**LIVING WITH TRAUMA:**
**A MULTIMETHOD STUDY OF POSTTRAUMATIC STRESS, HIV RISK, & RESILIENCE**
**AMONG CISGENDER SEXUAL MINORITY MEN IN THE UNITED STATES**


**by**
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**DISSERTATION ABSTRACT**

**Background**

Cisgender sexual minority men (SMM) in the United States (US) are disproportionately burdened by trauma and posttraumatic stress disorder (PTSD). Limited but growing research has linked PTSD symptoms to sexual risk behaviors among SMM but minimally accounted for PTSD symptomology's heterogeneity. Moreover, resilience processes in response to trauma remain poorly understood and understudied among SMM. This dissertation aimed to identify latent classes of posttraumatic stress symptoms, assess associations between class membership and serodiscordant condomless anal sex, and explore trauma's impact and associated resilience processes among SMM.

**Methods**

Trauma-exposed SMM's responses (6,319/11,069) to a PTSD symptom scale in the American Men's Internet Survey were subjected to latent class analysis; latent classes were then regressed on sociodemographic and other variables. In a subsample of non-Hispanic Black and white SMM (N=4,286), associations between latent classes and serodiscordant condomless anal sex were determined via the manual three-step Bolck, Croon, and Hagenaars method; moderation by race and social cohesion was also examined. An interpretative phenomenological analysis (IPA) approach with multiple in-depth interviews and photo/image-elicitation was used to explore trauma's impact and resilience processes among Black SMM (N=9).

**Results**

Four latent classes of posttraumatic stress symptoms emerged: "Intrusive-Avoidant"; "Dysphoric-Inattentive"; "Pervasive"; and "Resistant." Relative to white participants, non-Hispanic Black participants were overrepresented in the Intrusive-Avoidant class. Relative to HIV-negative participants, those living with HIV were overrepresented in the Pervasive class.

Higher prevalence of serodiscordant condomless anal sex was associated with Pervasive and Dysphoric-Inattentive class membership relative to Resistant class membership, as was higher prevalence of serodiscordant condomless anal sex with a high-risk partner. There were no significant moderation effects. Black SMM perceived trauma as transformative, experiencing a sense of depletion/disconnection, encumbrance/fixation, and pain/turmoil. Participants overcame trauma's impact via resilience processes involving purpose-giving/meaning-making, restoring self-worth/belief in goodness in the world, and reconstituting/cultivating self.

**Conclusions**

Posttraumatic stress symptoms emerge in diverse patterns among trauma-exposed SMM in the US, necessitating nuanced assessment and intervention approaches. As patterns are differentially linked to HIV transmission risk behaviors, integrated trauma-focused, sexual risk-reduction interventions tailored to each pattern may be warranted. Engaging Black SMM and leveraging their inherent resilience may improve psychosocial wellness.

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"I won't tell you that the world matters nothing, or the world's voice, or the voice of society. They matter a good deal. They matter far too much. But there are moments when one has to choose between living one's own life, fully, entirely, completely – or dragging out some false, shallow, degrading existence that the world in its hypocrisy demands. You have that moment now. Choose!" - Lord Darlington, in Oscar Wilde's *Lady Windermere's Fan: A Play about a Good Woman*

"[A] real decision makes one humble, one knows that it is at the mercy of more things than can be named.... This is certainly what my decision...came to. I had decided to allow no room in the universe for something which shamed and frightened me. I succeeded very well – by not looking at the universe, by not looking at myself, by remaining, in effect, in constant motion." - David, in James Baldwin's *Giovanni's Room*

"So what can we really do for each other except – just love each other and be each other's witness? And haven't we got the right to hope – for more? So that we can really stretch into whoever we really are?" - Vivaldo, in James Baldwin's *Another Country*

"Have patience with everything that remains unsolved in your heart. Try to love the questions themselves, like locked rooms and like books written in a foreign language. Do not now look for the answers. They cannot now be given to you because you could not live them. It is a question of experiencing everything. At present you need to live the question. Perhaps you will gradually, without even noticing it, find yourself experiencing the answer, some distant day." - Rainer Maria Rilke, *Letters to a Young Poet*

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# INTRODUCTION

## Terms and definitions

In this dissertation, *trauma* denotes an adverse event (e.g., witnessing death/murder, being assaulted, being diagnosed with a serious medical condition).[1,2] *Posttraumatic stress disorder* and *PTSD* refer to the disorder described in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).[2] PTSD diagnosis requires exposure to a trauma and the experience or significant exacerbation of several symptoms as a result of such an exposure. One must experience at least two Intrusion symptoms (e.g., intrusive thoughts or memories of the trauma; psychological distress due to trauma reminders), at least one Avoidance symptom (e.g., effortful avoidance of trauma reminders), at least two Negative Cognitions and Mood symptoms (e.g., negative beliefs about oneself, others, the world; inability to experience positive emotions), and at least two Arousal and Reactivity symptoms (e.g., hypervigilance; problems with concentration).[2] Symptoms must persist for at least one month, cause substantial impairment in functioning (e.g., social, occupational, other), and not be due to substance use, medication, or another medical condition. Terms such as *posttraumatic stress symptoms* and *PTSD symptoms* (and their derivations, e.g., *symptomology* instead of *symptoms*) denote these DSM-5 symptoms that result from trauma exposure, but do not imply presence of the disorder. These terms are very minimally and very selectively used in manuscript three, which was focused on participant perceptions and experiences of the effects of trauma exposure rather than the specific PTSD symptoms defined in DSM-5.

## Background

Both explicitly and implicitly, trauma and its impact are increasingly recognized as pertinent health issues and major drivers of health disparities faced by sexual and gender minorities. Objectives outlined in *Healthy People 2030* include a reduction in the bullying (i.e., a

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trauma) of sexual and gender minority high school students, as well as a reduction in illicit drug use and suicidal ideation (i.e., common consequences of trauma exposure and PTSD[3-7]) by sexual and gender minority high school students.[8] The National Academies of Sciences, Engineering, and Medicine's recent report, *Understanding the Well-Being of LGBTQI+ Populations*, not only mentioned trauma (or some derivation thereof) 37 times,[9] a more than threefold increase from that of the Institute of Medicine's 2011 report *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding*,[10] but also stated:

> *The physical and mental health disparities experienced by sexual and gender diverse [SGD] populations...are driven by experiences of minority stress, which include both structural and interpersonal stigma, prejudice, discrimination, violence, and trauma....*

Trauma may be particularly consequential for cisgender sexual minority men (SMM), as they are disproportionately burdened by trauma exposure. SMM are more likely to have experienced childhood abuse,[11-15] school-based/peer victimization,[16] intimate partner violence,[11,13,15,17,18] community violence/crime,[11,13,15] and a variety of other traumas relative to heterosexual men.[11] SMM are also disproportionately burdened by PTSD. Specifically, limited population-level research has shown that gay men and heterosexual men with same-sex partners have at least more than twice the PTSD prevalence of heterosexual men without same-sex attraction or partners (13.4% and 10.1% versus 5.0%, respectively), while bisexual men have nearly twice the prevalence (9.0% versus 5.0%).[11] Studies with community samples of SMM without a heterosexual comparison group have found PTSD prevalence as high as 60%.[19] Such disparities in PTSD are understandable, given that trauma involving interpersonal violence – which comprise the majority of disproportionate trauma exposures faced by SMM – have the highest conditional risk for the development of PTSD.[20]

While PTSD-specific disparities exist, PTSD could also drive additional disparities in health and other domains of functioning. For example, PTSD may lead to substance use disorders and secondary mental disorders such as depression and anxiety, as well as suicidality.[5-7] PTSD has also been linked to poorer physical health, including somatic symptoms, chronic pain and other chronic medical conditions, and cardiorespiratory and gastrointestinal problems, as well as reduced health-related quality of life.[21] PTSD is associated with higher unemployment and missed work days, totaling several billion dollars of lost productivity per year.[7,22] Though these potential consequences of PTSD have not been examined specifically among SMM, the already-established disproportionate burdens of trauma exposure and PTSD among SMM, as well as the numerous well-documented health disparities faced by SMM,[23,24] would suggest that PTSD may certainly play a contributing role.

**Problem statement**

One particular health disparity faced by SMM that has been investigated and connected to PTSD is HIV infection. For four decades, SMM have borne a disproportionate burden of HIV in the United States.[25-28] Data from the Centers for Disease Control and Prevention indicate that 69% of new HIV diagnoses in 2018 were among SMM.[28] Of these, 37% were among Black SMM, 30% were among Hispanic/Latino SMM, and 27% were among white SMM; nearly 60% were among SMM aged 13 to 34 years.[28] SMM comprise roughly two thirds of people living with HIV (PLHIV), and of these, less than 60% were virally suppressed at the end of 2016.[28]

Among the psychosocial factors potentially contributing to HIV-related disparities, depression and substance use have been the most commonly examined.[29-33] Other contributing factors, such as PTSD, continue to be underemphasized in research, despite a rich literature indicating its potential role in HIV-related outcomes. The majority of the evidence for this

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potential role of PTSD comes from work examining trauma exposure, the antecedent to PTSD, and its relationship to HIV-related outcomes among SMM. Specifically, trauma exposure has been linked to incident HIV infection[14,34,35] and positive HIV status,[36-43] condomless anal sex,[36,43-49] serodiscordant condomless anal sex,[38,41,42,49-52] and sex under the influence of drugs or alcohol.[51,53,54] Trauma exposures in this literature spanned childhood abuses, intimate partner violence, sexual assault, and death and bereavement. Trauma exposure is generally not in and of itself the cause of incident HIV infection or engagement in HIV transmission risk behavior; there are likely a number of pathways and mechanisms in operation to shape these outcomes, one of them being PTSD.

Some of the earliest work to suggest a link between PTSD and HIV-related outcomes among SMM was conducted in the last 10-15 years. Reisner and colleagues (2011) analyzed population-based data collected via probability sampling from 13,274 racially/ethnically diverse adult men (3.9% of whom were SMM) participating in the National Epidemiologic Survey on Alcohol and Related Conditions. SMM with a greater number of violence events (e.g., physical, sexual, verbal abuse; neglect; witnessed parental violence) in early life were more likely to report past-year incident HIV infection, and PTSD (modeled dichotomously) was found to partially mediate the association between early life exposure to violent events and past-year incident HIV infection.[35] Though the association between PTSD and incident HIV infection among SMM was not directly examined (or at least reported), the above findings certainly suggest a likely link.

Other research has examined PTSD and HIV-related outcomes more directly. Reisner and colleagues (2009) analyzed data collected via convenience and respondent-driven sampling methods from 189 racially/ethnically diverse adult SMM of mixed serostatus who had recently presented at a community health clinic for sexual health testing, or who were part of the social

network of those individuals presenting for testing, in the Boston, Massachusetts, area. The researchers found PTSD to be associated with past-month unprotected anal sex (the term *condomless anal sex* emerged later, after the development and roll-out of HIV pre-exposure prophylaxis [PrEP]).[19] Radcliffe and colleagues (2010) analyzed data collected via convenience sampling methods from 40 adolescent (ages 16-24) Black SMM living with HIV who were patients in a hospital-based HIV care clinic. The researchers found that higher levels of PTSD symptoms (analyzed continuously) were associated with increased frequency of past-month condomless sex.[55] Glover and colleagues (2013) analyzed data collected via convenience sampling methods from 99 Black adult SMM living with HIV in the local Los Angeles County community and found PTSD (modeled dichotomously) to be associated with a greater number of sex partners and with unprotected sex.[56] O'Cleirigh and colleagues (2013) analyzed data collected via convenience sampling methods from 503 racially/ethnically diverse adult SMM living with HIV attending a community health center in the Boston, Massachusetts, area who expressed interest in participating in research. While there was no main effect of PTSD (modeled dichotomously) on serodiscordant unprotected anal sex in the previous three months, a moderation-by-age analysis revealed an association among those under 30 years of age, but not those 30 years of age or older.[57]

Burnham and colleagues (2016) analyzed data collected via online and offline convenience sampling methods from 142 racially/ethnically diverse adult SMM living with HIV. The researchers found an indirect but no direct effect of PTSD (modeled dichotomously) on serodiscordant condomless anal sex, mediated through internalized HIV stigma.[58] Batchelder and colleagues (2017) analyzed data collected via convenience sampling methods from 290 racially/ethnically diverse adult SMM living without HIV in the local communities of Boston,

Massachusetts, and Miami, Florida. There was no main effect of PTSD symptom severity (modeled continuously) on serodiscordant condomless sex in the past three months. However, moderation analyses did reveal an association among those without substance dependence; among those with high self-esteem; and among those with high and low distress tolerance.[59]

Notably, two studies employed techniques reflective of less traditional analytic approaches to PTSD. In the Radcliffe et al. (2010) study mentioned previously, in addition to examining overall PTSD levels, researchers examined PTSD subscales (i.e., symptom clusters of PTSD), finding that intrusive and arousal symptom subscales (akin to the intrusive and arousal/reactivity symptom clusters) were associated with recent condomless anal sex, and that the arousal symptom subscale was associated with substance use just prior to sex.[55] Choi and colleagues analyzed data from 296 racially/ethnically diverse adult SMM living without HIV who were sampled using convenience sampling methods in the local community of Boston, Massachusetts. Employing network analysis, the researchers demonstrated that two PTSD symptoms – cognitive avoidance (i.e., avoidance of thoughts, feelings, and memories related to past trauma exposure) and emotional numbing (i.e., inability to feel emotions) – were associated with greater frequency of condomless anal sex with a serodiscordant or status-unknown partner in the past three months. Fearfulness, which was considered a depressive symptom in this study though it is also a symptom of PTSD, was similarly associated with the outcome.[60]

Limitations of this body of work are evident. Most studies have been restricted to a handful of coastal urban areas, utilized convenience sampling methods (some of which were confined to clinical settings), and recruited small sample sizes of participants. Additionally, with the exception of the Radcliffe[55] and Choi[60] studies discussed above, scholarship has yet to move beyond the examination of associations between PTSD at the diagnostic level (modeled

dichotomously) or the nondescript numerical level (modeled continuously) and HIV-related

outcomes. In their article "Mental Health in 2020 for Men who have Sex with Men in the United

States," Batchelder and colleagues recognized the need for advancing this area of research:

> The relationship between trauma history and engagement in sexual risk among
> [SMM] with and at risk for HIV is complex, and various psychological pathways
> have been proposed.... It is likely that trauma interferes with various
> psychological and social factors relating to health-promoting behaviors, and will
> continue to interfere with the health of [SMM] through 2020. We are hopeful that
> these relationships will be further delineated in the coming years in order to more
> effectively intervene on these pathways....[61]

Further delineation of these relationships could be achieved by reconceptualizing PTSD,

including its classification, measurement, and analysis. Notably, in its *Strategic Plan for

Research Domain Criteria*, the National Institute of Mental Health (NIMH) called for

reconceptualizing the classification of mental illnesses,[62] signaling an institutional response to

the decades-long criticisms of the arbitrary nature of many DSM-5 criteria and thresholds,

including criticisms pertaining to PTSD.[62-66] One of the core components of the plan involved

the application of a more dimensional approach to psychopathology, investigating its "full range

of variation," setting aside bias-prone thresholds and cut-points, and utilizing data-driven

approaches, all to enhance research- and practice-related decision-making.[62] A dimensional

approach could involve (a) attention to specific symptoms of mental illness rather than disorders,

setting aside the assumption that only psychopathology at the level of the disorder is relevant for

investigation,[67] and (b) the identification and examination of unique patterns of symptoms

typically associated with a disorder.[68]

Each of these approaches is particularly relevant for measuring PTSD symptoms, as

traditional approaches (i.e., variable-centered approaches, continuous measurement and summed

scores, PTSD/no PTSD) unavoidably mask the inherent diversity and heterogeneity of PTSD

symptomology, which is characterized by 20 symptoms represented across 4 symptom clusters. In fact, numerous symptom presentations are possible while still meeting PTSD diagnostic criteria,[69,70] as are symptom presentations for subthreshold PTSD,[63,71-73] which have also been shown to impact health and functioning.[65,74-77] Taken together, a more flexible, nuanced approach to investigating posttraumatic stress symptoms among SMM is warranted. Such an approach may help delineate further the relationship between PTSD symptomology and sexual risk behavior among SMM.

