the US to report enrolled participants' sociodemographic characteristics annually. The NIH Research, Condition, and Disease Categories (RCDC) Inclusion Statistics Report (https://report.nih.gov/risr/#/) makes this information across NIH-funded studies publicly available.

Table 3 lists the median proportions of participants' identities, based on the US Office of Management and Budget's (OMB) "race" and ethnicity categories, across NIH-funded studies and within pain-related RCDCs during 2018. These data highlight that White and "non-Hispanic/Latino" (language used by OMB) individuals are overwhelmingly represented in US pain-related clinical research. Although the representation of racialized groups in pain-related RCDCs is similar to estimates from the 2010 US Census, the fact that pain inequities persist raises concerns about using Census estimates as an inclusion goal; it guarantees that there will be low generalizability beyond group(s) with the highest Census estimates. Although some degree of *diversity* is achieved by matching enrollment targets to US Census estimates (ie, who is in the room), this strategy ultimately limits *inclusion* (ie, whose voice is heard). Further, the US population is projected to change substantially from 2016 to 2060 (eg, an anticipated 101% increase in Asian individuals, 41% increase in Black/African American individuals, and 93.5% increase

Table 1. Explanations of Common Language Choices in Scientific Narratives and a Commonly Used Underlying Research Framework in Pain Research With Proposed Shifts Based on an Antiracism Framework

Common approach		*Proposed shift**		*Rationale for shift*
Key term	*Definition*	*Key term*	*Definition*	
		Common underlying research framework		
Nonracism	The passive rejection, opposition, and disassociation from behaviors, discourses, and ideologies that are considered racist	Antiracism	The active process of eliminating racism by changing systems, organizational structures, policies and practices, and attitudes, so that power is redistributed and shared equitably	Calls on investigators to actively build cultural humility, self-reflect on study design choices, and engage in power-sharing and other behaviors that will bring the field of pain closer to justice for racialized groups
		Common Language Choices in Scientific Narratives		
Race/Racial	Social classification of individuals based on a mix of physical features (eg, skin tone and hair texture)	Racialized identity or racialized group identity when referring to racialized groups; "Race" (in quotations) when referring to White people or the general construct	A social process by which racialized meaning is ascribed to a group of individuals that previously did not identify as such; historically, White Europeans racialized individuals who did not have similar physical features to their own, leading to "othering" and differential treatment; because White people initiated the process of racialization, in our series, we do not refer to White people as being racialized	Indicates the action of White European societal and structural influences in creating and perpetuating racialized groups and hierarchies based on those groups (ie, acknowledges the sociopolitical process) rather than implying distinct classes of people (ie, might be inferred as biologically based); We use quotation marks around the term "race" where relevant to connote that it is a socially constructed, dynamic phenomenon
Minority	A distinct group that coexists with, but is subordinate to, a more dominant group	Minoritized	Group(s) in society that are defined as "minorities" by a dominant group	While used by some to denote minority percentage of the population, this term has taken on connotation that that racialized groups are relegated to a "minority" status by White dominant society
Social Determinants of Health	The conditions in the environments where people are born, live, work, play, and age that affect health, functioning, and quality of life that ultimately lead to poor health outcomes	Social Indicators of Health	An imperfect replacement term that seeks to emphasize social factors that contribute to health outcomes while moving away from deterministic language (see Salerno & Bogard, 2019)	Indicates that conditions are not fixed and can change across the lifespan, be surpassed because of resilience factors, or change with intervention
People of Color, BIPOC, non-White	Naming conventions typically used to refer to racialized groups	Use individuals' preferred identities or "racialized group(s)"	For example, "Black" or "African American" or "Jamaican American" when referring to a particular identity; "Racialized groups" can be used when referring to individuals spanning more than 1 panethnic category	Rather than passively cluster panethnic identities — which erases their heterogeneity — using individuals' preferred identity is a step toward recognizing unique lived experiences, and using "racialized" actively acknowledges the reason for lumping these groups together

Abbreviation: BIPOC, Black, Indigenous, People of Color.

*Because semantic change occurs continually, the utility of these proposed shifts should be closely monitored over time. As needed, new terms that hold systems accountable and validate the experiences of racialized individuals should be used.

in Hispanic/Latino/a/e/x individuals).[131] These projected changes emphasize the need for our field to set new enrollment standards and reframe study designs to proactively address the pain care needs of a diversifying society. Although these examples draw on US estimates, the considerations presented apply to investigators across WEIRD countries.

Multiple study design choices can act as barriers to recruiting racialized individuals in research[11] (Fig 1). First, the *selection of a study question* with poor relevance to racialized individuals can influence initial interest in participation.[22,33] Second, *strict inclusion/exclusion criteria* around health factors particularly impacted by systemic racism (eg, BMI, diabetes[4,88,101]) risk the systematic exclusion of individuals who are the targets of racism.[42,45] Third, investigators' *choices of study procedures* might inadvertently deter participation among individuals experiencing economic disenfranchisement if participation logistics present a high burden, such as the need to attend multiple in-person visits during work hours or arrange transportation.[33,42] Fourth, *study materials* designed without considering potential participants' language fluency, literacy levels, and cultural diversity can further restrict racialized individuals' participation, particularly for immigrants.[52,99] Fifth, racialized community members might not be *aware of research participation opportunities* if recruitment materials are inadequately disseminated.[19,42] Finally, the *mistreatment* of racialized individuals in science and healthcare settings undermines the trustworthiness of research establishments. Trust that is lost must be earned again through the investigative team's actions.[60,120]

The latter is particularly relevant for translational pain research, or research focused on taking discoveries of biological phenomena "from the bench to the bedside and back again"[43] (see Davis et al,[28] Kraus,[82] and Zarbin[137] for additional information). Translational research is considered a critical iterative process for biomarker discovery and validation as well as analgesic development and often features large-scale surveillance of physiological processes to identify potential intervention targets via biological fluids, tissues, or bioimages.[82] This iterative process occurs on a spectrum of research activities that are conducted in phases from biomarker discovery and assay development (T0/T1) to the assessment of the benefit and uptake of analgesics or other therapeutic interventions at the population level.[137] For this reason, racialized groups that have historically experienced exploitation of their biological samples by researchers (discussed in Morais et al[94]) are justified in their mistrust. Without concerted efforts from

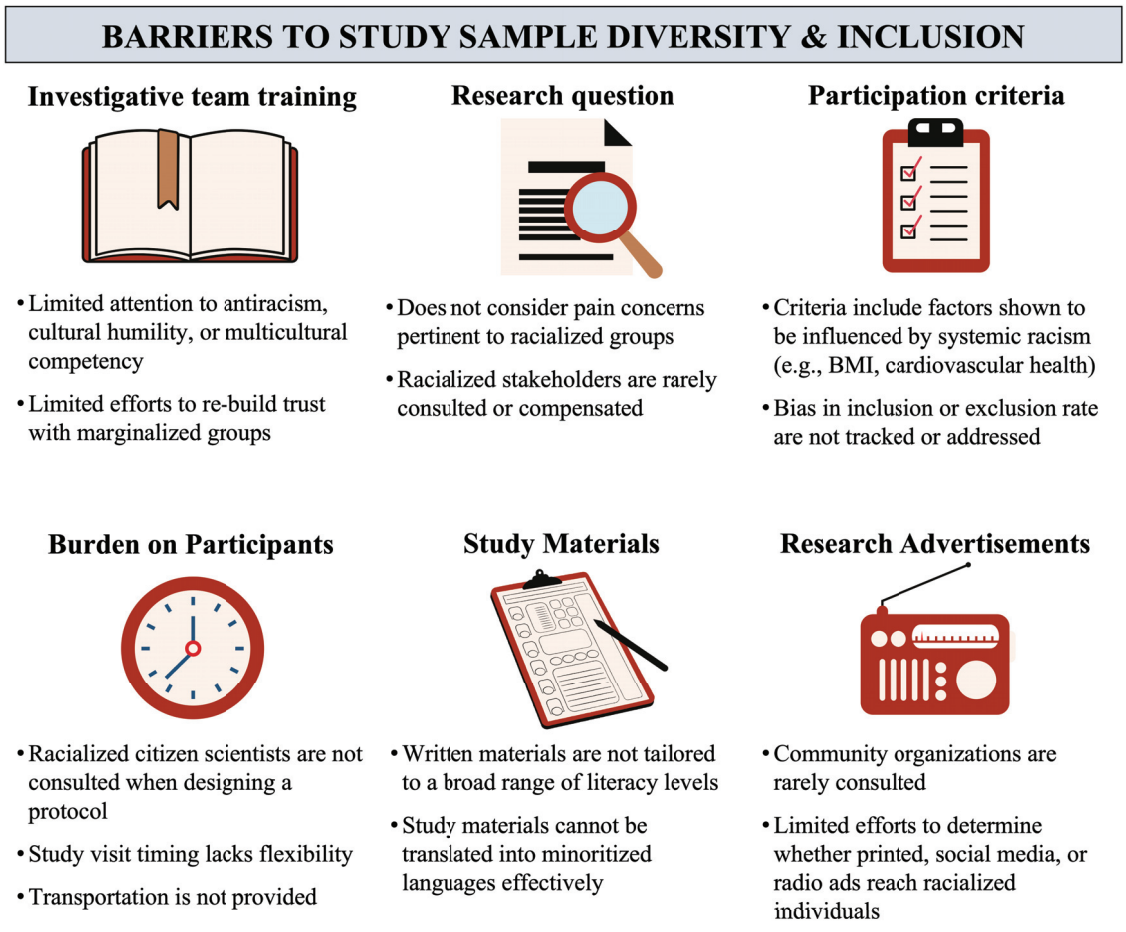

Figure 1. Study design choices that act as barriers to diversity and inclusion in research study samples.

investigators to build trust, studies that employ the collection of biological samples are particularly at risk of low sample diversity.

Notably, the barriers described in Figure 1 are not always present from a lack of awareness or attention but might be present because of a lack of resources. As discussed by Hood et al,[70] racialized investigators are often under-cited and under-resourced due to structures within academia/biomedical research. Yet, they are most likely to conduct community-engaged research. An antiracism framework would provide more funding opportunities for community-engaged research and would encourage collaborations between investigators from larger institutions with (in the US) investigators from Historically Black Colleges and Universities, Hispanic-Serving Institutions, Tribal Colleges and Universities, and Asian American and Pacific Islander Serving Institutions in a shared principal investigator role. Further, an antiracism framework calls on investigators from WEIRD societies to collaborate with and value the perspectives of investigators from the Global South who can offer alternatives to Eurocentric perspectives. This effort would be facilitated by increased resources and funding opportunities to support cross-cultural collaborations (eg, International Association for the Study of Pain Collaborative Research Grants).