*Resilience*

Related to issues on trauma and posttraumatic stress symptoms is the concept of resilience, defined as "the process of overcoming the negative effects of risk exposure, coping successfully with traumatic experiences, and avoiding the negative trajectories associated with risk."[78] This definition reflects core components of popular resilience theory: positive adaptation in spite of adversity and risk; and resilience's processual nature.[79,80] In line with calls from other scholars on the need for more research on resilience and in recognition of its untapped capacity in intervention work with SMM,[79,80] the National Academies of Sciences, Engineering, and Medicine's recent report, *Understanding the Well-Being of LGBTQI+ Populations,* noted that "more research is needed to elucidate...the factors that support resilience among SGD populations...[and] to identify effective interventions to promote SGD population resilience."[10] Qualitative research may be particularly effective in helping elucidate such factors, given the opportunity for richness and depth. Elucidating such factors is particularly relevant for Black SMM, who, in addition to contending with traumas that are inherent to all life experience, must also contend with systemic racism and associated structural trauma, as well as intersecting stigmas related to both sexuality and race.

Though the literature remains sparse,[80] some notable work on resilience among Black and other SMM of Color has been conducted to examine resilience processes. Harper and colleagues applied the Adolescent Resilience Framework (discussed in more detail below) to Black and Latino SMM to understand how resilience processes operated following HIV diagnosis and identified four such processes: engaging in health-promoting cognitive processes (reevaluating life goals, gaining a sense of control through knowledge-seeking, taking responsibility for health), enacting healthy behavioral practices (exercise and diet, reduced substance use, safe sex), enlisting social support from others (friends, family, partners, healthcare providers), and empowering other sexual minority men.[81]

Adapting the resilience processes identified in Harper et al.'s work, Barry and colleagues explored resilience among young Black SMM living with and without HIV as they coped with stigma, discrimination, and other life challenges. The resilience processes identified in this study mirrored those reported by Harper and colleagues, but varied somewhat in their composition: exchanging social support (emotional and informational), engaging in health-promoting cognitive processes (reframing, self-acceptance, endorsing a positive outlook, taking responsibility for outcomes), enacting healthy behavioral practices (modeling sex-positive norms, reducing HIV risk, living well with HIV), and empowering other sexual minority youth (role modeling, promoting self-advocacy, providing encouragement).[82]

Buttram explored resilience and HIV transmission risk among substance-using Black SMM, with resilience processes emerging in the form of (a) avoidance of sexuality disclosure to maintain social, economic, and cultural capital (expected to be lost following disclosure due to homonegative environments), and (b) engagement in substance use and sexual behaviors to cope with depression.[83] These are reflective of Obrist's Multilayered Social Resilience Framework[84]

and Ungar's concept of hidden resilience[85] (described below), respectively. While this body of work certainly extends understanding of resilience among SMM, it is limited in scope, pertaining to just a handful of adversities, and therefore cannot be assumed to apply to all contexts and populations. Certainly, some of the processes (e.g., enlisting social support) and strategies (e.g., reframing) reported could conceivably be expected to emerge in other scenarios, but their role and operative properties may differ. In addition, the resilience processes in this body of work have been expounded upon in a primarily descriptive manner. A deeper level of analysis and interpretation may be able to expand on how such processes emerge and reveal the unique ways in which they function to support adaptation in the face of adversity, including contending with the effects of trauma.

**Study aims**

This research was designed to address gaps in understanding how posttraumatic stress symptoms uniquely manifest and impact sexual behavior among SMM in the United States, and how Black SMM perceive and experience the impact of trauma and demonstrate resilience in its midst. Multiple, person-centered methods (quantitative and qualitative) were employed to help articulate the effects of trauma on the lives of SMM. This research aimed to (1) identify latent classes of posttraumatic stress symptoms and describe sociodemographic and other correlates of each class in a large, nationwide sample of SMM; (2) assess the association between membership in latent classes of posttraumatic stress symptoms and serodiscordant condomless anal sex in a subsample of non-Hispanic Black and white SMM; and (3) qualitatively explore perceptions and experiences of the impact of trauma, as well as the activation and function of resilience processes, among mid-Atlantic Black SMM.

**Theoretical frameworks**

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*Conservation of resources*

Hobfoll's Conservation of Resources Theory argues that individuals inherently strive to gain, retain, protect, and foster resources, and that stress occurs when resources are lost, threatened with loss, or unobtained despite one's efforts to get them.[86,87] One type of resource described in this framework is that of personal characteristics, which includes self-related cognitions and worldviews.[86,87] The negative cognitions and mood symptom cluster of PTSD – comprised of symptoms such as negative thoughts about self or the world, exaggerated blame of self and others – demonstrates how trauma exposure can impact this particular resource of personal characteristics. Sexual risk behavior may reflect an attempt to replenish the loss/reduction of positive thoughts of self and positive conceptions of the world.[88] PTSD is also characterized by other losses that, despite not being formally included as resources in this particular framework, certainly could be. These losses include decreased capacity to regulate one's emotions or to utilize problem-focused coping strategies.[2] Sexual risk behavior may reflect a strategy to manage these losses (i.e., upregulate negative mood states) or a consequence of such losses (i.e., avoidance of trauma-related information because there are no other ways to manage it).[88]

Gratz and Roemer's model of emotion regulation[89] adds support to how sexual risk behavior may be used to manage and compensate for the loss of self-regulatory capacity or may be a consequence of such loss. The model defines emotional regulation as

> *the awareness, understanding, and acceptance of emotions; the ability to control impulsive behaviors and engage in goal-directed behaviors when experiencing negative emptions; flexible use of situationally appropriate strategies to modulate the intensity and duration of emotional responses in order to meet individual goals and situational demands; and a willingness to experience negative emotions in pursuit of desired goals.*

Emotional dysregulation is positively associated with PTSD,[90,91] and emotional dysregulation is positively associated with sexual risk behaviors.[92,93] Sexual risk behaviors may be one of the few remaining and most accessible strategies to regulate emotions. Alternatively, emotional dysregulation itself, along with repeated, unsuccessful attempts at regulation may tax one's adaptive and self-regulatory capacities, leading to decreased defenses and disinhibition that may facilitate sexual risk behavior. Another explanation could be that emotional dysregulation compromises one's ability to perceive and attend to emotional indicators of risk. Latent classes that feature posttraumatic stress symptoms indicative of emotional dysregulation may therefore be more strongly associated with serodiscordant condomless anal sex.

Cognitive Escape Theory[94] posits that SMM engage in sexual risk behavior to escape from their own awareness of threat. This perpetual threat is taxing and requires effortful coping that, over time, becomes aversive and incites a need to escape. These processes align with avoidance coping models, which argue that, due to the lack of other coping strategies and resources, individuals engage in denial, distraction, and disengagement to avoid information associated with risk and threat, as such thoughts and emotions are reminiscent of past trauma. Sexual risk behavior, then, could be both an avoidance coping strategy (i.e., used to distract or disengage from troubling thoughts or emotions) and a consequence of avoidance coping (i.e., the result of denial of, distraction/disengagement from risk-related cues). Avoidance coping has been linked to sexual risk behavior among MSM,[44,95-98] and trauma exposure among SMM has been linked to using sex to escape negative affective states (e.g., depression, loneliness).[54] Latent classes found to be associated with the sexual risk behavior outcome could be indicative of use of avoidance coping by class members.

*Socioecological models, stigma, and minority stress*

While the main constructs and relationships examined in this dissertation exist and occur

at the individual level, they are embedded within and influenced by broader systems. The

seminal work by McLeroy and colleagues delineates how health behaviors are influenced by

factors across these levels, including the structural (e.g., policies, laws), community/institutional

(e.g., social and community institutions and organizations, and relationships among and between

them), interpersonal/network (e.g., social support/family and friend relationships), and individual

levels (e.g., personal knowledge, beliefs, perceptions, skills, characteristics).[99]

Two factors of particular relevance are stigma, which is the cooccurrence of labeling,

stereotyping, separation, status loss, and discrimination in a context in which power is

exercised;[103,104] and minority stress, which refers to the chronic social stress that people with

stigmatized identities experience.[24,104,105] Those who are multiply marginalized – e.g., individuals

who are both sexual and racial/ethnic minorities – may experience intersecting stigmas and

compounded stress that shape their health and behaviors in unique ways relative to those who are

not multiply marginalized. Stigma and minority stress may shape frequency and type of trauma

exposure, responses and reactions to trauma exposure, manifestation of posttraumatic stress

symptoms, and the activation of resilience processes to overcome those symptoms.

*Resilience*

The Adolescent Resilience Framework posits that resilience involves the leveraging of

promotive factors – internal assets (e.g., self-efficacy, coping skills) and/or external resources

(e.g., social support, community services) – to adapt to and overcome risk or adversity.[78]

Individuals may therefore leverage various coping skills and sources of social support to

overcome the effects of trauma. Multi-Layered Social Resilience extends the above scholarship

to consider the social and structural context of resilience, including the interaction between the individual and their environment. Social resilience is defined as

> *the capacity of actors to access capitals in order to – not only cope with and adjust to adverse conditions (that is, reactive capacity) – but also search for and create options (that is, proactive capacity), and thus develop increased competence (that is, positive outcomes) in dealing with a threat.*[106]

Though opportunities for building resilience may lie at all levels of the socioecological model, an individual's social position determines the extent to which they have access to such opportunities. Individuals have agency to act upon their environment to manage the consequences of trauma, but their actions are constrained by larger structures within the environment. SMM with greater access to social capital should have more options to support coping with and overcoming the effects of trauma.[84] The concept of hidden resilience is defined as "patterns of coping that allow individuals to experience their lives as subjectively successful whether or not others outside their culture and context see them that way."[107] Engaging in substance use to numb emotional pain related to trauma exposure could be an example of hidden resilience, so long as the substance use behavior does not become impairing.[108]

*Conceptual model*

This dissertation is informed by the conceptual model depicted in Figure 1. The model shows the presumed, individual-level pathway leading from trauma exposure (though this is not modeled in the analysis) to posttraumatic stress symptoms in the form of latent classes, to serodiscordant condomless anal sex. The mechanisms described above (i.e., restoring lost resources, emotion regulation, avoidance coping) linking latent classes to the outcome are presumed to operate between the constructs, but are not displayed in the model since no data were collected to assess them. Race may moderate the relationship between class membership and the outcome, given how intersecting stigmas and compounded minority stress processes may

shape both class membership and sexual behavior. Likewise, social cohesion, as a form of cognitive social capital promotive of resilience, may moderate the association between class membership and outcome.

The conceptual model draws on the theoretical frameworks described previously. The main constructs and relationships of interest, which exist at the individual level, are affected by broader levels of influence at the interpersonal/network, community/institutional, and structural/policy levels. In particular, intersecting stigmas, minority stress, and resilience processes exist and interact across socioecological levels to shape the frequency and types of trauma one encounters; the subjective experience of and response to those traumas; the ensuing posttraumatic stress symptoms, if any; and the resilience processes that are activated and leveraged to manage, cope, and overcome the effects of trauma.

**Methods**

Multiple, person-centered methods were employed to examine how the effects of trauma manifest and operate in the lives of SMM. Quantitative methods were used to identify latent classes of posttraumatic stress symptoms, determine sociodemographic and other correlates of membership in each latent class, and assess associations between class membership and serodiscordant condomless anal sex among SMM. Qualitative methods were used to explore the lived experience of the effects of trauma and the emergence and function of resilience processes among Black SMM.

*Quantitative methods*

Data from the American Men's Internet Survey were used to identify latent classes of posttraumatic stress symptoms. Latent class analysis was performed on responses to an 8-item posttraumatic stress symptom scale completed by participants who reported a lifetime history of

trauma exposure (6,319/11,069). As an 8-item PTSD symptom scale was used, latent class

models with two through seven latent classes were considered. Several information criteria,

relative fit indices, other fit information, model characteristics, and the principles of parsimony

and diminishing return were used to select the best-fitting model. A Full Maximum Likelihood

estimator was used under the assumption that data were missing at random to derive estimates

based on all available data while simultaneously accounting for any missingness.

To support the clinical utility and increase the validity of the identified latent classes,

associations between sociodemographic characteristics and class membership were examined.

This was done via multinomial logistic regression of the classes on sociodemographic and other

variables via Vermunt's (2010)[109] automatic three-step method, which corrects for potential

classification error in assigning individuals to latent classes and is the recommended method for

examining associations between covariates and class membership.[110] Estimated coefficients were

exponentiated to generate unadjusted and adjusted odds ratios; Wald tests, with statistical

significance set at $\alpha=0.05$, and 95% confidence intervals were also calculated and examined.

Given the unique lived experience of being both Black and a sexual minority in the

US,[111-113] and given the ongoing disparities in HIV infection between Black and white SMM,[28]

the subsequent study was restricted to the non-Hispanic Black and white SMM participants from

the first study. Stepwise multiple indicator multiple cause (MIMIC) modeling[114] was performed

to assess measurement invariance and differential item functioning (DIF) of the latent class

parameters between Black and white participants. After accounting for DIF, the manual three-

step Bolck, Croon, and Hagenaars (BCH) method[110] was employed to determine associations

between latent classes and serodiscordant condomless anal sex, adjusting for covariates of both

the latent classes and outcome. Moderation of these associations by race and social cohesion (a

form of cognitive social capital)[115] was subsequently examined by allowing their effects to be freely estimated across latent classes. When appropriate, parameter estimates were exponentiated to generate odds ratios, and Wald tests, with significance set at $\alpha=0.05$, and 95% confidence intervals were calculated and examined. All quantitative procedures were conducted in Stata version 15[116] and Mplus version 8.[117]

*Qualitative methods*

The effects of trauma and the emergence of resilience processes were explored qualitatively using an interpretative phenomenological analysis (IPA) approach. Purposive sampling was used to recruit participants from a parent study, Project STAR, a pilot randomized controlled trial to promote home-based testing and treatment of HIV and STIs among Black SMM in the Baltimore, Maryland and Washington, DC areas. Eligibility criteria include self-reported male sex at birth, current male gender identity, two or more male sex partners in the prior six months, Black race, 17 years of age or older, and weekly internet usage. Additional criteria for participation in this sub-study included a history of trauma exposure and current posttraumatic stress symptoms, which was assessed by the Primary Care PTSD for the DSM-5 screener (PC-PTSD-5),[118] which was administered to all Project STAR participants.

Participants who provided verbal consent to participate underwent three individual in-depth interviews (IDIs) via telephone or online video conferencing software. The first two IDIs were conducted with a flexible, semi-structured interview guide and assessed conceptions of trauma; assets, resources, and strategies utilized to cope with past trauma; trauma's place in and impact on one's life; perceived current impacts of trauma exposure; assets, resources, and strategies utilized to cope with those impacts; lessons from trauma; and changes in perspective on the world, future, and self. For the third IDI, participants were asked to provide photos/images

that represented (1) how trauma affects them and (2) how they overcome the effects of trauma, which served as the basis for the interview.

Analysis involved several steps: (1) reading and re-reading, (2) narrative summarizing, (3) initial noting, (4) developing emergent themes, (5) searching for connections across emergent themes, (6) moving to the next case and repeating the previous steps, and (7) looking for patterns across all cases. Step (1) involved multiple, line-by-line readings of Participant A's transcript to gain familiarity and mark words/passages indicative of trauma-related impacts, methods of coping, use of linguistic devices (e.g., metaphorical language), and contradictions between passages. Step (2) involved summarizing Participant A's trauma history, perceived trauma-related impacts, and primary means of coping. Step (3) involved writing descriptive, linguistic, and conceptual notes on the marked passages to facilitate deeper immersion in Participant A's account and identify how Participant A discussed, understood, thought about/perceived, and made sense of the effects of trauma. Step (4) involved the use of notes to identify emergent themes. Step (5) consisted of clustering themes together to help identify superordinate themes. Step (6) involved repeating these steps on all subsequent transcripts, one-by-one. In step (7), patterns of convergence across all superordinate themes that were identified in step (5) were assessed. These steps were in accordance with an IPA approach,[119] with the exception of narrative summarizing,[120] which was added to assist with synthesizing participants' accounts. Photos/images shared by participants were not the focus of the analysis, as their purpose was to act as a tool to facilitate deeper reflection and discussion about topics of interest.