Antiracism Reframe 2: Adopt New Ideologies and Strategies to Promote Inclusion in Pain Research

For new data collection, investigators can prioritize partnering with stakeholders from racialized groups to inform the research question, methods, and dissemination approach. *Social location* is a concept associated with Critical Race Theory (see Morais et al[94] for background) that refers to an individual's or group's position in a social hierarchy based on dimensions of privilege and marginalization.[41] Metanarratives tend to be propagated by those with privileged social location; however, *centering in the margins* – or including the viewpoints of individuals with marginalized social location – can enrich metanarratives by balancing perspectives. The result is a research study grounded in scientific theory and evidence that is enriched by valuable perspectives from individuals' lived experiences.[127] We encourage all researchers committed to pain equity to partner with diverse community members to refine their research questions. Shifting to community-engaged research in the field of pain will have a universal benefit for the impact of our collective work. Strategies for partnering with stakeholders from racialized groups are described in Janevic et al[72] and Hood et al.[70]

For new or ongoing data collection, investigators can track the recruitment of individuals from racialized groups from the initial phone screen through the end of their participation in the research protocol, as well as collect qualitative data on individuals' experiences participating in the study. These data can determine the effectiveness of strategies in reaching racialized communities, identify where screening criteria might systematically exclude certain racialized groups, and uncover reasons for individuals' attrition. This information is often collected as part of the CONSORT approach[14] for reporting recruitment and retention in randomized controlled trials and could be advanced through an antiracism framework by tracking this information across all human participants research and detailing where bias arises. Publishing these data alongside primary outcomes will be valuable information for investigators planning future studies on a similar topic.

Further, the intended use of biospecimen/images, study objectives, risks, and benefits of participation for all clinical trials should be explicitly stated and translated for participants who are not fluent in the language used to communicate study information.[130] Transparency around biospecimen data collection and usage could be critically important for building and maintaining trust in the biomedical research process/investigators as well as reducing attrition among racialized groups that are already underrepresented and historically mistreated in biomedical research.

For completed data collection, it is strongly recommended that pain researchers report the study's composition of racialized groups in all associated publications. If the study aimed to produce results that are generalizable across a diverse sample, yet mainly enrolled NHW participants, an antiracism framework encourages researchers to 1) note that a key limitation is the study's risk of perpetuating pain inequities and 2) provide a reflective statement for how the team will incorporate greater diversity/inclusion in future projects. Further, given that studies conducted with a sample of participants with racialized identities are often expected by peer reviewers to report the sample's racialized group identity in the publication's title or abstract, studies conducted with a sample of NHW participants should do the same to model parity. Otherwise, this practice conveys that a study with NHW participants is the accepted "norm" and studies reporting on findings within racialized groups are a deviation.

Study Design Factor 3: Using "Race" as a Statistical Variable

Two prevailing notions on the design of pain studies are that 1) pain disparities are measured by comparing 1 or more racialized groups to a NHW group (primary independent variable), and 2) "race" should be controlled for in statistical models (statistical control). These notions run a conditional risk of producing research products that unintentionally harm racialized individuals without ample thought and discussion of what the outcomes of these tests might mean.

"Race" as a Primary Independent Variable

Studies using "race" as the primary independent variable are considered a traditional approach to pain disparities research. In WEIRD societies, traditional designs compare 1 or more racialized groups to a NHW group,

which is treated as a reference or accepted norm. There are several strengths to this approach: 1) it encourages inclusivity of racialized groups, 2) it elucidates where pain inequities exist and new inequities emerge, and 3) it builds from a rich literature foundation to track progress toward pain care equity. However, investigators should consider several inherent risk factors when applying this model, particularly when examining pain mechanisms.

First, although comparing groups is effective for highlighting *where* differences exist, it is less effective for explaining *why* and *how* they emerge. In a prevailing biomedical metanarrative, the implied reasoning is that group differences in pain are somehow innate.[105] Even when biopsychosocial factors are considered in tandem, another assumption is often that group differences result from behavioral choices without recognizing the constraints imposed by a history of systemic oppression.[119] An examination of *why* disparities in pain exist and *how* they persist necessitates awareness of a historical perspective[37] (see Morais et al[94]) as well as recognition of contemporary sociopolitical forces that maintain disparities in lived experience.

Second, the use of "race" as a primary independent variable has been a long-standing epistemological debate in the fields of epidemiology, nursing, psychology, and sociology,[55,74,95] among others. Our group is not the first to consider the limitations of using "race" in study designs and aims to bring the expert opinions of those scholars who have critically evaluated this approach to the field of pain. Some scholars in these fields have contested that using "race" as a primary independent variable frames research questions around its effects on outcome distributions[78] (eg, how does "race" impact pain mechanisms?). The scholars on this side of the debate have further noted that the logic that might stem from using "race" in certain statistical tests – particularly those with causal inference – is that this factor is a variable upon which to intervene.[78] They note that this logic is ordinarily not researchers' intent, and it is instead treated as an immutable factor and/or proxy measure of other explanatory variables,[20,71] such as experiences of discrimination, access to healthcare resources, or other social indicators. Consequently, some scholars have indicated that progress toward health equity would be facilitated by directly measuring the hypothesized explanatory variables among racialized participants.[20,73] Further, questions have been raised about how to best measure "race,"[31] and there has been debate on whether "race" should be considered as an immutable factor (ie, characteristic of the person) or a contextual factor in meaning/significance depending on the society in which the individual lives.[73]

Third, a NHW reference group in studies examining patterns of pain care can help identify areas in which racialized groups are inequitably treated. However, as emphasized by Booker et al[13] and Janevic et al,[72] the use of a NHW reference group can lead to study narratives that portray this group as the accepted "norm" and racialized groups as diverging from this norm (Table 2).