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Figure 1. Conceptual model of posttraumatic stress and serodiscordant condomless anal sex informing the dissertation research.
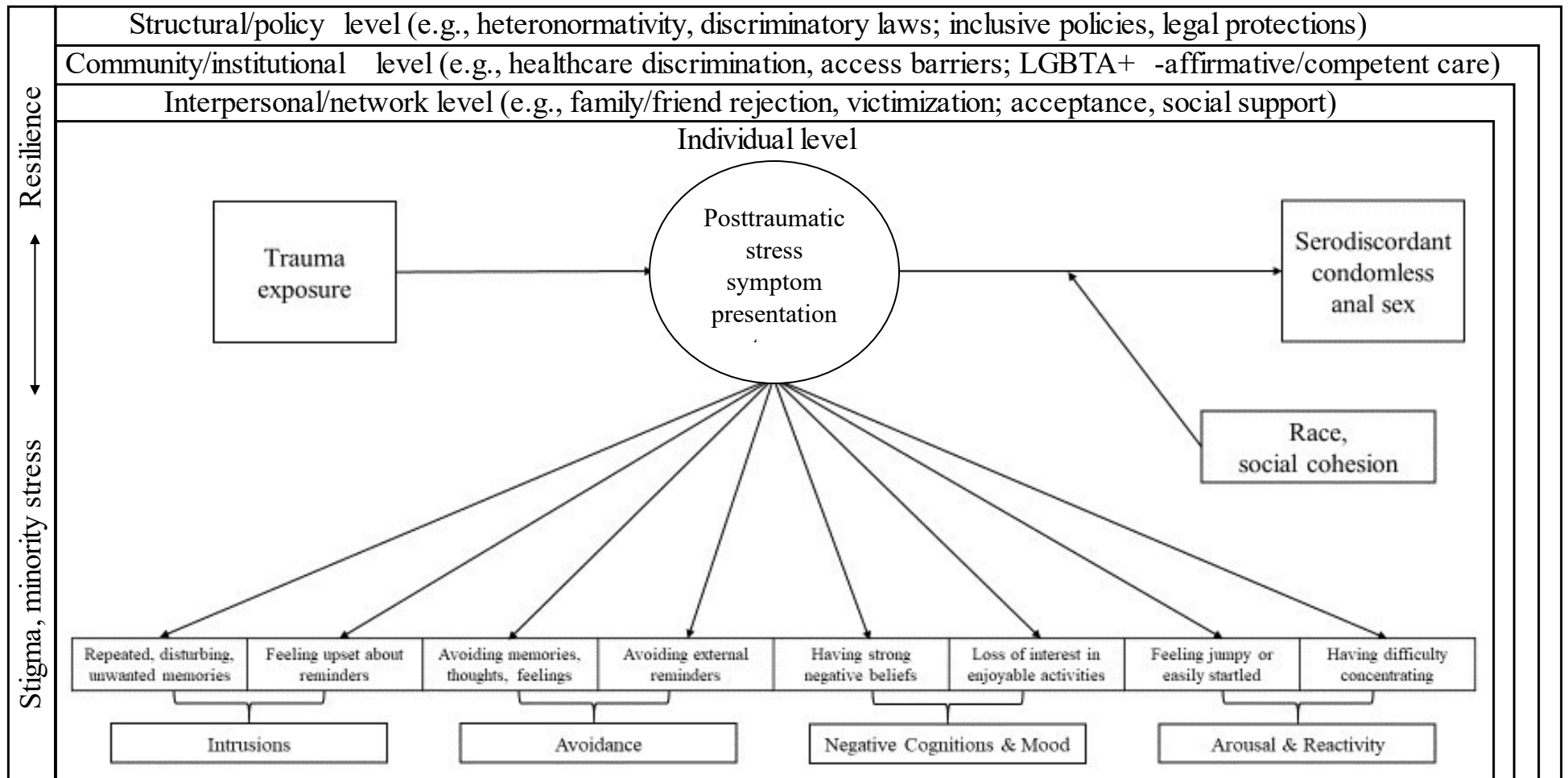
**MANUSCRIPT ONE: Posttraumatic stress symptoms among cisgender sexual minority men in the United States: A latent class analysis**

**Abstract**

**Background**

Disparities in trauma exposure have been well-documented among cisgender sexual minority men (SMM) in the United States (US), and a limited but growing body of research has examined mental health sequelae – such as posttraumatic stress disorder (PTSD) – of trauma exposure in this population. This research has likewise demonstrated a disproportionate burden of PTSD among SMM, but research has yet to move beyond an examination of PTSD symptomology at the diagnostic/disorder level, motivating a more nuanced approach to examining posttraumatic stress symptoms in this population.

**Methods**

From September 2020-January 2021, N=13,433 SMM across the US were recruited through online convenience sampling to complete the online American Men's Internet Survey; 6,319 participants endorsed trauma exposure and completed an 8-item version of the Posttraumatic Checklist for the DSM-5. Latent class analysis was performed on responses to this scale to identify subgroupings of posttraumatic stress symptoms, and multinomial logistic regression was used to assess associations of sociodemographic and other characteristics with membership in the identified classes.

**Results**

Four classes were identified: "Intrusive-Avoidant" (n=1,086; class prevalence=17.2%), which featured moderate to high probabilities (0.545-0.891) of intrusive thoughts, associated psychological discomfort, and cognitive and physical avoidance of reminders of trauma; "Dysphoric-Inattentive" (n=1,230; class prevalence=19.5%), which featured moderate to high probabilities (0.532-0.779) of negative beliefs, loss of interest in previously enjoyable activities,

and difficulties concentrating; "Pervasive" (n=1,471; class prevalence=23.3%), which featured

high probabilities (0.745-0.979) of all 8 posttraumatic stress symptoms; and "Resistant"

(n=2,532; class prevalence=40.1%), which featured low probabilities (0.021-0.089) of all 8

posttraumatic stress symptoms. Non-Hispanic Black participants were overrepresented in the

Intrusive-Avoidant class, while participants age 15-24 years were overrepresented in all classes

except "Resistant." Participants living with HIV and with an unknown status relative to HIV-

negative participants, and other sexually-identifying participants (e.g., heterosexual, asexual)

relative to gay/homosexual-identifying participants were overrepresented in the Pervasive class.

**Conclusions**

Diverse patterns of posttraumatic stress symptoms are evident among trauma-exposed SMM in

the US, and SMM of certain sociodemographic profiles may be more vulnerable to some patterns

than others. Unique patterns may necessitate unique intervention approaches tailored to symptom

profiles. Future research should explore the extent to which these patterns differentially

contribute to other health outcomes and health disparities experienced by SMM.

**Introduction**

Disparities in trauma exposure have been well-documented among cisgender sexual minority men (SMM) in the United States (US), across race/ethnicity and HIV-status groups. SMM report disproportionately high instances of childhood physical, sexual, and mental abuse by caregivers or other adults,[1-24] as well as physical, sexual, verbal, and cyber-bullying experiences by peers.[25-33] As adults, SMM experience excessively high prevalence of exposure to intimate partner violence,[1,6-8,14,20,34-41] physical and sexual assault,[1,7,8,14,18,21,22,40,42-45] and hate-crime victimization.[7,46,47] Trauma exposure related to death of a loved one, incarceration, witnessing violence, and experiencing a serious illness (e.g., HIV/AIDS), injury/accident, or some other event – either directly or indirectly – is also highly prevalent in this population.[1,42,45,48-52]

Social stigma due to sexuality may underpin much of the trauma faced by SMM.[1] Likewise, the chronic social stress that results from such stigma may similarly fuel mental health disparities that have been consistently observed among SMM relative to non-SMM, as such minority stress can heighten one's vulnerability to maladaptive reactions to trauma-exposure, contributing to the development of psychopathology.[53-57] Relative to sexual majority men, trauma-exposed SMM may therefore be at higher risk for experiencing Posttraumatic Stress Disorder (PTSD), which is characterized by intrusions (e.g., thoughts, memories, flashbacks, nightmares related to trauma; associated psychological distress), avoidance (e.g., exerting effort not to think about or experiencing feelings related to the trauma; avoiding external reminders of trauma), negative cognitions and mood (e.g., negative thoughts about self or others; anhedonia, detachment), and arousal and reactivity symptoms (e.g., hypervigilance, difficulties concentrating).[58] Indeed, nationally representative data have indicated a higher PTSD prevalence

among SMM relative to non-SMM,[1] while SMM-only community samples have reported PTSD prevalence as high as 60%.[21,22,42,48,49,59-63]

PTSD is complex, and its presentation remains poorly understood and understudied among SMM. Part of its complexity lies in the numerous associated symptoms, the several criteria that must be satisfied for diagnosis,[58] the diversity of possible symptom patterns of both PTSD and sub-threshold PTSD,[64-69] and the documented health impacts of PTSD and sub-threshold PTSD.[69-73] While traditional approaches to assessing posttraumatic stress symptoms (e.g., continuous measures summed to meet a certain threshold indicative of PTSD) are useful for describing PTSD epidemiology and measuring responses to treatment, diverse symptom patterns and their differential risk for further adverse health outcomes may be missed, especially if such patterns do not meet diagnostic criteria for PTSD. A person-centered approach, such as latent class analysis (LCA) – which identifies patterns in responses to observed indicators that reflect underlying latent classes by which like participants may be expected to cluster together[74] – may provide additional insight into how posttraumatic stress symptoms manifest and impact the health of trauma-exposed SMM, which may be particularly consequential given that this population experiences such a high burden of trauma exposure and is highly vulnerable to psychopathology.

In several prior studies with other populations, LCA has been used to identify diverse patterns of posttraumatic stress symptoms. Often, classes characterized by different levels of severity (e.g., low, moderate, severe, or some variation thereof) were found, as seen in a community sample of adults aged 18-45 years in the Detroit Metropolitan Statistical Area and young adults aged 19-23 years in a mid-Atlantic urban area;[75] a nationwide sample of adolescents aged 12-17 years;[65] a sample of Vietnam veterans;[76] a sample of survivors of

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Hurricane Katrina in Southern Mississippi;[77] and a community sample of low-income, African-American male and female primary care patients in Atlanta, Georgia.[78] In others cases, classes defined by severity as well as different symptom clusters were found (high-PTSD, high-intrusive/avoidant, moderate-PTSD, no-PTSD), as seen in a sample of refugees and asylum-seekers resettled in Australia.[66]

Given the burden of trauma exposure and PTSD among SMM, as well as the heightened vulnerability toward developing psychopathology, and given that prior research has identified prevalent patterns of diverse posttraumatic stress symptoms in other populations, using LCA to identify possible posttraumatic stress symptom patterns among SMM is warranted. Moreover, investigating associations between sociodemographic characteristics can not only validate the existence of the classes, but also help identify individuals that may be at risk for a particular posttraumatic stress symptom pattern, which may capture individuals who would be missed otherwise, and may indicate the need for the application of different treatment modalities. The objectives of this analysis were to identify latent classes of posttraumatic stress symptoms and assess associations with sociodemographic and other characteristics among trauma-exposed SMM in the US.

**Methods**

*Data source, participants, and procedures*

The American Men's Internet Survey (AMIS)[79,80] is an annual cross-sectional web-based behavioral survey of 10,000+ SMM living in the US intended to monitor trends in HIV risk behavior and access to/use of HIV testing and prevention services. From September 2020-January 2021, participants were recruited through convenience sampling from a variety of websites using banner advertisements or emails to website subscribers. Individuals who clicked

on the ads were taken directly to the survey website hosted on a secure server administered by SurveyGizmo.[81] Individuals were also recruited by emailing participants from the previous cycle of AMIS (2019) who consented to be re-contacted for future studies. Eligibility criteria included being ≥15 years of age, being cisgender male, US residence, and lifetime oral or anal sex with a man or self-identification as gay or bisexual. SMM who met the eligibility criteria and consented to participate began the survey immediately. Participants were not compensated for completing the survey.

Several data-cleaning steps were performed, including deduplication of survey responses and restriction of surveys to participants who reported having oral or anal sex in the past 12 months, provided a valid US ZIP code, and provided consent. Information on sociodemographic characteristics, past-year sexual behaviors, past-year sexual health care utilization, use/uptake of HIV prevention strategies, mental health (including trauma exposure and posttraumatic stress symptoms), substance use, and other domains was collected. Ethical approval for this study was obtained from Emory University Institutional Review Board, and secondary analysis of the de-identified dataset was deemed exempt by Johns Hopkins University Institutional Review Board.

*Measures*

**Trauma exposure**. In line with other researchers who have used, or advocated for use of, a more relaxed trauma exposure criterion than that found in the Diagnostic & Statistical Manual of Mental Disorders-5 (DSM-5; to capture a broader range of potentially traumatic events),[82-85] a single, yes/no item describing a range of traumas was used to assess lifetime trauma exposure: "Sometimes things happen to people that are extremely upsetting, like being in a life threatening situation such as a major disaster, very serious accident or fire; being physically or sexually assaulted or raped, seeing another person killed or dead, or badly hurt; hearing about something

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horrible that has happened to someone you are close to; being diagnosed with a chronic illness like HIV; or being incarcerated in jail or prison. Have you ever experienced this kind of event?" Participants answering affirmatively were automatically directed to the PTSD symptom scale.

**PTSD symptoms**. An 8-item version of the Posttraumatic Checklist for the DSM-5 (PCL-5; originally 20 items)[86-88] was used to assess past-month PTSD symptoms (Table 1; Appendix A). This reduced version of the PCL-5, hereafter referred to as R-PCL-5, contained two symptoms from each PTSD symptom cluster. As in the full version, the same stem ("In the past month, how much were you bothered by") was applied to each symptom (e.g., "Repeated, disturbing, and unwanted memories of the stressful experience?"). Participants responded on a five-point Likert scale ranging from "Not at all" (0) to "Extremely" (4). Items were summed to arrive at a composite score (range: 0-32), with scores of 19 or higher indicative of PTSD.[88] For the present LCA, response options were dichotomized because, conceptually, PTSD symptoms are binary constructs, being assessed clinically by their presence or absence, as described in the DSM-5; moreover, in the present study, the goal and interest was the presence/absence of symptoms rather than intensity of symptoms. Response options were dichotomized by collapsing all affirmative responses greater than 1 (i.e., mildly bothered by a given symptom), in accordance with prior research to ensure variability and avoid ceiling effects.[66,89,90]

**Covariates**. Participants provided their age in years. For analysis, five age categories were created: 15-24 years; 25-34 years; 35-44 years; 45-54 years; and 55+ years. For race/ethnicity, participants were asked, "Which racial group or groups do you consider yourself to be a part of?" Response options included "American Indian or Alaska Native"; "Asian"; "Black or African-American"; "Native Hawaiian or Other Pacific Islander"; or "white." Participants could select multiple responses. Participants were asked a yes/no item regarding

ethnicity, "Do you consider yourself to be Hispanic or Latino?" For analysis, a four-level categorical variable was created: "Non-Hispanic Black," "Hispanic," "Non-Hispanic white," and "Other Race, Multiracial." For sexual identity, participants could select one of five options: "heterosexual or straight"; "gay or homosexual"; "bisexual"; "another identity" (which they could then write-in); and "don't know." Those who selected "don't know" were considered "questioning."

Highest level of education was assessed with six response options: "never attended school"; "less than high school"; "some high school"; "high school diploma or GED"; "some college, Associate's degree, or technical school"; and "college, postgraduate studies, or professional school." For analysis, four education categories were created: "less than high school"; "high school or equivalent"; "some college or a technical degree"; and "earned a college degree or completed some postgraduate studies." Household income from the previous year was assessed with seven response options: "<$20,000"; "≥$20,000<$40,000"; "≥$40,000<$75,000"; "≥$75,000<$125,000"; "≥$125,000<$150,000"; "≥$150,000+." Those earning $75,000+ were collapsed into one category, leaving four for analysis. Two yes/no items assessed housing instability: "In the past 12 months, did you double up or stay overnight with friends, relatives or someone you didn't know because you didn't have a regular, adequate, and safe place to stay at night?" "In the past 12 months, were you ever homeless? That is, were you living on the street, in a shelter, in a Single Room Occupancy (SRO), or in a car?" For analysis, a binary variable was created, with endorsement of either item being considered past-year housing instability, and lack of endorsement of both items being considered lack of past-year housing instability.

For HIV status, participants were asked to report the result of their most recent HIV test: "negative," "positive," "never obtained results," "indeterminate," "I prefer not to answer," and

"don't know." Those who did not indicate "positive" or "negative" and those who reported not having had an HIV test were categorized as "unknown." This resulted in a three-level categorical variable: "negative," "positive," and "unknown."