Fourth, dichotomizing groups restricts the examination of within-group heterogeneity[86] (also see Booker et al,[13] Janevic et al[72]). Research in the US often uses panethnic categories specified by the OMB, rather than allowing individuals to self-report their identity. Although there are some shared experiences among individuals with the same panethnic identity, there is also substantial heterogeneity that is missed when collapsing across subidentities.[59] For example, disaggregating panethnic categories shows unique patterns of disease morbidity and mortality based on factors such as country of origin and age of immigration to the US.[38,47,62,109]

"Race" as a Statistical Control

Another common use for "race" in statistical models is to apply this factor as a control variable to examine associations between another primary variable and the outcome of interest.[72] Scholars opine that "race" is a complex and ambiguous sociopolitical concept that lacks specificity.[76,103] Because investigators rarely justify which definition of "race" is used for deriving this variable, it is often unclear why the statistical adjustment is being made.[83] In other words, adjusting for "race" provides little insight into the role or meaning of this factor in the model and can lead to inappropriate conclusions.[77] Another disadvantage cited is that conceptualizing "race" as a confounder in the association between a factor and health outcome treats it as something to be discarded or discounted rather than explored to understand why this factor should be adjusted for in the first place.[73] Although adjusting for "race" is thought to be less problematic than using it as the primary independent variable, scholars note that specific explanatory variables may reduce bias in models more effectively than using "race" as a proxy for those factors.[78]

Antiracism Reframe 3: Measure Lived Experiences Pertinent to Racialized Individuals and Interpret Findings in this Context

Although there are limitations for the use of a traditional pain disparities design or statistically controlling for "race," research questions should always dictate study designs. For research seeking to examine inequities in pain referrals, assessment, and treatment, a traditional pain disparities design is imperative to track progress toward equitable pain care. The NHW group serves as a reference in this case because WEIRD societies are unjustly structured to benefit NHW individuals. Therefore, comparing racialized groups to a NHW reference group in a clinical context can highlight bias in pain care.

To adopt an antiracism reframe, investigators using a traditional disparities design can 1) discuss the rationale for using a NHW reference group, 2) measure and discuss proximal mediators contributing to inequities, and 3) hold oppressive systems accountable where inequities

Table 2. Example Scenarios for How to Apply Antiracism Reframes for Common Study Design Factors

Design factor	*Example scenario*	*Common approach*	*Antiracism approach*
Social Indicators of Pain	Previous work has robustly documented sleep as a predictor of pain outcomes. An investigator would like to ask a research question to better understand the mechanisms of this association.	Using a biomedical metanarrative, the investigator would ask, "What are the neural pathways and inflammatory mediators of this association?"	Using a biopsychosocial metanarrative, the investigator would ask, "Do social factors create conditions by which sleep is unjustly distributed across the population? If so, are there unique psychophysiological pathways by which sleep and pain are associated for individuals who systematically experience sleep disturbance due to certain social factors?"
Sample Diversity	After several months of recruitment, an investigator is concerned about the enrollment of mostly NHW participants in their study sample.	The investigator expresses a desire to have a diverse study sample. They explain, however, that racialized groups are "hard to reach" and "distrust" the medical system and continue with their current methods.	The investigator reflects on ways that their recruitment practices inadvertently exclude certain groups on a systematic basis, include and value coinvestigators with expertise in community-engaged research, and/or partner with racialized community members to implement new recruitment practices.
"Race" as a Statistical Variable	In seeking to understand children's pain coping styles, an investigator administers questionnaires to NHW and Black school-aged children on pain coping and quality of life.	The investigator finds that NHW children are enrolled in Cognitive-Behavioral Therapy at a higher rate than their Black peers, who tend to cope through prayer and community support. They interpret results as greater use of "active" coping strategies among NHW children and greater use of "passive" coping among Black children.	The investigator first conducts a qualitative study with Black children/families to identify themes around pain coping. They use this information in a larger follow-up study to quantitatively examine how these themes associate with children's use of coping strategies and quality of life. They do not label coping styles based on NHW American cultural values in their discussion of results.
Translation of Preclinical Science to Diverse Humans	An investigator seeks to use a mouse model to examine and validate a therapeutic target for an analgesic	The investigator examines this therapeutic target for an analgesic across a strain of mice that have developed under the same living conditions.	The investigator appreciates that systemic racism causes unique developmental conditions and aims to model these conditions so that not all mice in their sample are raised equitably. They then examine whether the therapeutic target and analgesic has unique mechanisms of action or efficacy based on these disparate conditions.

Abbreviation: NHW, Non-Hispanic White.

are identified. Studies statistically adjusting for "race" can be intentional about using this variable by explaining how it is expected to associate with the study's primary variables and whether it is serving as a proxy for other unmeasured variables.[83]

A traditional pain disparities design runs a conditionally higher risk of harming racialized groups when examining pain mechanisms. This is *not* to say that all mechanistic work using a traditional disparities approach has been or will be harmful; in fact, much valuable work has been done to disprove myths about lower pain sensitivity that were used to justify the enslavement of Black individuals in the US.[61] Traditional pain disparities designs have also helped highlight where group differences might warrant further exploration. However, an antiracism framework advocates for 1) extra care and self-reflection on biases in interpreting why groups are being compared in the first place and what observed differences might mean and 2) framing research questions around root causes of racialized disparities rather than simply continuing to document where disparities exist.