ZIP codes were used to determine rural-urban categorizations, as defined by the National Center for Health Statistics: "large central metro," "large fringe metro," "medium metro," "small metro," "micropolitan," and "non-core."[91] For analysis, medium and small metros were collapsed, and micropolitan and non-core sites were collapsed, resulting in a four-level categorical variable: "urban/central," "suburban/fringe," "medium/small metro," and "rural." ZIP codes were also used to determine census region, as defined by the US Census Bureau: "Northeast," "Midwest," "South," "West," and "US Dependent Areas."[92]

*Statistical analyses*

Descriptive statistics were computed for all variables of interest, and missingness was assessed. Kruskal-Wallis rank sum tests (for age) and chi-square tests (for all other variables) were used to assess sociodemographic differences between those exposed to trauma versus those not; those endorsing any posttraumatic stress symptoms versus those not; and those meeting criteria for PTSD versus those not. As an 8-item PTSD symptom scale was used, latent class models with two through seven latent classes were considered, and models were run using different sets of starting values to assess identification. Several information criteria (Akaike's Information Criterion [AIC],[93] Consistent AIC [CAIC],[94] Bayesian Information Criterion [BIC],[95] Sample size-Adjusted BIC [SABIC],[96] and Approximate Weight of Evidence [AWE][97]), relative fit indices (Vuong-Lo-Mendell-Rubin Likelihood Ratio Test [VLMR-LRT] and adjusted VLMR-LRT,[98] Bootstrapped Likelihood Ratio Test [BLRT],[99] Bayes Factor [BF],[100,101] and Approximate Correct Model Probability [cmP][95]), other fit information (Log-Likelihood value

[LL], Likelihood Ratio Chi-Square Test [LR $\chi^2$]), model characteristics (entropy statistic of class delineation, lowest classification probability, and lowest class prevalence), and the principles of parsimony and diminishing return were used to select the best-fitting model (Table 2).[74] A Full Maximum Likelihood estimator was used under the assumption that data were missing at random to derive estimates based on all available data while simultaneously accounting for any missingness, an approach shown to be comparable to multiple imputation.[102,103] No data were imputed. After selecting the optimal latent class model, standardized bivariate residuals of expected versus observed responses to indicator pairs were examined to assess whether the conditional independence assumption was satisfied or not, and model adjustments were made if necessary. Residuals greater than z=+/-1.96 indicate a violation of this assumption, which can be addressed by allowing the pair of items in question to be correlated.[104]

To support the clinical utility and increase the validity of the identified latent classes, associations between sociodemographic characteristics and class membership were examined. This was done via multinomial logistic regression of the classes on sociodemographic variables via Vermunt's (2010)[105] automatic three-step method, which corrects for potential classification error in assigning individuals to latent classes and is the recommended method for examining associations between covariates and class membership.[106] Estimated coefficients were exponentiated to generate unadjusted and adjusted odds ratios (OR, aOR); Wald tests, with statistical significance set at 0.05, and 95% confidence intervals (CI) were also calculated and examined. Analyses were conducted in Stata Version 15[107] and Mplus Version 8.5.[108]

**Results**

*Sample characteristics*

A total of 13,433 participants completed AMIS. Of these, 1,660 (12.4%) did not answer the trauma exposure item and were excluded. Of the remaining 11,421, 150 (1.3%) indicated a preference not to respond to the item, while 202 (1.8%) indicated they did not know if they had been exposed to trauma or not. Excluding these participants left 11,069 participants. More than half of these (n=6,326; 57.2%) endorsed exposure to trauma. Of the 6,326 trauma-exposed participants, 7 (0.11%) did not answer the PTSD symptom scale and were excluded, leaving N=6,319 for the current analysis. PTSD symptom scale missingness ranged from 0.03-1.38% per item and was found among 3.0% (n=191) of participants, 81.7% (n=156) of whom were missing one item. Participants with any missing data on the R-PCL-5 were more likely to be non-Hispanic Black and 35-44 and 55+ years, suggesting a missing-at-random mechanism, justifying the use of the Full Maximum Likelihood estimator.

Sample characteristics are presented in Table 3. Mean age was 33.3 years (SD=15.7), while median age was 27 years (IQR=20-42). Nearly 40% (n=2,434) of participants were 15-24 years of age. A majority of participants were non-Hispanic white (n=3,829; 60.6%), followed by relatively equal proportions of Black (n=1,031; 16.3%) and Hispanic participants (n=1,024; 16.2%). More than three quarters (n=4,820) identified as gay or homosexual, and more than 20% (n=1,289) identified as bisexual. More than 40% (n=2,715) had a college degree or postgraduate education, and roughly one third (n=2,043) earned $75,000 per year or more. One in eight (n=794) reported past-year housing instability. More than a third (n=2,370) resided in a central urban area, and more than 40% of participants were from the South (n=2,647).

Roughly 93% (n=5,865) of participants endorsed any posttraumatic stress symptoms, and approximately 75% (n=4,613) endorsed at least moderate symptoms. Roughly 18% (n=1,150) met criteria for PTSD. Differences in moderate or worse posttraumatic stress symptoms versus

mild/none were evident across age category ($\chi^2$[3]=379.8, p<0.001), education level ($\chi^2$[3]=173.69, p<0.001), household income ($\chi^2$[3]=152.8, p<0.001), race/ethnicity ($\chi^2$[3]=40.3, p<0.001), sexual identity ($\chi^2$[2]=11.0, p=0.004), housing instability ($\chi^2$[1]=164.7, p<0.001), and urbanicity ($\chi^2$[3]=9.7, p=0.021) (Table 4).

*Class enumeration*

All solutions were replicated using different sets of starting values. Fit indices and model characteristics for latent class models with two through seven classes are presented in Tables 5-6. As is evident from the bolded values in the table, there was no consistent indication of a preferred model. The VLMR-LRT and adjusted VLMR-LRT indicated a five-class model, while the AWE indicated a six-class model. The AIC, CAIC, BIC, and SABIC only reached a minimum value in the model with maximum possible number of classes. The BLRT, BF, and cmP yielded insufficient evidence to indicate a model. However, visualization of log-likelihood, BIC, SABIC, CAIC, and AWE values (Figure 2) showed substantial improvements (large increases in log-likelihood values) from a two- to three-class model, and three- to four-class model, but minimal, incremental improvement with each additional model thereafter. This suggested that improvement in fit beyond a four-class model was unlikely to be the worth the added complexity of models with five or more classes. Similarly, an examination of model characteristics showed that six- and seven-class models had the lowest utility, as the entropy statistic of class delineation and/or lowest classification probabilities were well-below the desired threshold of 0.80. Finally, five through seven class models each had a class with a prevalence ranging from 3-8%, hovering just below or just above the still-debated threshold of suboptimal class size (5~9%).[74] Weighing all of this information, the four-class model was selected. Examining the standardized bivariate residuals of expected versus observed responses

to indicator pairs revealed several that were >1.96, violating the local independence assumption. This assumption was relaxed by modeling the residual covariance of items 1-2 (intrusive memories, upset about reminders) and 5-6 (negative beliefs, loss of interest in activities), which resolved the issue.

Class 1 (n=1,086; class prevalence=17.2%) was named "Intrusive-Avoidant," as it featured moderate to high probabilities (0.546-0.892) of intrusive thoughts, associated psychological discomfort, and cognitive and physical avoidance of reminders of trauma, and low to moderate probabilities (0.152-0.439) of the other symptoms. Class 2 (n=1,230; class prevalence=19.5%) was named "Dysphoric-Inattentive," as it featured moderate to high probabilities (0.533-0.780) of negative beliefs, loss of interest in previously enjoyable activities, and difficulties concentrating, and low to moderate probabilities (0.142-0.393) of the other symptoms. Class 3 (n=1,471; class prevalence=23.3%) was named "Pervasive," as it featured high probabilities (0.746-0.979) of all 8 posttraumatic stress symptoms. Class 4 (n=2,532; class prevalence=40.1%) was named "Resistant," as it featured low probabilities (0.021-0.089) of all 8 posttraumatic stress symptoms (Figure 3).

*Correlates of class membership*

Unadjusted and adjusted associations between sociodemographic characteristics and class membership are presented in Tables 7-8. Compared to non-Hispanic white participants, non-Hispanic Black participants were significantly more likely to fall in the Intrusive-Avoidant class relative to the Resistant class (aOR=1.83, 95% CI=1.39, 2.42). Compared to gay or homosexual participants, other sexually-identified participants were significantly more likely to fall in the Pervasive class relative to the Resistant class (aOR=1.93, 95% CI=1.18, 3.14). Unstably housed participants were significantly more likely to fall in the Intrusive-Avoidant (aOR=2.43, 95%

CI=1.72, 3.41), Dysphoric-Inattentive (aOR=2.32, 95% CI=1.63, 3.31), and Pervasive classes relative to the Resistant class (aOR=5.25, 95% CI=4.01, 6.86). Compared to HIV-negative participants, those living with HIV (aOR=1.55, 95% CI=1.15, 2.08) and with an unknown HIV status (aOR=1.25, 95% CI=1.02, 1.53) were significantly more likely to fall in the Pervasive class relative to the Resistant class. Compared to those residing in urban areas, participants residing in small/medium metros were significantly more likely to fall in the Pervasive class relative to the Resistant class (aOR=1.28, 95% CI=1.05, 1.55).

Compared to participants aged 15-24 years, those aged 25-34 years were significantly less likely to fall in the Intrusive-Avoidant (aOR=0.78, 95% CI=0.61, 0.98) or Pervasive classes relative to the Resistant class (aOR=0.79, 95% CI=0.65, 0.96); those aged 35-44 years were significantly less likely to fall in the Dysphoric-Inattentive (aOR=0.57, 95% CI=0.37, 0.88) or Pervasive classes relative to the Resistant class (aOR=0.57, 95% CI=0.40, 0.80); and those aged 45-54 years and 55+ years were significantly less likely to fall in the Intrusive-Avoidant (aOR=0.55, 95% CI=0.38, 0.81; aOR=0.40, 95% CI=0.29, 0.55), Dysphoric-Inattentive (aOR=0.48, 95% CI=0.32, 0.73; aOR=0.28, 95% CI=0.20, 0.39), or Pervasive classes relative to the Resistant class (aOR=0.43, 95% CI=0.31, 0.61; aOR=0.17, 95% CI=0.13, 0.24). Compared to non-Hispanic white participants, non-Hispanic Black participants were significantly less likely to fall in the Dysphoric-Inattentive class relative to the Resistant class (aOR=0.47, 95% CI=0.32, 0.70). Compared to participants with less than high school education, those with high school education (aOR=0.45, 95% CI=0.26, 0.78) and those with some college education (aOR=0.47, 95% CI=0.28, 0.79) were significantly less likely to fall in the Pervasive class relative to the Resistant class; and those with a college degree or higher were significantly less likely to fall in the Intrusive-Avoidant (aOR=0.48, 95% CI=0.25, 0.92) or Pervasive class relative to the

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Resistant class (aOR=0.30, 95% CI=0.18, 0.51). Compared to participants with an income <$20,000, those earning up to $40,000 and up to $75,000 were significantly less likely to fall in the Dysphoric-Inattentive (aOR=0.68, 95% CI=0.51, 0.92; aOR=0.72, 95% CI=0.54, 0.95) or Pervasive classes relative to the Resistant class (aOR=0.69, 95% CI=0.54, 0.87; aOR=0.55, 95% CI=0.43, 0.71); those earning $75,000+ were significantly less likely to fall in the Intrusive-Avoidant (aOR=0.68, 95% CI=0.51, 0.90), Dysphoric-Inattentive (aOR=0.50, 95% CI=0.38, 0.65), or Pervasive classes relative to the Resistant class (aOR=0.50, 95% CI=0.40, 0.63).

Additional differences were found when comparing the symptomatic classes to one another, and these associations are displayed in Table 8. Compared to participants aged 15-24 years, those 55+ years were significantly more likely to fall in the Intrusive-Avoidant (aOR=2.29; 95% CI=1.48, 3.18) and Dysphoric-Inattentive classes (aOR=1.62; 95% CI=1.08, 2.44) relative to the Pervasive class. Compared to non-Hispanic white participants, non-Hispanic Black participants were significantly more likely to fall in the Intrusive-Avoidant class relative to the Pervasive (aOR=2.27; 95% CI=1.62, 3.18) and Dysphoric-Inattentive classes (aOR=3.89; 95% CI=2.49, 6.08), and significantly less likely to fall in the Dysphoric-Inattentive class relative to the Pervasive class (aOR=0.58; 95% CI=0.39, 0.88). Compared to participants with less than high school education, those with a college degree or higher were significantly more likely to fall in the Dysphoric-Inattentive class relative to the Pervasive class (aOR=1.99; 95% CI=1.11, 3.59). Compared to participants with an income <$20,000, those earning up to $40,000 (aOR=1.59; 95% CI=1.17, 2.15) and $75,000 (aOR=1.69; 95% CI=1.21, 2.35) were significantly more likely to fall in the Intrusive-Avoidant class relative to the Pervasive class, and those earning up to $40,000 were also more likely to fall in the Intrusive-Avoidant class relative to the Dysphoric-Inattentive class (aOR=1.60; 95% CI=1.13, 2.26). Participants reporting past-year

housing instability were significantly less likely to fall in the Intrusive-Avoidant (aOR=0.46; 95% CI=0.34, 0.63) or Dysphoric-Inattentive classes (aOR=0.44; 95% CI=0.34, 0.58) relative to the Pervasive class. Compared to participants in urban areas, those in rural areas were significantly more likely to fall in the Intrusive-Avoidant class relative to the Dysphoric-Inattentive class (aOR=1.56; 95% CI=1.01, 2.41). Compared to participants in the Northeast, those in the Midwest were significantly more likely to fall in the Dysphoric-Inattentive class relative to the Pervasive class (aOR=1.39; 95% CI=1.01, 1.93).

*Sensitivity Analyses*

Given that a five-class solution was indicated by the VLMR and aVLMR (Table 5), and given the high entropy (0.79) in the five-class solution (Table 6), a sensitivity analysis was performed by selecting the five-class model as the optimal solution. Examination of standardized bivariate residuals again revealed violations of local independence, and modeling the residual covariance resulted in considerable changes in class structure and a decrease in entropy and interpretability of some classes (not displayed). Due to these issues, further analysis of this solution was not considered.

Non-Hispanic Black and Other, Multiracial categories were each associated with class membership. As each category included participants reporting Black race, a sensitivity analysis was performed to determine if the association between Other, Multiracial and class membership was being driven by those reporting Black race. Therefore, participants reporting Black race (n=135) were removed from the Other, Multiracial group, and analyses were re-run to determine if the association would remain, which it did, increasing in magnitude (aOR=1.60, 95% CI=1.06, 2.41).

**Discussion**

This study documented a high burden of posttraumatic stress symptoms among trauma-exposed SMM in the US and characterized the ways in which this burden uniquely manifests by revealing four classes of posttraumatic stress symptoms. That four classes emerged reflects prior LCA studies on posttraumatic stress symptoms,[66,77,109,110] though three classes have been reported in some studies.[65,111] Latent classes were sizable, each being comprised of over 1,000 participants, and illustrated both the extremes of possible symptom patterns (Pervasive, Resistant) and more nuanced patterns (Intrusive-Avoidant, Dysphoric-Inattentive). The high probability of arousal/reactivity symptoms most strongly distinguished the Pervasive class from the Intrusive-Avoidant class, while the high probability of avoidance symptoms most strongly distinguished the Pervasive class from the Dysphoric-Inattentive class; the high probability of avoidance symptoms most strongly distinguished the Intrusive-Avoidant class from the Dysphoric-Inattentive class. Prior LCA studies on posttraumatic stress symptoms have also shown that arousal/reactivity and avoidance symptoms can strongly distinguish one class from another.[66,76-78,112] Each posttraumatic stress symptom pattern was differentially linked to a range of sociodemographic characteristics, providing validity to these patterns among SMM and yielding insight into potential markers of membership in a given class.

High posttraumatic stress symptom burden was illustrated in several of the findings, with roughly 9/10 participants endorsing mild symptomology, 3/4 endorsing moderate, and 1/5 meeting criteria for likely PTSD. This PTSD prevalence is higher than what was previously reported from a nationally representative sample of US adults, in which PTSD prevalence among a subsample of SMM ranged from 7-13%,[113] but lower than what has been reported in small community samples of SMM, with past-week to past-month (depending on the measure used) PTSD prevalence ranging from 24-60%.[21-23,42,45,49,62,63,114-116] Eighteen percent past-month

prevalence is also several times higher than what has been found in the general population, with a 12-month prevalence of 1.8% and a lifetime prevalence of 3.6% among US men.[117] However, these comparisons must be interpreted with caution, as SMM unexposed to trauma were excluded from the sample in the present study, unlike the majority of prior research that included such individuals in prevalence calculations. Had such individuals been included in the present study, PTSD prevalence would be lower.

A second indication of high posttraumatic stress symptom burden was reflected in 60% of participants falling into a symptomatic class. Comparable percentages have been reported in studies targeting highly trauma-exposed populations, such as refugees/asylum-seekers and survivors of natural disaster.[66,77] This finding shows that trauma-exposed SMM are at high risk of experiencing at least some sort of constellation of posttraumatic stress symptoms and contrasts sharply with the 18% meeting diagnostic criteria for PTSD, revealing a gap of 42% of individuals whose posttraumatic stress symptoms may be missed or go untreated because they do not meet diagnostic criteria for PTSD. This reveals a critical area for intervention, as subclinical posttraumatic stress symptoms have been shown to impact health and functioning.[69-73] A final indication of high posttraumatic stress symptom burden is evidenced by the second-largest class being the Pervasive class at 23%, in which endorsement of all symptoms would be expected. In several prior LCA studies of posttraumatic stress symptoms, classes comparable to the Pervasive class found in this study were the smallest, ranging from 10-14%,[65,76,77,111] though two reported findings nearing comparability with the present results. A study with highly trauma-exposed, low-income, predominantly African-American, inner-city primary care patients in Atlanta, Georgia, found the Pervasive class to be 18%,[109] while a study with resettled refugees and asylum-seekers in Australia found this class to be 21% (and the second-smallest out of four

rather than the smallest).[66] These prior studies intentionally targeted highly trauma-exposed populations to investigate posttraumatic stress symptomology, while the present study involved a convenience sample that happened to be highly traumatized.

The high posttraumatic stress symptom burden reflected in the above findings – even in a sample with relatively high socioeconomic status – may be underpinned by socio-structural conditions, such as intersecting stigmas, which foster individual-level minority stress,[118] contributing to ego depletion[119] and taxing adaptive resources, thereby increasing the likelihood of experiencing poor mental health and other outcomes when exposed to trauma. Posttraumatic stress symptoms are psychologically distressing, impair one's functioning, and reduce quality of life, warranting treatment and intervention in their own right.[120,121] However, posttraumatic stress symptoms can also lead to a wide range of other adverse health outcomes for which intervention is justified. Specifically, among SMM, posttraumatic stress symptoms have been linked to HIV- and STI-transmission, condomless anal sex, use of drugs and/or alcohol just prior to (or during) sex, and transactional sex,[21,42,62,122,123] making posttraumatic stress-specific interventions and trauma-informed interventions even more urgent to develop and implement within this population.

The emergence of high-symptom (Pervasive) and no/low-symptom (Resistant) classes of posttraumatic stress symptoms was unsurprising, reflecting classes commonly found in LCA studies on posttraumatic stress symptoms.[65,66,76,77,109-111] More novel findings were the other two classes. The Intrusive-Avoidant class reflects what are often perceived as some of the core symptoms of PTSD – intrusive memories of trauma, psychological distress in response to intrusions, avoidance of trauma-related reminders – which resemble a learned fear-response to trauma and are more explicitly linked to trauma exposure.[124,125] Similar classes have been

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identified among trauma-exposed refugees, trauma-exposed adults in the Detroit metro area, and trauma-exposed young adults in mid-Atlantic urban areas of relatively low socioeconomic status.[66,110,111] What may be common among these samples is greater experiences of minority stress, or heightened vulnerabilities to the effects of minority stress due to marginalization and stigma,[118] fostering fear-based responses to trauma and fueling a prolonged sense of threat, in turn maintaining intrusive-avoidant symptoms.[66] Additional research to explore how minority stress processes may act as a mechanism between trauma exposure and the posttraumatic stress response is needed.

The Dysphoric-Inattentive class is comprised of symptoms less directly related to past trauma, such as negative beliefs about self, others, and the world; anhedonia; and difficulties concentrating. Notably, none of the trauma-specific symptoms, such as intrusive memories of trauma or avoidance of external reminders of trauma, were strongly featured in this class. Participants with this particular constellation of symptoms may have become sensitized to trauma-related intrusions and associated distress, eliminating the need to avoid trauma reminders. Alternatively, such trauma-specific symptoms may simply not emerge with this particular posttraumatic stress symptom presentation. This is plausible, as such nonspecific symptoms resemble those seen in other psychiatric disorders, such as depression,[131] which is also a common effect of trauma exposure.[132] This particular class may be capturing SMM who are experiencing depression in response to trauma exposure. Trauma exposure-related depression may uniquely differ from depression that arises independently of trauma, and may therefore require different intervention approaches to mitigate. Unlike depression, posttraumatic stress symptoms typically have an index event that is directly addressed and confronted in many evidence-based treatment and intervention approaches.[133-138] As such, in the case of trauma-

related depression, depression treatments and interventions that do not address the trauma that precipitated it – as they were not designed or intended to do this – may be less effective in its mitigation. Public health researchers have tended to focus primarily on depression when investigating the mental health of SMM,[139] and such research has been helpful in documenting the high prevalence of depression among SMM populations.[140] However, such an exclusive emphasis on depression, combined with a deemphasis on trauma and posttraumatic stress symptomology, the shared symptoms of both depression and PTSD,[131] and their tendency to be comorbid[141,142] may mask or miss posttraumatic stress symptoms or trauma-related depression and result in the misapplication of treatment approaches. Accurately deciphering and addressing the particular mental health needs of trauma-exposed SMM requires nuanced assessment of both depression and posttraumatic stress symptoms.

Associations linking socioeconomic variables and HIV status with posttraumatic stress symptom class membership were expected to some extent, as these variables have been linked with PTSD in the broader PTSD literature[143,144] and the smaller body of literature concerning SMM.[42,114,115] Notably, HIV status was linked only to the Pervasive class, while income, education, and housing instability were linked to multiple or all symptomatic classes. While the reasons for this are unclear and merit further research, that these associations were observed across classes lends support for their existence as valid, distinct manifestations of posttraumatic stress symptoms among SMM in the US. The negative association with age may stem from two factors. Research has shown that SMM have significantly higher odds of experiencing childhood abuse and mal/mistreatment from caregivers relative to non-SMM.[113,145-149] If this also reflects the experiences of this sample, then the abuse would have occurred most recently for the youngest age group, and recency of trauma exposure is positively associated with greater

posttraumatic stress symptomology.[150] This association may also demonstrate that younger SMM have devised fewer coping strategies or have access to fewer resources to mitigate the effects of trauma-exposure than older SMM.[62] Regardless, this finding indicates an urgent need for targeted interventions for trauma-exposed young SMM.

Non-Hispanic Black SMM were overrepresented in the Intrusive-Avoidant class but underrepresented in the Dysphoric-Inattentive class. Relatedly, the sensitivity analysis found that Black race was not driving the association with Intrusive-Avoidant class membership among Other, Multiracial participants; in fact, this association increased when participants with a Black racial background were removed. These findings could be indicative of unique experiences of posttraumatic stress symptoms for non-Hispanic Black and Other, Multiracial SMM, possibly shaped by racism and intersecting stigmas.[151-153] The association between other sexual identity – which was comprised of heterosexual-identifying and questioning participants, as well as those with unlisted identities (many of which were asexual) – and Pervasive class membership is unclear, given the small number of participants in that group and the wide heterogeneity of identities represented. Research with larger samples of these identities is needed to more fully understand these groups' experiences of posttraumatic stress symptoms. Similarly, the association between unknown HIV status and Pervasive class membership is unclear. Lack of HIV testing – and therefore lack of knowledge of one's status – may reflect constrained resource access, including those that could both mitigate posttraumatic stress symptoms and address sexual health needs. Likewise, the association between residence in a small/medium metro and Pervasive class membership may signal decreased access to resources – especially LGBTQ+-friendly resources – in less urban areas.

These findings should be considered in light of several limitations. Out of concern for participant burden in adding items to an existing survey, the R-PCL-5 rather than the full 20-item PCL-5 was administered. Analyzing the full scale may have revealed substantially different classes – both in terms of number and composition – than what the shortened version revealed. This should be considered when comparing this study's findings to those of other LCA studies on posttraumatic stress symptoms, though some comparability with other studies was noted. Additionally, the R-PCL-5 was validated in previous research and was highly correlated with the full 20-item version.[88] Moreover, such a version that reduces participant/patient burden will be useful for quicker screening services and research purposes. Second, also out of concern for participant burden, a separate trauma-exposure scale was not included; instead, one global trauma-exposure item was used. Having more detailed information on trauma-exposures would likely yield important insights on differential relationships between diverse trauma exposures and posttraumatic stress symptom patterns; future research to explore this is needed. Similarly, the DSM-5 trauma exposure criterion was relaxed by allowing a wider range of events (e.g., HIV diagnosis; incarceration) to be considered traumatic other than those specifically designated as such in the DSM-5, which may have resulted in the inclusion of some participants in the analytic sample that would have been excluded otherwise. Therefore, comparability with other LCA (and non-LCA) studies on posttraumatic stress symptoms that did not relax this criterion may be compromised. However, this has been done previously by other researchers and has likewise been recommended when examining trauma and posttraumatic stress symptoms among SMM and other sexual minorities.[42,154]

Third, R-PCL-5 response options were dichotomized, losing information describing the intensity of each symptom. However, this approach aligns with prior LCA studies on

posttraumatic stress symptoms that have either dichotomized Likert responses[66,89,90] or used originally-dichotomous assessment measures.[65,111] Fourth, two pairs of items were highly correlated, requiring the residual covariance to be modeled and decreasing entropy as a result, though it was still at an acceptable level. An alternative posttraumatic stress symptom scale that consists of less correlated items may be more useful in identifying diverse presentations of posttraumatic stress symptoms and may therefore not require covariance to be modeled. Fifth, participants were sampled through online recruitment methods, over half of participants were non-Hispanic white and in their 20s, and a majority were of moderately high socioeconomic status. Such sampling and sociodemographic characteristics decrease generalizability of the findings and shape the findings. A more diverse sample recruited through probability or other sampling/over-sampling methods may reveal different patterns of posttraumatic stress symptoms and different relationships between sociodemographic characteristics and class membership. Despite these issues, having such a large, nationwide, relatively diverse sample of several thousand SMM is rare in research with SMM, especially when examining posttraumatic stress symptoms in this population. Of particular relevance, this research was conducted during the COVID-19 pandemic, which may have inflated endorsement of trauma exposure and influenced responses to posttraumatic stress symptom items.

There is an unrecognized and understudied epidemic of posttraumatic stress symptomology among SMM in the US. Interventionists and healthcare providers need to be aware of the extent of the heavy, heterogeneous burden of posttraumatic stress symptoms in this population, as well as the limitations of capturing it through traditional assessment approaches. Measurement of posttraumatic stress symptoms in this population must be prioritized in public health research efforts, and nuanced assessment and treatment methods (e.g., using broad

definitions of trauma exposure, setting aside diagnostic thresholds and criteria, providing treatment and resources for any reported symptom pattern) must be incorporated into clinical practice. Moreover, ensuring that SMM reporting posttraumatic stress symptoms have access to tailored care and resources and are properly followed-up by LGBTQ-competent providers is paramount. SMM are a diverse group of individuals, and care must be taken to understand how posttraumatic stress symptoms are uniquely experienced by clinical/healthcare patients and research participants alike. Thoughtful research in these areas in collaboration with SMM communities may reveal important insights into the mechanisms linking posttraumatic stress symptomology with other mental health outcomes and with sexual health outcomes.

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Table 1. Reduced Posttraumatic Checklist for the DSM-5 administered to trauma-exposed SMM across the US, 2020-2021.[88]

| PTSD symptom clusters | Items<br>*In the past month, how much were you bothered by:* |
|---|---|
| Intrusions | 1. Repeated, disturbing, and unwanted memories of the stressful experience?<br>2. Feeling very upset when something reminded you of the stressful experience? |
| Avoidance | 3. Avoiding memories, thoughts, or feelings related to the stressful experience?<br>4. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)? |
| Negative Cognitions & Mood | 5. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?<br>6. Loss of interest in activities that you used to enjoy? |
| Arousal & Reactivity | 7. Feeling jumpy or easily startled?<br>8. Having difficulty concentrating? |

DSM, Diagnostic & Statistical Manual of Mental Disorders; SMM, cisgender sexual minority men; US, United States; PTSD, posttraumatic stress disorder
Response options: Not at all (0), A little bit (1), Moderately (2), Quite a bit (3), Extremely (4)

Table 2. Guidelines for key fit statistics for latent class analysis, adapted from Nylund-Gibson & Choi.[155]

| Information criterion | |
|---|---|
| Log-Likelihood value | Select the model with the lowest value, or the model where there is a diminishing decrement in value for each added class |
| Consistent AIC (CAIC) | |
| Bayesian Information Criterion (BIC) | |
| Sample size-Adjusted BIC (SABIC) | |
| Approximate Weight of Evidence (AWE) | |
| Relative fit indices | |
| Vuong-Lo-Mendell-Rubin Likelihood Ratio Test (VLMR-LRT) | Compares K-class model to K-1 class model, provides p-value indicating if additional class (K-class model) significantly improves model fit compared to K-1 class model |
| Bootstrapped Likelihood Ratio Test (BLRT) | |
| Bayes Factor (BF) | Compares K-class model to K+1 class model; BF<3, weak evidence for K-class model over K+1 model; 3<BF<10, moderate evidence; BF>10, strong evidence |
| Approximate Correct Model Probability (cmP) | Estimates the probability that each model out of a given set of fitted LCA models is correct, assuming the true model is in the set; all values sum to 1; model with largest value is selected |
| Model characteristics | |
| Entropy | This statistic is an indication of class separation, i.e., how distinct each class is from all others, and reflects the potential utility of the model; entropy ≥0.80 is preferable |
| Lowest Classification Probability | Classification probability indicates likelihood of having been correctly classified; e.g., classification probability of 0.75 for Class 1 would suggest that, for individuals in this class, there is a 75% probability of having been correctly classified as belonging to Class 1 and a 25% probability of having been misclassified as belonging to Class 1; lowest classification probability ≥0.80 is preferable |
| Lowest Class Prevalence | Debate continues with regard to threshold for lowest acceptable class prevalence, but falls within 5-10% range |

Table 3. Sociodemographic and other characteristics of trauma-exposed SMM in the US, 2020-2021 (N=6,319).

| Continuous variable | mean (SD); median (IQR) |
|---|---|
| Age | 33.3 (15.7); 27 (22-42) |
|   Unknown/Missing | 1 (0.02) |
| Categorical variables | Total, n (%) |
| Age categories | |
|   15-24 | 2,434 (38.5) |
|   25-34 | 1,991 (31.5) |
|   35-44 | 402 (6.4) |
|   45-54 | 473 (7.5) |
|   55+ | 1,018 (16.1) |
|   Unknown/Missing | 1 (0.02) |
| Race/ethnicity | |
|   Non-Hispanic Black | 745 (11.8) |
|   Hispanic | 1,165 (18.4) |
|   Non-Hispanic white | 3,829 (60.6) |
|   Other, Multiracial | 456 (7.2) |
|   Unknown/Missing | 124 (2.0) |
| Sexual identity | |
|   Gay or homosexual | 4,820 (76.3) |
|   Bisexual | 1,289 (20.4) |
|   Other[a] | 179 (2.8) |
|   Unknown/Missing | 31 (0.5) |
| Highest level of education | |
|   < High school | 151 (2.4) |
|   High school or equivalent | 1,052 (16.7) |
|   Some college[b] | 2,378 (37.6) |
|   College degree or higher | 1,715 (43.0) |
|   Unknown/Missing | 23 (0.4) |

| | |
|---|---|
| Household income | |
|   < $20,000 | 925 (14.6) |
|   ≥ $20,000 < $40,000 | 1,337 (21.2) |
|   ≥ $40,000 < $75,000 | 1,499 (23.7) |
|   $75,000+ | 2,043 (32.3) |
|   Unknown/Missing | 515 (8.2) |
| Housing instability | |
|   Yes | 794 (12.6) |
|   No | 5,456 (86.3) |
|   Unknown/Missing | 69 (1.1) |
| HIV status | |
|   Negative | 4,375 (69.2) |
|   Positive | 597 (9.5) |
|   Unknown | 1,347 (21.3) |
| Urbanicity | |
|   Urban/central | 2,370 (37.5) |
|   Suburban/fringe | 1,285 (20.3) |
|   Medium/small metro | 1,992 (31.5) |
|   Rural | 650 (10.3) |
|   Unknown/Missing | 22 (0.4) |
| Region | |
|   Northeast | 985 (15.6) |
|   Midwest | 1,236 (19.6) |
|   South | 2,647 (41.9) |
|   West | 1,430 (22.6) |
|   US Dependent Areas | 21 (0.3) |
|   Unknown/Missing | 0 (0.0) |