In an influential paper, Plaut (2010)[105] defines *diversity science* as the study of the dynamic process by which observed group differences are constructed, interpreted, and rerepresented across structures, institutions, and cultural understanding. Applying an antiracism, diversity science approach to pain would include a shift from assumptions based on group averages toward an interest in variability. To create this shift, pain researchers can consider the diversity of identities, lived experiences, contexts, and histories that differentially influence pain. In the supplementary materials, Table S1 provides numerous examples of lived experiences that can be examined in pain research to help us move beyond a NHW lens (eg, familism, racism-related stress, discrimination, measures of structural racism). We do not intend for every researcher to include measures of all examples listed in the table in their studies; choosing explanatory factors to include in a study is best done with input from stakeholders from racialized groups. However, we provide an extensive list of potential explanatory variables that, to date, have seldom been considered in pain research.

Table 3. "Race" and Ethnicity Category Data in Pain-Related Topics From the Publicly Available National Institutes of Health Research, Condition, and Disease Categories Inclusion Statistics Report

		Median % across study samples									
		US Office of Management and Budget Categories*									
RCDC	Total participants across studies	American Indian, Alaska native	Asian	Native Hawaiian, OPI	Black, African American	>1 "Race"	White	UK, UR	Hispanic, Latino	Not Hispanic, Latino	UK, UR
Arthritis	36,146	<1%	<1%	<1%	7%	<1%	72%	<1%	2%	93%	<1%
Back Pain	1,518	<1%	5%	<1%	16%	<1%	63%	2%	8%	88%	<1%
Chronic Pain	147,997	<1%	1%	<1%	11%	<1%	72%	<1%	5%	93%	<1%
Fibromyalgia	1,500	<1%	<1%	<1%	5%	<1%	89%	3%	3%	94%	<1%
Headaches	1,659	<1%	6%	<1%	7%	3%	80%	1%	6%	90%	<1%
Migraines	1,182	<1%	9%	<1%	6%	3%	77%	2%	6%	90%	<1%
Neck Pain	30	7%	7%	3%	10%	<1%	73%	<1%	13%	87%	<1%
Neurosciences	1,217,529	<1%	2%	<1%	8%	<1%	70%	<1%	5%	92%	<1%
Opioid Misuse and Addiction	26,421	<1%	<1%	<1%	13%	1%	67%	<1%	4%	94%	<1%
Osteoarthritis	25,837	<1%	<1%	<1%	11%	<1%	74%	<1%	1%	98%	<1%
Pain Research	180,452	<1%	<1%	<1%	11%	<1%	71%	<1%	4%	94%	<1%
Rheumatoid Arthritis	9,529	<1%	2%	<1%	7%	<1%	69%	6%	7%	85%	<1%
TMJD	1,147	<1%	5%	<1%	5%	5%	82%	<1%	7%	91%	<1%

Abbreviations: RCDC, Research, Condition, and Disease Categories; OPI, Other Pacific Islander; UK, UR, Unknown, Unreported; TMJD, Temporomandibular Muscle/Joint Disorder.
*Specific category names (eg, "Hispanic, Latino," "Other Pacific Islander") are shown as they appear in the online RCDC tables and do not reflect the ACTION-PR's choices.

This process would be further facilitated by underused research approaches in this area, including qualitative/mixed methods and statistical models that account for racism at multiple levels. Qualitative and mixed-methods approaches align with an antiracism framework when centering the voices of racialized individuals living with pain. However, a study does not need to include qualitative or mixed-methods to be conducted in the spirit of antiracism. Further, preclinical and clinical researchers who acknowledge the lens through which they view their work – a practice often used in qualitative/mixed-methods studies – can help readers understand factors that shaped the authors' interpretation of their work. Another area of growth is for the field to examine how racism at micro-, meso-, and macro-levels impacts pain experiences, which will help identify areas where intervention might be most critical (see Sewell for additional explanation on multilevel statistical models to understand the impact of racism on racialized health disparities[123]). Additional methods to expand beyond a traditional disparities approach are discussed by Stewart and Sewell.[122]

In these updated approaches, the location of the "problem" or "vulnerability" shifts away from an individual (ie, biology and individual choice) to upstream causes at the level of society and structures. Instead of asking, "how does '*race*' associate with pain outcomes?" an antiracism reframe asks, "how does *racism (or other lived experience)* associate with pain outcomes among racialized individuals?"[24] Thirty years ago, David and colleagues[27] understood this difference and called for a shift in focus from "*race" to racism* to improve perinatal outcomes, which was ultimately not sufficiently answered by the field. Substantial time and resources have since been invested to continue documenting dangerously high preterm birth and infant mortality rates for Black newborns that have persisted since the Jim Crow era[32]; however, limited progress has been made in moving beyond group comparisons to address the mechanisms that perpetuate racialized disparities.

To illustrate this shift in study design related to pain, we reanalyzed our (Letzen, CM Campbell) published data reporting differences between healthy Black and NHW adults in μ-opioid receptor binding potential during the experience of noxious stimuli.[85] Although this project was one of the first to examine physiological pathways of heightened pain sensitivity (on average) among Black adults, it could not identify why differences emerged (ie, "the causes of the causes") Fig 2A shows part of the original group comparison on mean μ-opioid receptor binding potential values in the ventral striatum, a region associated with discrimination in the context of racialized pain disparities.[87] On average, binding potential in the bilateral ventral striatum was greater among Black adults. Using an antiracism reframe in the present article, we reanalyzed these data to examine the association between μ-opioid receptor binding potential and severity of experienced ethnic discrimination and social exclusion (Fig 2B). In reflecting on how we wanted to approach this reanalysis, we chose to examine data across the sample, rather than use participants' reported "race" as a moderator; however, this is just 1 way that an antiracism reframe could have been applied to these data. We found significant, positive associations between binding potential values with experienced ethnic discrimination ($r = .30$, $P = .04$) and

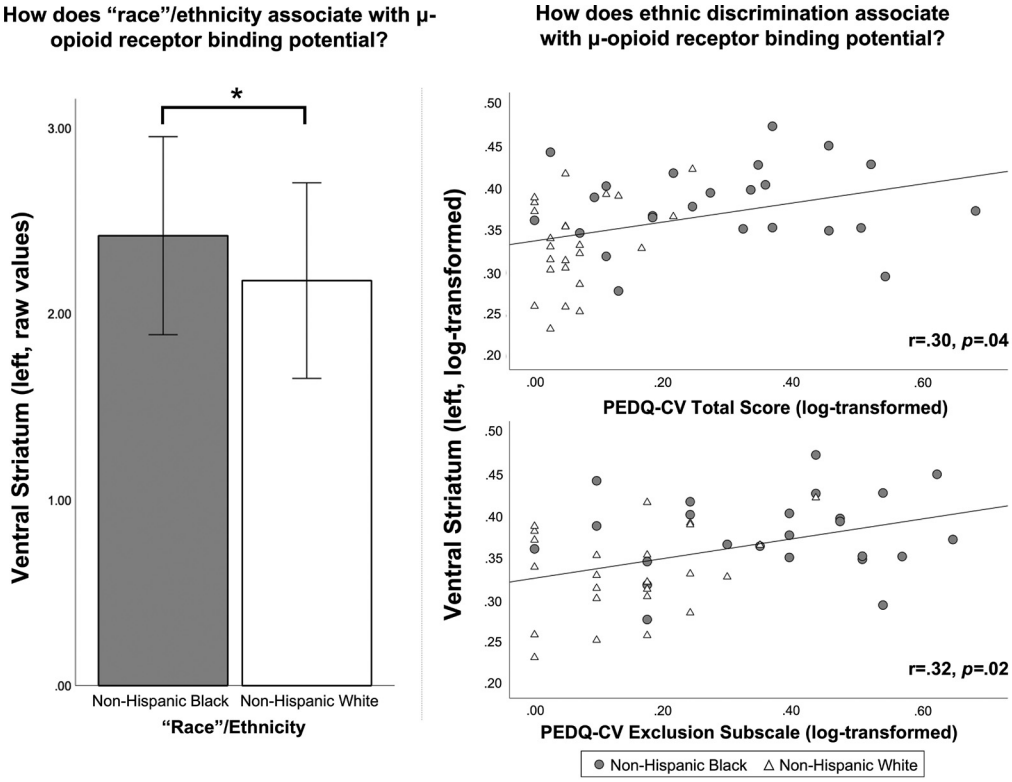

Figure 2. Example of an antiracism reframe from a traditional pain disparities framework (A) to a measure of lived experience (B).

social exclusion (r = .32, *P* = .02). This antiracism reframe highlights that discrimination/social exclusion is associated with pain-related neurophysiology, considers a lived experience that is particularly salient to Black individuals living in a racist society, elucidates a mechanism from social experience to physiology, and identifies discrimination/social exclusion as potential intervention targets to reduce the disparate burden on pain-related neurophysiology.

Our suggestion to incorporate this particular reframe in the field of pain is *not* a recommendation to abolish the exploration of racialized differences in pain. Assuming parity between NHW and racialized groups where disparities exist risks maintaining pain inequities. Instead, it emphasizes the importance of self-reflection, cultural humility, and consultation with stakeholders in deciding whether to compare groups, intentionality in the use of "race" as a statistical variable, and consideration of lived experiences that will enhance interpretation of findings from a social contextual perspective as well as lead to more effective and relevant pain interventions for racialized groups. Further, given measurement issues with the construct of "race" (see Ross et al,[116] for recommendations on how to measure and report identity in health research), measuring lived experiences has the potential to lead to more tangible solutions to address health inequities.

By considering social indicators or developing pain treatments that include the needs of racialized groups, we do not advocate for race-based medicine that relies on a patient's skin tone to make clinical decisions. Rather, we advocate for an improved understanding of the embodiment of systemic oppression on pain physiology and the recognition of multicultural pain expressions. There is an ethical and professional need to develop pain treatments that lead to pain care equity.[96,102,115] The development of analgesics and non-pharmacological therapies within contexts that consider, and are not blind too, the reality of racialized differences in lived experiences will likely accelerate progress toward equity.

Study Design Factor 4: Preclinical Studies Rarely Model the Effects of Social Factors on Pain Physiology

The T0/T1 phases of translational research are critical to the development of novel analgesic therapies because of their focus on biomarker discovery, assay development, and rigorous validation of targets in preclinical (animal) models and humans.[28,82] Although preclinical models rarely focus on how social indicators contribute to pain and analgesia, they offer opportunities to investigate the impact of these indicators on specific cellular and molecular mechanisms with a level of precision that cannot be achieved in human studies.[64] In our review of preclinical pain studies, we found few that focused on social mechanisms and were not able to find *any* studies that have modeled the effects of racism-related stress on pain physiology.