SMM, cisgender sexual minority men; US, United States; SD, standard deviation; IQR, interquartile range

[a]Including heterosexual or straight (n=46), another identity (n=96; e.g., Pansexual, Queer, Asexual, Demisexual, Homoflexible, Bi-curious, Same-Gender-Loving, Tri/Multisexual, undecided or no identity), and questioning (n=37)

[b]Including Associate's degree and technical school

Table 4. Differences in sociodemographic characteristics by trauma exposure (N=11,069), any posttraumatic stress symptoms (N=6,319), and posttraumatic stress disorder (N=6,319) among trauma-exposed SMM in the US, 2020-2021.

| | Trauma exposure | | Any posttraumatic Stress Symptoms | | Posttraumatic Stress Disorder | |
|---|---|---|---|---|---|---|
| | Yes (n=6,326 (57.2%) | No (n=4,743; 42.9%) | Yes (n=4,613; 73.0%) | No (n=1,706; 27%) | Yes (n=1,150; 18.2%) | No (n=5,169; 81.8%) |
| Age, median (IQR) | 27 (22-42) | 26 (22-36) | 25 (21-33) | 30 (25-56) | 24 (20-29) | 27 (23-47) |
| $\chi^2$ statistic (p-value) | - | 20.2 (p<0.001) | - | 414.8 (p<0.001) | - | 211.5 (p<0.001) |
| Age categories | | | | | | |
| 15-24 | 2,436 (38.5) | 2,023 (42.7) | 2,031 (44.0) | 403 (23.6) | 620 (54.0) | 1,814 (35.1) |
| 25-34 | 1,994 (31.5) | 1,479 (31.2) | 1,478 (32.1) | 513 (30.1) | 349 (30.4) | 1,642 (31.8) |
| 35-44 | 402 (6.4) | 302 (6.4) | 274 (5.9) | 128 (7.5) | 61 (5.3) | 341 (6.6) |
| 45-54 | 474 (7.5) | 277 (5.8) | 288 (6.2) | 185 (10.8) | 57 (5.0) | 416 (8.1) |
| 55+ | 1,019 (16.1) | 661 (13.9) | 541 (11.7) | 477 (28.0) | 62 (5.4) | 956 (18.5) |
| $\chi^2$ statistic (p-value) | - | 31.0 (p<0.001) | - | 379.8 (p<0.001) | - | 201.9 (p<0.001) |
| Race/ethnicity | | | | | | |
| Non-Hispanic Black | 747 (12.0) | 568 (12.2) | 563 (12.5) | 182 (10.8) | 156 (13.9) | 589 (11.6) |
| Hispanic | 1,165 (18.8) | 952 (20.4) | 903 (20.0) | 262 (15.6) | 257 (22.9) | 908 (17.9) |
| Non-Hispanic white | 3,834 (61.8) | 2,780 (59.6) | 2,686 (59.5) | 1,143 (68.0) | 610 (54.4) | 3,219 (63.4) |
| Other Race, Multiracial | 456 (7.4) | 363 (7.8) | 363 (8.0) | 93 (5.5) | 98 (8.7) | 358 (7.1) |
| $\chi^2$ statistic (p-value) | - | 6.5 (0.091) | - | 40.3 (p<0.001) | - | 32.1 (p<0.001) |
| Sexual identity | | | | | | |
| Gay or homosexual | 4,826 (76.7) | 3,579 (76.0) | 3,474 (75.7) | 1,346 (79.2) | 845 (74.0) | 3,975 (77.2) |
| Bisexual | 1,290 (20.5) | 1,005 (21.4) | 969 (21.1) | 320 (18.8) | 246 (21.5) | 1,043 (20.3) |
| Other[a] | 179 (2.8) | 124 (2.6) | 145 (3.2) | 34 (2.0) | 51 (4.5) | 128 (2.5) |
| $\chi^2$ statistic (p-value) | - | 1.5 (p=0.468) | - | 11.0 (p=0.004) | - | 14.9 (p=0.001) |
| Highest level of education | | | | | | |
| < High school | 151 (2.4) | 116 (2.5) | 131 (2.9) | 20 (1.2) | 62 (5.4) | 89 (1.7) |
| High school or equivalent | 1,054 (16.7) | 824 (17.4) | 862 (18.8) | 190 (11.2) | 270 (23.6) | 782 (15.2) |
| Some college[b] | 2,380 (37.8) | 1,545 (32.7) | 1,842 (40.1) | 536 (31.5) | 506 (44.2) | 1,872 (36.3) |
| College degree or higher | 2,718 (43.1) | 2,239 (47.4) | 1,759 (38.3) | 956 (56.2) | 307 (26.8) | 2,408 (46.8) |
| $\chi^2$ statistic (p-value) | - | 31.2 (p<0.001) | - | 173.9 (p<0.001) | - | 194.3 (p<0.001) |

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| | | | | | | |
|---|---|---|---|---|---|---|
| **Household income** | | | | | | |
| <$20,000 | 927 (16.0) | 534 (12.4) | 783 (18.7) | 142 (8.8) | 268 (25.9) | 657 (13.8) |
| ≥$20,000<$40,000 | 1,338 (23.0) | 842 (19.6) | 1,030 (24.6) | 307 (18.9) | 280 (27.1) | 1,057 (22.2) |
| ≥$40,000<$75,000 | 1,502 (25.9) | 1,155 (26.9) | 1,056 (25.3) | 443 (27.3) | 232 (22.4) | 1,267 (26.6) |
| $75,000+ | 2,044 (35.2) | 1,771 (41.2) | 1,313 (31.4) | 730 (45.0) | 255 (24.6) | 1,788 (37.5) |
| $\chi^2$ statistic (p-value) | - | 59.6 (p<0.001) | - | 152.8 (p<0.001) | - | 132.8 (p<0.001) |
| **Housing instability** | | | | | | |
| Yes | 797 (12.7) | 268 (25.2) | 729 (16.0) | 65 (3.8) | 317 (28.2) | 477 (9.3) |
| No | 5,460 (87.3) | 4,448 (94.3) | 3,827 (84.0) | 1,629 (96.2) | 808 (71.8) | 4,648 (90.7) |
| $\chi^2$ statistic (p-value) | - | 152.7 (p<0.001) | - | 164.7 (p<0.001) | - | 296.2 (p<0.001) |
| **HIV status** | | | | | | |
| Negative | 4,380 (69.2) | 3,181 (67.1) | 3,099 (67.2) | 1,276 (74.8) | 715 (62.2) | 3,660 (70.8) |
| Positive | 597 (9.4) | 238 (5.0) | 429 (9.3) | 168 (9.9) | 113 (9.8) | 484 (9.4) |
| Unknown | 1,349 (21.3) | 1,324 (27.9) | 1,085 (23.5) | 268 (15.4) | 322 (28.0) | 1,025 (19.8) |
| $\chi^2$ statistic (p-value) | - | 120.8 (p<0.001) | - | 49.8 (p<0.001) | - | 39.8 (p<0.001) |
| **Urbanicity** | | | | | | |
| Urban/central | 2,373 (37.6) | 1,837 (38.8) | 1,684 (36.6) | 686 (40.4) | 379 (33.1) | 1,991 (38.7) |
| Suburban/fringe | 1,287 (20.4) | 1,020 (21.6) | 935 (20.3) | 350 (20.6) | 250 (21.8) | 1,035 (20.1) |
| Medium/small metro | 1,994 (31.6) | 1,418 (30.0) | 1,487 (32.3) | 505 (29.7) | 393 (34.3) | 1,599 (31.0) |
| Rural | 650 (10.3) | 459 (9.7) | 492 (10.7) | 158 (9.3) | 123 (10.7) | 527 (10.2) |
| $\chi^2$ statistic (p-value) | - | 6.1 (p=0.107) | - | 9.7 (p=0.021) | - | 12.5 (p=0.006) |
| **Region** | | | | | | |
| Northeast | 985 (15.6) | 878 (18.5) | 710 (15.4) | 275 (16.1) | 183 (15.9) | 802 (15.5) |
| Midwest | 1,237 (19.6) | 1,025 (21.6) | 890 (19.3) | 346 (20.3) | 208 (18.1) | 1,028 (19.9) |
| South | 2,652 (41.9) | 1,764 (37.2) | 1,967 (42.6) | 680 (39.9) | 489 (42.5) | 2,158 (41.8) |
| West | 1,431 (22.6) | 1,067 (22.5) | 1,032 (22.4) | 398 (23.3) | 265 (23.0) | 1,165 (22.5) |
| Dependent Areas | 21 (0.3) | 9 (0.2) | 14 (0.3) | 7 (0.4) | 5 (0.4) | 16 (0.3) |
| $\chi^2$ statistic (p-value) | - | 36.8 (p<0.001) | - | 4.3 (p=0.370) | - | 2.3 (p=0.0674) |

SMM, cisgender sexual minority men; US, United States

[a]Including heterosexual or straight (n=46), another identity (n=96; e.g., Pansexual, Queer, Asexual, Demisexual, Homoflexible, Bi-curious, Same-Gender-Loving, Tri/Multisexual, undecided or no identity), and questioning (n=37)

[b]Including Associate's degree and technical school

Table 5. Fit indices for latent class models of posttraumatic stress symptoms among trauma-exposed SMM in the US, 2020-2021 (N=6,319).

| K | Log Likelihood (improvement) | Npar | LR χ², df, p-value | AIC (CAIC) | BIC (SABIC) | AWE | VLMR-LRT, p-value | aVLMR-LRT, p-value | BLRT p-value | BF | cmP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | -26,153.097 | 17 | 1,162.505, 233, p<0.001 | 52,340.193 (52,471.966) | 52,454.966 (52,400.944) | 52,480.466 | 14,616.569 p<0.001 | 14,433.317, p<0.001 | <0.001 | <0.000 | <0.001 |
| 3 | -25,330.348 (+822.749) | 26 | 1,525.123, 228, p<0.001 | 50,712.695 (50,914.230) | 50,888.229 (50,805.608) | 50,927.230 | 1,645.498, p<0.001 | 1,624.868, p<0.001 | <0.001 | <0.000 | <0.001 |
| 4 | -24,841.605 (+488.743) | 35 | 882.285, 220, p<0.001 | 49,753.210 (50,024.506) | 49,989.507 (49,878.286) | 50,042.006 | 977.485, p<0.001 | 965.230, p<0.001 | <0.001 | <0.016 | <0.001 |
| 5 | -24,761.141 (+80.464) | 44 | 721.357, 211, p<0.001 | 49,610.282 (49,951.340) | 49,907.340 (49,767.520) | 49,973.340 | **160.928, p=0.0030** | **158.911, p=0.0032** | <0.001 | 0.024 | <0.001 |
| 6 | -24,684.428 (+76.713) | 53 | 567.930, 202, p<0.001 | 49,474.855 (49,885.676) | 49,832.675 (49,664.255) | **49,912.176** | 168.622, p=0.0507 | 166.507, p=0.0525 | <0.001 | 0.592 | 0.005 |
| 7 | -24,639.810 (+44.618) | 62 | 478.695, 193, p<0.001 | **49,403.621 (49,884.202)** | **49,822.202 (49,625.183)** | 49,915.202 | 70.294, p=0.1484 | 69.412, p=0.1512 | <0.001 | - | 0.009 |

SMM, cisgender sexual minority men; US, United States; K, number of classes; Npar, number of free parameters; LR χ², likelihood ratio chi-square test; df, degrees of freedom; AIC, Akaike's Information Criterion; CAIC, Consistent Akaike's Information Criterion; BIC, Bayes' Information Criterion; SABIC, sample size-adjusted Bayes' Information Criterion; AWE, average weight of evidence; VLMR-LRT, Vuong-Lo-Mendell-Rubin likelihood ratio test; aVLMR-LRT, adjusted Vuong-Lo-Mendell-Rubin likelihood ratio test; BLRT, bootstrapped likelihood ratio test; BF, Bayes' Factor; cmP, Approximate Correct Model Probability

Table 6. Characteristics of latent class models of posttraumatic stress symptoms among trauma-exposed SMM in the US, 2020-2021 (N=6,319).

| K | Entropy | Lowest classification probability | Lowest class prevalence |
|---|---------|-----------------------------------|-------------------------|
| 2 | 0.876 | 0.952 | 41.7% |
| 3 | 0.783 | 0.858 | 25.7% |
| 4 | 0.780 | 0.771 | 17.4% |
| 5 | 0.792 | 0.631 | 5.4% |
| 6 | 0.726 | 0.621 | 8.2% |
| 7 | 0.747 | 0.493 | 4.9% |

SMM, cisgender sexual minority men; US, United States; K, number of classes

Figure 2. Line plots of improvement in log-likelihood, BIC, SABIC, CAIC, and AWE values for two through seven latent classes of posttraumatic stress symptoms among trauma-exposed SMM in the US, 2020-2021 (N=6,319).
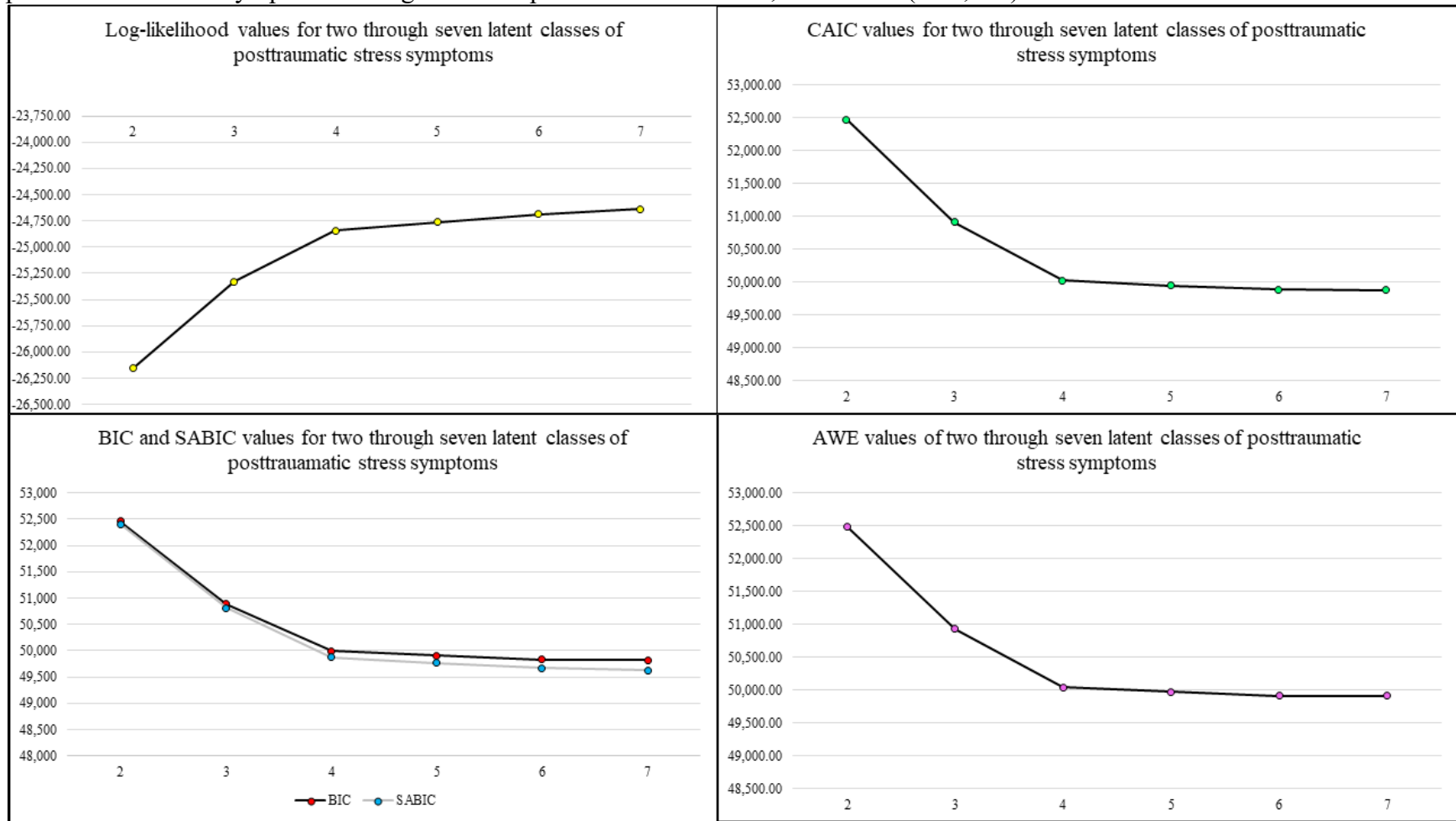