Racism-related stress is multidimensional and differs from other forms of stress. It includes: 1) racism-related life events (ie, salient racist acts that an individual has experienced), 2) racism microaggressions (ie, insidious racist acts that occur on a more frequent basis), 3) vicarious racism (ie, the observation of racist events

impacting members of one's racialized group; eg, a Black child observing police brutality against a Black adult), 4) collective experiences of racism (ie, knowledge of racist events that happened to members of one's racialized group; eg, Japanese internment camps in the US), 5) intergenerational trauma (ie, emotional and behavioral responses to a traumatic event among the descendants of an individual who experienced the event), 6) social role demands and the need to adapt to White or dominant group society, and 7) structural/institutional racism's impact on living conditions, access to resources, and opportunities.[66] Finally, unlike some other forms of stress, the impact of racism-related stress occurs across the lifespan.

The paucity of research on preclinical modeling of racism-related stress and other social indicators indicates that it will be important to develop best practices for preclinical studies using an antiracism framework, if these studies are to be used as predictive models of diverse human pain experiences. As noted in Morais et al,[94] a limitation of the ACTION-PR is that our group includes mostly clinical researchers and the perspectives of 1 translational science researcher (E.M.) and 1 preclinical science researcher (M.B.). Understanding this limitation, we highly encourage preclinical researchers to similarly organize, gather, and brainstorm ways to best model experiences of racism-related stress and other social indicators that lead to inequitable pain experiences, and disseminate these recommendations to the pain field. Moreover, adopting these frameworks could foster earlier engagement with clinical, population health, and implementation science researchers at these critical phases of biomarker identification and therapeutic development. Although adopting new frameworks in established research practices can be challenging, it is not unattainable. As described in the introduction, advocacy for the consideration of sex as a biological variable, for example, has led to the inclusion of female animals in basic science and, in turn, improved the generalizability of findings.[84]

Antiracism Reframe 4: Develop Translational Research Models for the Impact of Social Indicators on Physiological Pain Processes

We encourage preclinical researchers to consider how to model constructs of racism-related stress – similar to how they have risen to the challenge of modeling other aspects of human behaviors, cognitive processes, and conditions – and other social indicators. With innovations in paradigm design and animal strain type, this information would help us understand how a systematically added burden of oppression across the lifespan impacts pain, nocifensive behaviors, and/or a candidate analgesic's mechanism of action. It could also more precisely identify neuronal, epigenetic, and cellular pathways that predict susceptibility or resilience to chronic pain across diverse humans. Effective modeling of racism-related stress, in particular, might require a combination of paradigms that manipulate interactions and environmental conditions across the lifespan. Below are examples of existing models that might act as analogues for isolated aspects of racism-related stress that can be combined to emulate the multidimensional impact of racism-related stress. We hope these examples will spark discussions among preclinical researchers and lead to the development of translational pain research using an antiracism framework (Fig 3).

As an analog to racism-related life events and racism microaggressions, interpersonal social stressors can be

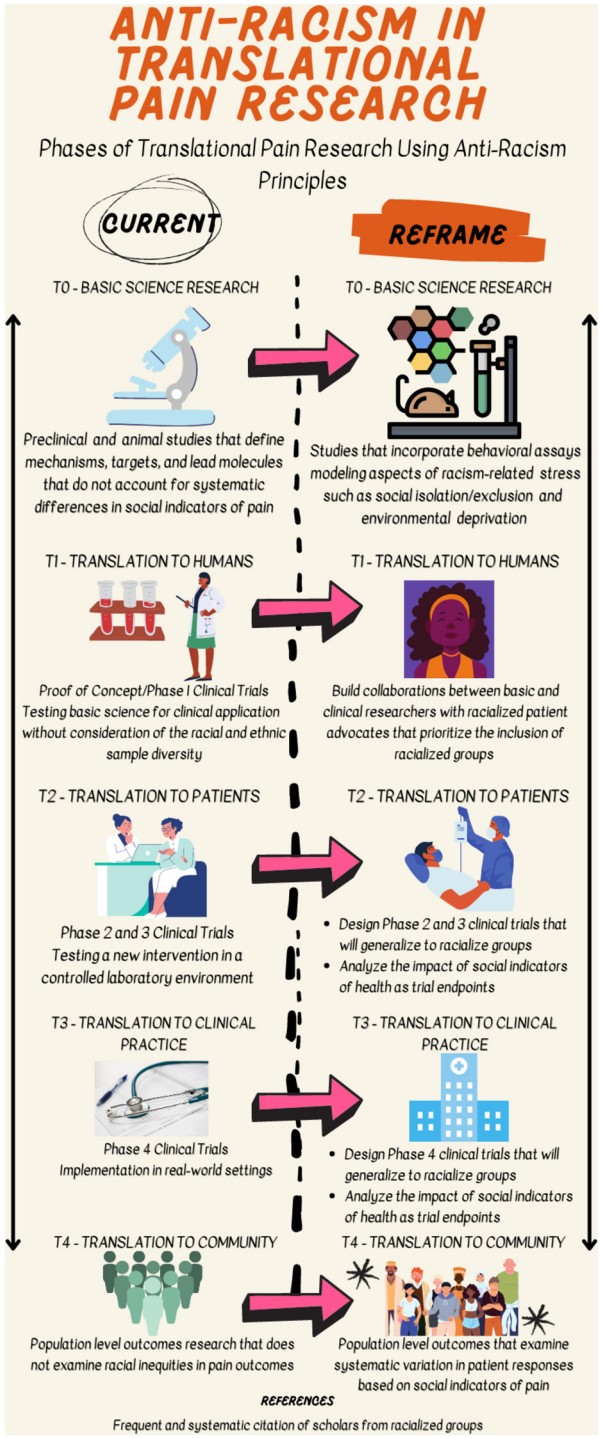

Figure 3. Integration of antiracism practices in translational research.

modeled. Examples of approaches to model such stressors include repeated social defeat stress, chronic social subordination stress, maternal separation, neonatal isolation, and manipulations in postweaning housing conditions.[26,56,97] Further, given that certain racialized groups are over 3 times more likely to be in solitary confinement when incarcerated in the US[117] (and are incarcerated at a systematically higher rate due to discriminatory policing), understanding pain responses among single-housed animals as an analog for solitary confinement could highlight pain mechanisms under unmet needs for social contact. Vicarious and intergenerational social stressors have been modeled using vicarious social defeat stress[124] and predator stress during pregnancy to examine epigenetics.[8,9] Inequities in living conditions caused by structural racism can be modeled with manipulations such as fasting or nutrition deprivation, enriched versus deprived housing,[2] and single versus multianimal housing.[48] Environmental toxins, another aspect of structural racism, can also be introduced at systematically different rates into the animals' environments to determine their impact on pain physiology and analgesic responses.[53] Finally, resilience factors, such as social support, can be modeled using conspecific pairings prior to or during a manipulation.[46]

Because racism-related stress is chronic, paradigms might be most impactful when conducted repeatedly rather than acutely. Where appropriate, they should also be administered across development (see Lupien et al[89] for a review on animal models of stress from a lifespan perspective) and can be used to determine how changes in these factors over a lifespan influence pain pathways. For example, animal models can help us better understand how having adverse childhood experiences might increase chronic pain risk and/or prosocial support later in development can change the course of symptoms.

Although racialized identity is a sociopolitical construct, an antiracism framework acknowledges that there is genetic variability across humans based on ancestry. Seeking to understand how pain mechanisms and candidate analgesics function while considering genetic variability will inform whether to anticipate select or widespread translation of findings and will have a universal benefit. A fundamental aspect of preclinical experimental design is to determine the animals' inbred (similarity in responses) or outbred (genetic variability) strain type. Typically, C57 black background animals are considered the "gold standard" because of their inbred nature, low variability in behavioral output, and responses to various stimuli like alcohol and a high-fat diet. However, there is a debate that outbred animals have a variable genetic background that is more analogous to humans. Determining whether to use similar inbred animals versus more variable outbred animals has implications for the genetic diversity of translational research samples; it *cannot and should not* be used, however, to make conclusions about specific groups of people based on "race" or ethnicity.

This reframe can be considered even after therapeutic targets and the uptake of analgesic therapies or other therapeutic interventions have been established. This allows for bidirectional approaches to the refinement of therapeutic targets, dosing, or mode of administration from the preclinical level to diverse humans at the population level. This approach could spawn much needed collaboration between diverse people with lived experience of pain and preclinical, clinical, and population health researchers.

Table 4. Reflection Questions for the Research Process to Encourage Antiracism in Pain Research Practices

Design factors	*Investigator self-reflection questions*
Social Indicators of Pain	• Does the study contribute to a biomedical metanarrative of pain more so than a biopsychosocial metanarrative? • Do societal inequities mediate or moderate the associations among the research question's biomedical or psychological variables?
Sample Diversity	• Does the research question consider the needs of racialized individuals living with pain? • Have diverse stakeholders been consulted in forming the research question, recruitment strategies, and dissemination of results? • Is there a collaborator with expertise in community-engaged research who can be included on the project? Will this collaborator be appropriately compensated? • Has the investigative team participated in training in antiracism, cultural humility, and multiculturalism?
"Race" as a Statistical Variable	• If "race" is hypothesized as a proxy measure for a set of lived experiences, is it possible to directly measure and test those experiences instead? Have the limitations of using "race" as a proxy for lived experiences been discussed in the scientific narrative? • Has "race" been described in the scientific narrative as a sociopolitical construct? • If comparing groups, what is the rationale for this comparison? Is 1 group treated as the reference/norm? • Has there been an attempt to ask about cultural/national identity within panethnic categories?
Translation of Preclinical Basic Science to Diverse Humans	• Do behavioral assays used in the study account for the diversity of lived experiences based on social indicators? Are social indicators used as explanatory variables? • Is biological data appropriately integrated or harmonized with measures of the lived experiences in human participants? • Do AI algorithms for prediction models and complex statistical analyses incorporate social indicators? • Is there genetic diversity among the animals being used in the study? If not, has the scientific narrative discussed how this factor might limit the findings' generalization across genetic ancestries?

Conclusions

The fundamental goal of pain research is to reduce the burden of pain and enhance individuals' wellbeing. Although our field's intent is to apply this goal across individuals of diverse backgrounds, our study design choices can impact how well this goal is met. Shifting the field of pain toward antiracism research practices will work toward the elimination of long-standing inequities for racialized groups in pain care and create true strides toward equity. As discussed in Part 1 of this series (Morais et al[94]), investigators should strive to build cultural humility to engender self-awareness of the impact of their study design choices as a foundational step toward antiracism in pain research. Table 4 provides self-reflection questions to facilitate the latter process. As discussed in Part 3 of this series (Hood et al[70]), engaging with racialized communities as research partners, diversifying research environments, and expanding dissemination approaches will further progress the field toward this goal. Ongoing discussions about the effectiveness of these proposed antiracism reframes in attaining equity for racialized groups in pain care is encouraged.

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Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jpain.2022.01.010.

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