CAIC, consistent Akaike's Information Criterion; BIC, Bayes' Information Criterion; SABIC, sample size-adjusted Bayes' Information Criterion; AWE, approximate weight of evidence; SMM, cisgender sexual minority men; US, United States

Figure 3. Line plot of a four-class model of latent classes of posttraumatic stress symptoms among trauma-exposed SMM in the US, 2020-2021 (N=6,319).
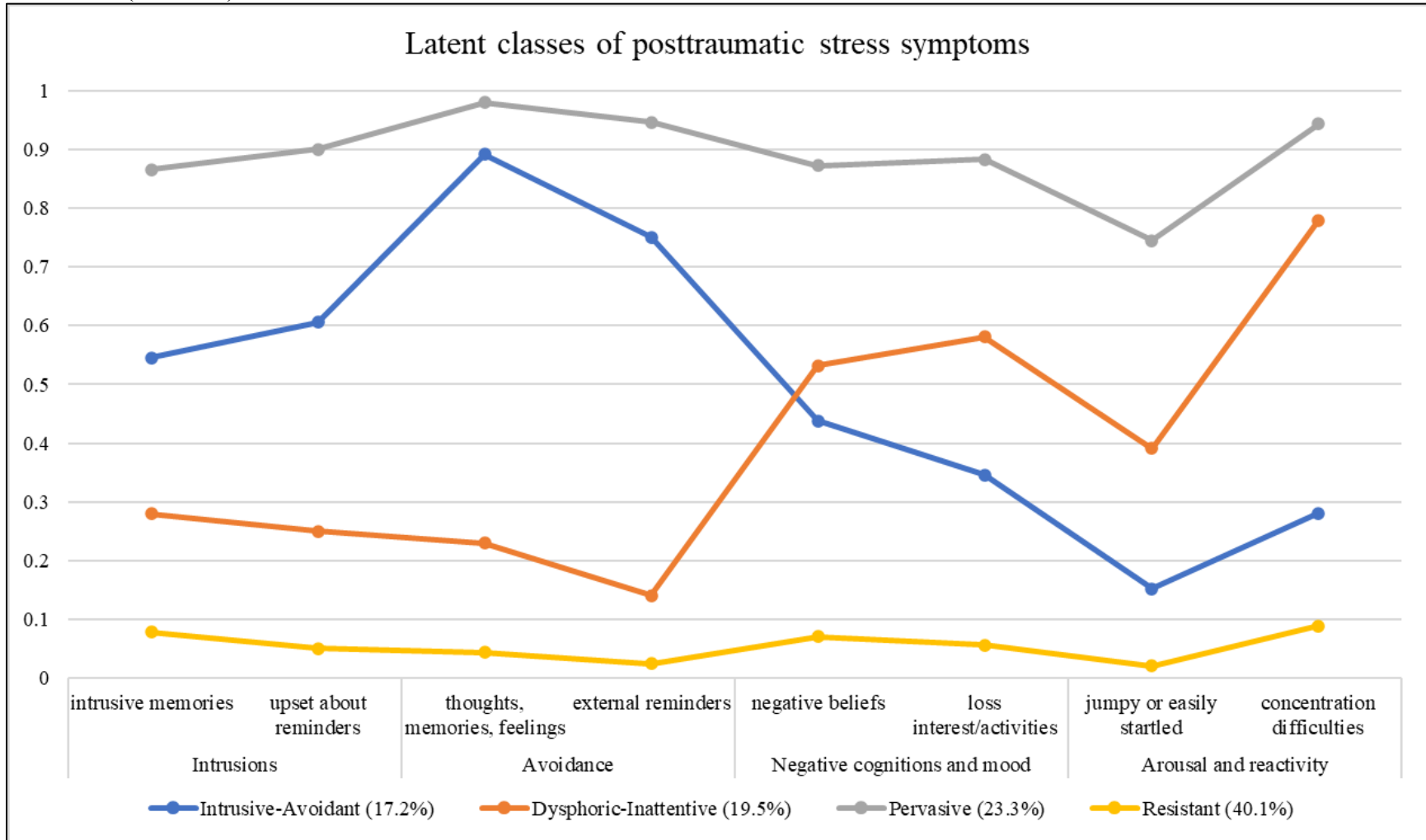


SMM, cisgender sexual minority men; US, United States

Table 7. Results of multinomial logistic regressions of latent classes of posttraumatic stress symptoms on sociodemographic and other characteristics among trauma-exposed SMM in the US, 2020-2021 (N=6,319).

| | Intrusive-Avoidant vs Resistant | | Dysphoric-Inattentive vs Resistant | | Pervasive vs Resistant | |
|---|---|---|---|---|---|---|
| | OR (95% CI) | aOR (95% CI) | OR (95% CI) | aOR (95% CI) | OR (95% CI) | aOR (95% CI) |
| **Age groups** | | | | | | |
| 15-24 | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| 25-34 | 0.64‡ (0.52, 0.80) | **0.78*** (0.61, 0.98) | 0.73† (0.59, 0.91) | 0.85 (0.67, 1.07) | 0.57‡ (0.48, 0.68) | **0.79*** (0.65, 0.96) |
| 35-44 | 0.61† (0.42, 0.87) | 0.74 (0.51, 1.07) | 0.43‡ (0.28, 0.65) | **0.57*** (0.37, 0.88) | 0.38‡ (0.28, 0.52) | **0.57†** (0.40, 0.80) |
| 45-54 | 0.42‡ (0.29, 0.60) | **0.55†** (0.38, 0.81) | 0.38‡ (0.26, 0.56) | **0.48‡** (0.32, 0.73) | 0.28‡ (0.21, 0.38) | **0.43‡** (0.31, 0.61) |
| 55+ | 0.28‡ (0.21, 0.37) | **0.40‡** (0.29, 0.55) | 0.24‡ (0.18, 0.33) | **0.28‡** (0.20, 0.39) | 0.11‡ (0.08, 0.15) | **0.17‡** (0.13, 0.24) |
| **Race/ethnicity** | | | | | | |
| Non-Hispanic white | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Non-Hispanic Black | 2.27‡ (1.78, 2.90) | **1.83‡** (1.39, 2.42) | 0.61† (0.42, 0.88) | **0.47‡** (0.32, 0.70) | 1.20 (0.95, 1.51) | 0.81 (0.61, 1.06) |
| Hispanic | 1.53‡ (1.21, 1.95) | 1.13 (0.87, 1.47) | 1.16 (0.91, 1.47) | 0.83 (0.64, 1.08) | 1.54‡ (1.28, 1.86) | 0.93 (0.75, 1.15) |
| Other, Multiracial | 1.88‡ (1.33, 2.67) | **1.49*** (1.03, 2.14) | 1.49* (1.05, 2.11) | 1.18 (0.82, 1.71) | 1.69‡ (1.27, 2.24) | 1.16 (0.84, 1.58) |
| **Sexual identity** | | | | | | |
| Gay or homosexual | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Bisexual | 1.20~ (0.97, 1.49) | 1.07 (0.85, 1.34) | 0.97 (0.77, 1.22) | 0.95 (0.74, 1.20) | 1.13 (0.95, 1.35) | 1.00 (0.82, 1.22) |
| Other[a] | 1.32 (0.71, 2.45) | 1.04 (0.53, 2.04) | 1.72~ (0.99, 2.99) | 1.61 (0.88, 2.93) | 2.42‡ (1.60, 3.68) | **1.93†** (1.18, 3.14) |
| **Education** | | | | | | |
| Less than high school | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| High school or equivalent | 0.81 (0.41, 1.59) | 0.82 (0.42, 1.59) | 0.48* (0.24, 0.96) | 0.57 (0.27, 1.17) | 0.39‡ (0.23, 0.64) | **0.45†** (0.26, 0.78) |
| Some college[b] | 0.50* (0.26, 0.97) | 0.60 (0.31, 1.15) | 0.52* (0.27, 1.00) | 0.74 (0.37, 1.50) | 0.29‡ (0.18, 0.47) | **0.47†** (0.28, 0.79) |
| College degree or higher | 0.28‡ (0.15, 0.54) | **0.48*** (0.25, 0.92) | 0.31‡ (0.16, 0.60) | 0.60 (0.29, 1.21) | 0.12‡ (0.07, 0.19) | **0.30‡** (0.18, 0.51) |
| **Income** | | | | | | |
| <$20,000 | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| ≥$20,000<$40,000 | 0.90 (0.68, 1.17) | 1.09 (0.82, 1.44) | 0.66† (0.50, 0.87) | **0.68*** (0.51, 0.92) | 0.55‡ (0.44, 0.68) | **0.69†** (0.54, 0.87) |
| ≥$40,000<$75,000 | 0.64† (0.49, 0.83) | 0.93 (0.70, 1.25) | 0.59‡ (0.45, 0.76) | **0.72*** (0.54, 0.95) | 0.33‡ (0.27, 0.41) | **0.55‡** (0.43, 0.71) |
| $75,000+ | 0.40‡ 0.31, 0.52) | **0.68†** (0.51, 0.90) | 0.38‡ (0.29, 0.49) | **0.50‡** (0.38, 0.65) | 0.25‡ (0.20, 0.30) | **0.50‡** (0.40, 0.63) |
| **Housing instability** | | | | | | |
| No | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Yes | 3.49‡ (2.53, 4.83) | **2.43‡** (1.72, 3.41) | 3.05‡ (2.17, 4.29) | **2.32‡** (1.63, 3.31) | 8.11‡ (6.29, 10.46) | **5.25‡** (4.01, 6.86) |
| **HIV status** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Negative | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Positive | 1.17 (0.87, 1.57) | 1.26 (0.91, 1.76) | 0.86 (0.62, 1.20) | 1.29 (0.89, 1.86) | 1.10 (0.87, 1.42) | **1.55**[†] (1.15, 2.08) |
| Unknown | 1.63[‡] (1.31, 2.03) | 1.22 (0.96, 1.56) | 1.50[‡] (1.19, 1.88) | 1.18 (0.93, 1.51) | 1.98[‡] (1.66, 2.35) | **1.25**[*] (1.02, 1.53) |
| Urbanicity | | | | | | |
| Urban | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Suburban | 1.16 (0.90, 1.48) | 1.15 (0.89, 1.49) | 1.04 (0.81, 1.34) | 0.98 (0.75, 1.27) | 1.26[*] (1.04, 1.52) | 1.19 (0.96, 0.15) |
| Small/medium metro | 1.27[*] (1.03, 1.58) | 1.24[~] (0.98, 1.56) | 1.25[*] (1.01, 1.55) | 1.10 (0.87, 1.38) | 1.41[‡] (1.19, 1.67) | **1.28**[*] (1.05, 1.55) |
| Rural | 1.28 (0.95, 1.73) | 1.19 (0.86, 1.65) | 0.96 (0.69, 1.33) | 0.77 (0.54, 1.09) | 1.16 (0.90, 1.49) | 0.94 (0.71, 1.26) |
| Region | | | | | | |
| Northeast | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Midwest | 1.14 (0.83, 1.56) | 1.04 (0.75, 1.45) | 1.15 (0.85, 1.55) | 1.12 (0.81, 1.55) | 0.86 (0.68, 1.10) | 0.80 (0.62, 1.05) |
| South | 1.33[*] (1.01, 1.76) | 1.10 (0.82, 1.47) | 1.11 (0.85, 1.46) | 1.12 (0.85, 1.49) | 1.02 (0.83, 1.25) | 0.92 (0.73, 1.16) |
| West | 1.23 (0.90, 1.66) | 1.14 (0.83, 1.58) | 1.01 (0.75, 1.37) | 0.98 (0.71, 1.35) | 0.96 (0.77, 1.21) | 0.89 (0.69, 1.15) |
| Dependent Areas | 0.08 (0.00, 863.70) | 0.09 (0.00, 23.86) | 0.96 (0.22, 4.15) | 0.80 (0.15, 4.37) | 1.04 (0.36, 3.05) | 1.04 (0.34, 3.19) |

SMM, cisgender sexual minority men; US, United States; vs, versus; OR, odds ratio; aOR, adjusted odds ratio; CI, confidence interval; Ref., reference category; HIV, human immunodeficiency virus

[a]Including heterosexual or straight (n=46), another identity (n=96; e.g., Pansexual, Queer, Asexual, Demisexual, Homoflexible, Bi-curious, Same-Gender-Loving, Tri/Multisexual, undecided or no identity), and questioning (n=37)

[b]Including Associate's degree and technical school

~p<0.10, *p<0.05, †p<0.01, ‡p<0.001

Bolded values indicate statistically significant, adjusted associations

Table 8. Results of multinomial logistic regressions of latent classes of posttraumatic stress symptoms on sociodemographic and other characteristics among trauma-exposed SMM in the US, 2020-2021 (N=6,319).

| | Intrusive-Avoidant vs Pervasive | | Dysphoric-Inattentive vs Pervasive | | Intrusive-Avoidant v Dysphoric-Inattentive | |
|---|---|---|---|---|---|---|
| | OR (95% CI) | aOR (95% CI) | OR (95% CI) | aOR (95% CI) | OR (95% CI) | aOR (95% CI) |
| Age groups | | | | | | |
| 15-24 | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| 25-34 | 1.13 (0.89, 1.44) | 0.98 (0.75, 1.28) | 1.29* (1.04, 1.59) | 1.07 (0.85, 1.35) | 0.88 (0.67, 1.14) | 0.92 (0.69, 1.22) |
| 35-44 | 1.59* (1.03, 2.47) | 1.31 (0.83, 2.07) | 1.13 (0.72, 1.76) | 1.01 (0.63, 1.61) | 1.41 (0.85, 2.34) | 1.30 (0.77, 2.18) |
| 45-54 | 1.51~ (0.96, 2.37) | 1.28 (0.79, 2.07) | 1.37 (0.89, 2.09) | 1.12 (0.71, 1.77) | 1.11 (0.68, 1.81) | 1.14 (0.68, 1.93) |
| 55+ | 2.50‡ (1.68, 3.72) | **2.29‡ (1.48, 3.18)** | 2.17‡ (1.48, 3.17) | **1.62* (1.08, 2.44)** | 1.15 (0.78, 1.71) | 1.41 (0.91, 2.18) |
| Race/ethnicity | | | | | | |
| Non-Hispanic white | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Non-Hispanic Black | 1.89‡ (1.41, 2.55) | **2.27‡ (1.62, 3.18)** | 0.51‡ (0.35, 0.74) | **0.58* (0.39, 0.88)** | 3.73‡ (2.48, 5.61) | **3.89‡ (2.49, 6.08)** |
| Hispanic | 0.99 (0.76, 1.30) | 1.22 (0.91, 1.65) | 0.75* (0.59, 0.95) | 0.90 (0.69, 1.17) | 1.33~ (0.98, 1.80) | 1.36~ (0.97, 1.89) |
| Other, Multiracial | 1.12 (0.76, 1.64) | 1.29 (0.86, 1.94) | 0.88 (0.62, 1.24) | 1.02 (0.71, 1.46) | 1.27 (0.83, 1.93) | 1.26 (0.81, 1.95) |
| Sexual identity | | | | | | |
| Gay or homosexual | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Bisexual | 1.06 (0.83, 1.37) | 1.07 (0.82, 1.39) | 0.85 (0.67, 1.09) | 0.95 (0.74, 1.21) | 1.25 (0.94, 1.66) | 1.13 (0.84, 1.52) |
| Other[a] | 0.55~ (0.29, 1.02) | 0.54~ (0.26, 1.12) | 0.71 (0.43, 1.17) | 0.83 (0.50, 1.39) | 0.77 (0.38, 1.56) | 0.65 (0.30, 1.43) |
| Education | | | | | | |
| Less than high school | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| High school or equivalent | 2.10* (1.14, 3.86) | 1.81~ (0.97, 3.36) | 1.25 (0.72, 2.15) | 1.25 (0.69, 2.28) | 1.68 (0.80, 3.53) | 1.45 (0.65, 3.20) |
| Some college[b] | 1.74~ (0.96, 3.15) | 1.29 (0.70, 2.36) | 1.79* (1.07, 2.98) | 1.60 (0.90, 2.83) | 0.97 (0.48, 1.99) | 0.81 (0.38, 1.74) |
| College degree or higher | 2.39† (1.32, 4.35) | 1.60 (0.86, 2.98) | 2.65‡ (1.58, 4.44) | **1.99* (1.11, 3.59)** | 0.90 (0.44, 1.85) | 0.80 (0.37, 1.75) |
| Income | | | | | | |
| <$20,000 | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| ≥$20,000<$40,000 | 1.63† (1.22, 2.18) | **1.59† (1.17, 2.15)** | 1.20 (0.92, 1.56) | 0.99 (0.75, 1.31) | 1.36~ (0.98, 1.90) | **1.60† (1.13, 2.26)** |
| ≥$40,000<$75,000 | 1.94‡ (1.44, 2.61) | **1.69† (1.21, 2.35)** | 1.78‡ (1.37, 2.32) | 1.29 (0.97, 1.71) | 1.09 (0.79, 1.50) | 1.31 (0.92, 1.86) |
| $75,000+ | 1.62† (1.21, 2.17) | 1.37~ (0.99, 1.88) | 1.53† (1.19, 1.98) | 1.00 (0.76, 1.31) | 1.06 (0.77, 1.46) | 1.37~ (0.97, 1.94) |
| Housing instability | | | | | | |
| No | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Yes | 0.43‡ (0.33, 0.57) | **0.46‡ (0.34, 0.63)** | 0.38‡ (0.29, 0.49) | **0.44‡ (0.34, 0.58)** | 1.15 (0.81, 1.62) | 1.05 (0.72, 1.52) |
| HIV status | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Negative | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Positive | 1.05 (0.74, 1.49) | 0.82 (0.54, 1.22) | 0.78 (0.55, 1.10) | 0.83 (0.57, 1.22) | 1.35 (0.90, 2.03) | 0.98 (0.62, 1.55) |
| Unknown | 0.83 (0.65, 1.05) | 0.98 (0.75, 1.29) | 0.76* (0.61, 0.95) | 0.95 (0.74, 1.21) | 1.09 (0.83, 1.43) | 1.03 (0.77, 1.39) |
| Urbanicity | | | | | | |
| Urban | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Suburban | 0.92 (0.69, 1.23) | 0.96 (0.71, 1.30) | 0.83 (0.64, 1.08) | 0.82 (0.62, 1.07) | 1.11 (0.81, 1.53) | 1.18 (0.85, 1.64) |
| Small/medium metro | 0.90 (0.70, 1.16) | 0.97 (0.74, 1.27) | 0.89 (0.71, 1.11) | 0.86 (0.68, 1.09) | 1.02 (0.77, 1.34) | 1.13 (0.84, 1.52) |
| Rural | 1.11 (0.77, 1.58) | 1.27 (0.86, 1.87) | 0.83 (0.59, 1.17) | 0.81 (0.56, 1.18) | 1.33 (0.89, 1.99) | **1.56* (1.01, 2.41)** |
| Region | | | | | | |
| Northeast | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| Midwest | 1.32 (0.91, 1.90) | 1.29 (0.88, 1.89) | 1.33~ (0.97, 1.82) | **1.39* (1.01, 1.93)** | 0.99 (0.66, 1.48) | 0.93 (0.61, 1.40) |
| South | 1.31~ (0.95, 1.79) | 1.19 (0.85, 1.67) | 1.09 (0.83, 1.44) | 1.22 (0.92, 1.63) | 1.20 (0.84, 1.70) | 0.98 (0.68, 1.41) |
| West | 1.28 (0.90, 1.81) | 1.28 (0.88, 1.85) | 1.05 (0.77, 1.44) | 1.10 (0.79, 1.52) | 1.21 (0.82, 1.79) | 1.17 (0.77, 1.76) |
| Dependent Areas | 0.08 (0.00, 956.77) | 0.09 (0.00, 23.81) | 0.92 (0.20, 4.11) | 0.77 (0.16, 3.63) | 0.08 (0.00, 1168.71) | 0.11 (0.00, 40.58) |

SMM, cisgender sexual minority men; US, United States; vs, versus; OR, odds ratio; aOR, adjusted odds ratio; CI, confidence interval; Ref., reference category; HIV, human immunodeficiency virus

[a]Including heterosexual or straight (n=46), another identity (n=96; e.g., Pansexual, Queer, Asexual, Demisexual, Homoflexible, Bi-curious, Same-Gender-Loving, Tri/Multisexual, undecided or no identity), and questioning (n=37)

[b]Including Associate's degree and technical school

~p<0.10, *p<0.05, †p<0.01, ‡p<0.001

Bolded values indicate statistically significant, adjusted associations

**MANUSCRIPT TWO: Associations between latent classes of posttraumatic stress symptoms and HIV transmission risk behavior among cisgender sexual minority men in the United States**

**Abstract**

**Background**

Cisgender sexual minority men (SMM) continue to be disproportionately impacted by HIV. Posttraumatic stress symptoms have received little but growing focus as a contributing psychological factor to HIV transmission risk behaviors (TRBs). However, the inherent nuance and heterogeneity of posttraumatic stress symptoms have yet to be captured or modeled when investigating this relationship. Likewise, sociodemographic and other factors that may affect conceptions and manifestations of posttraumatic stress symptoms, or moderate their association with TRBs, have received little attention.

**Methods**

Using online cross-sectional survey data from a subsample of trauma-exposed, cisgender, non-Hispanic Black (n=688) and white SMM (n=3,598), latent class analysis was performed on responses to a posttraumatic stress symptom scale to confirm the same latent class structure identified previously in the full sample. Next, multiple-indicator, multiple-cause (MIMIC) modeling was used to assess measurement invariance of posttraumatic stress symptom class parameters by race. The manual three-step Bolck, Croon, and Hagenaars method with distal outcome inclusion was employed to determine associations between latent class membership and any serodiscordant condomless anal sex and serodiscordant condomless anal sex with a partner who was not using HIV prevention or treatment medication at the time of sex. Moderation of these associations by race and social cohesion was subsequently examined.

**Results**

The same latent class structure of posttraumatic stress symptoms identified in previous research was replicated: "Intrusive-Avoidant" (n=707, class prevalence=16.5%); "Dysphoric-Inattentive"

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**Background**

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**Methods**

Using online cross-sectional survey data from a subsample of trauma-exposed, cisgender, non-Hispanic Black (n=688) and white SMM (n=3,598), latent class analysis was performed on responses to a posttraumatic stress symptom scale to confirm the same latent class structure identified previously in the full sample. Next, multiple-indicator, multiple-cause (MIMIC) modeling was used to assess measurement invariance of posttraumatic stress symptom class parameters by race. The manual three-step Bolck, Croon, and Hagenaars method with distal outcome inclusion was employed to determine associations between latent class membership and any serodiscordant condomless anal sex and serodiscordant condomless anal sex with a partner who was not using HIV prevention or treatment medication at the time of sex. Moderation of these associations by race and social cohesion was subsequently examined.

**Results**

The same latent class structure of posttraumatic stress symptoms identified in previous research was replicated: "Intrusive-Avoidant" (n=707, class prevalence=16.5%); "Dysphoric-Inattentive"

(n=782, class prevalence=18.2%); "Pervasive" (n=985, class prevalence=23.0%); and "Resistant" (n=1,812, class prevalence=42.3%). In the first outcome model, a significantly higher prevalence of any serodiscordant condomless anal sex was associated with Pervasive (=27.9, 95% CI=18.0, 37.7, p=0.002) and Dysphoric-Inattentive class membership (=26.8, 95% CI=16.3, 37.3, p=0.032) relative to Resistant class membership (=21.7, 95% CI=11.7, 31.6). In the second outcome model, a significantly and marginally higher prevalence of serodiscordant condomless anal sex with a partner who was not using HIV prevention or treatment medication at the time of sex was associated with Pervasive (=27.9, 95% CI=18.0, 37.7, p=0.002) and Dysphoric-Inattentive class membership (=26.8, 95% CI=16.3, 37.3, p=0.032), respectively, relative to Resistant class membership (=16.8, 95% CI=7.4, 26.2). There were no significant moderation effects.

**Conclusion**

Distinct patterns of posttraumatic stress symptoms are differentially associated with HIV TRB, necessitating integrated trauma-focused, sexual risk-reduction interventions tailored to subtypes of presentation of posttraumatic stress symptoms. Furthermore, posttraumatic stress symptoms may manifest differently among Black SMM relative to white SMM and lead to unique health impacts, warranting additional research and potentially Black SMM-specific measurement tools and/or intervention strategies.

**Introduction**

Cisgender sexual minority men (SMM) continue to bear a disproportionate burden of HIV and AIDS in the United States (US). The Centers for Disease Control and Prevention indicate that 69% of new HIV diagnoses in 2018 were among SMM, and nearly two thirds of people living with HIV (PLHIV) are SMM; of these, less than 60% were virally suppressed at the end of 2018.[1] Racial disparities are evident among SMM subgroups, with Black SMM being the most disproportionately impacted since the epidemic emerged.[2,3] In 2018, Black SMM accounted for 26% of all incident HIV infections, despite accounting for roughly 0.2% of the US population, and 37% of incident HIV infections among SMM specifically, despite accounting for roughly 9% of the SMM population.[1]

Among the psychosocial factors contributing to HIV transmission risk, depression and substance use have been the most examined.[4-8] Other contributing factors, such as posttraumatic stress symptomology, continue to be underemphasized in research endeavors, despite literature indicating its potential role in HIV-related outcomes. Posttraumatic stress is generally conceptualized diagnostically, as posttraumatic stress disorder (PTSD), which is characterized by intrusions (e.g., thoughts, memories, flashbacks, nightmares related to trauma; associated psychological distress), avoidance (e.g., exerting effort not to think about or experiencing feelings related to the trauma; avoiding external reminders of trauma), negative cognitions and mood (e.g., negative thoughts about self or others; anhedonia, detachment), and arousal and reactivity symptoms (e.g., hypervigilance, difficulties concentrating).[9]

Research on trauma exposure – the antecedent to posttraumatic stress symptoms/PTSD – has found consistent links with several HIV-related outcomes, including incident HIV infection[10-12] and positive HIV status,[13-20] as well as HIV transmission risk behaviors (TRBs)

such as condomless anal sex,[13,20-26] including among serodiscordant partners,[15,18,19,26-29] and sex under the influence of drugs or alcohol.[28,30,31] Though posttraumatic stress symptomology does not always follow trauma exposure, the above findings suggest there is a high likelihood that it may mediate the association between trauma exposure and engagement in TRBs in at least some instances through several mechanisms: depletion of positive conceptions of self and reduction in self-regulatory emotional capacities;[32-34] modification of risk-appraisal and risk-processing; decreased sexual self-efficacy (i.e., belief in one's ability to handle a sexual context well);[35] fostering of avoidant coping behaviors (such as high-risk sex); or some complex combination thereof.[22,33,36-38]

PTSD has been shown to mediate the link between trauma exposure and incident HIV infection among racially/ethnically diverse SMM.[11] In addition, PTSD has been linked to condomless anal sex in samples of racially/ethnically diverse SMM of mixed serostatus,[39] as have greater levels of PTSD symptoms and PTSD diagnosis in samples of Black SMM living with HIV, specifically.[40,41] Greater levels of PTSD symptoms and PTSD diagnosis have also been directly and indirectly linked to serodiscordant condomless anal sex in samples of racially/ethnically diverse SMM living with and without HIV.[42-44] Two studies employed more nuanced analytic approaches, examining associations between symptom clusters or specific symptoms of PTSD and HIV-related outcomes. A study with Black SMM living with HIV revealed intrusive and arousal/reactivity symptom clusters to be linked with substance use just prior to sex,[41] while a study with racially/ethnically diverse, urban, HIV-negative SMM used a network analysis approach to show cognitive avoidance and emotional numbing symptoms to be directly linked to greater number of condomless anal sex episodes.[45]

While the above literature points to a clear link between posttraumatic stress symptomology/PTSD and TRBs, several factors may affect this relationship that have yet to be systematically considered. Research with other populations has shown that posttraumatic stress symptoms – both at the diagnostic and subsyndromal levels – can manifest in diverse patterns.[46-51] Such patterns have not been explored in research with SMM, and could reveal differential relationships with TRBs. Similarly, posttraumatic stress symptoms may manifest differently according to the presence of other marginalized or stigmatized attributes, such as race, and associations with TRBs could likewise be moderated by race. For Black SMM in particular, intersecting race- and sexuality-based stigmas and lived experiences[52,53] could shape conceptions and experiences of posttraumatic stress symptoms, increase susceptibility to posttraumatic stress symptoms and their potential impacts, constrain access to positive coping resources, and contribute to engagement in TRB.[54,55] For example, sexual racism and stereotyping faced by Black SMM has been shown to decrease sexual self-efficacy, [56-59] and this could be further exacerbated by posttraumatic stress symptoms and lead to even greater TRB in this population. Lastly, social cohesion – a form of cognitive social capital defined as the extent to which one perceives trusting relationships with other SMM and believes other SMM can be reliably depended upon to gain needed support and resources[60] – has been shown to be protective against poor mental health and TRB in prior studies with SMM,[61-63] and may likewise moderate the association between posttraumatic stress symptom patterns and TRB. Constructs related to social cohesion, such as coping, social support, and resilience, have also been found to be protective against TRB.[64-66]

To increase understanding of heterogeneous presentations of posttraumatic stress symptomology and their potentially differential links to TRBs among SMM, the ways in which

different subgroups of SMM may differentially conceive of and experience posttraumatic stress symptoms must be more intentionally captured and modeled. Building on prior research that identified latent classes of posttraumatic stress symptoms (manuscript one), the objectives of this analysis were to (1) assess measurement invariance and differential item functioning (DIF) in latent class parameters by race, (2) determine associations between latent classes and serodiscordant condomless anal sex, and (3) examine moderation of these associations by race and social cohesion in a sample of trauma-exposed, cisgender, non-Hispanic Black and white SMM in the US. This study focuses on these particular subgroups of SMM due to the ongoing HIV disparities between them[1] and the differences in lived experience due to anti-Black racism and white privilege in the US.

**Methods**

*Data source, participants, and procedures*

The American Men's Internet Survey (AMIS)[67,68] is an annual cross-sectional web-based behavioral survey of 10,000+ SMM living in the US. From September 2020-January 2021, participants were recruited through convenience sampling from a variety of websites using banner advertisements or emails to website subscribers. Individuals who clicked on the ads were taken directly to the survey website hosted on a secure server administered by SurveyGizmo.[69] Recruitment efforts also included emailing participants from the previous cycle of AMIS (2019) who consented to be re-contacted for future studies. Eligibility criteria included being ≥15 years of age, being cisgender male, US residence, and lifetime oral or anal sex with a man or self-identification as gay or bisexual. MSM who met the eligibility criteria and consented to participate began the survey immediately. Participants were not compensated for completing the survey.

Several data-cleaning steps were performed, including deduplication of survey responses and restriction of surveys to participants who reported having oral or anal sex in the past 12 months, provided a valid US ZIP code, and provided consent. Information on sociodemographic characteristics, past-year sexual behaviors, past-year sexual health care utilization, use/uptake of HIV prevention strategies, mental health (including trauma exposure and posttraumatic stress symptoms), substance use, and other domains was collected. Ethical approval for this study was obtained from Emory University Institutional Review Board, and secondary analysis of the de-identified dataset was deemed exempt from Johns Hopkins University Institutional Review Board.

*Measures*

**Trauma exposure**. In line with other researchers who have used, or advocated for use of, a more relaxed trauma exposure criterion than that found in the Diagnostic & Statistical Manual of Mental Disorders-5 (DSM-5; to capture a broader range of potentially traumatic events),[39,70,71] a single, yes/no item describing a range of traumas was used to assess lifetime trauma exposure: "Sometimes things happen to people that are extremely upsetting, like being in a life threatening situation such as a major disaster, very serious accident or fire; being physically or sexually assaulted or raped, seeing another person killed or dead, or badly hurt; hearing about something horrible that has happened to someone you are close to; being diagnosed with a chronic illness like HIV; or being incarcerated in jail or prison. Have you ever experienced this kind of event?" Participants answering affirmatively were automatically directed to the PTSD symptom scale.

**PTSD symptoms**. Past-month PTSD symptoms were assessed with an 8-item version of the Posttraumatic Checklist for the DSM-5 (PCL-5; originally 20 items)[72-74] (Table 9; Appendix A). This reduced version of the PCL-5, hereafter referred to as R-PCL-5, contained two

symptoms from each PTSD symptom cluster. As in the full version, the same stem ("In the past month, how much were you bothered by") was applied to each symptom (e.g., "Repeated, disturbing, and unwanted memories of the stressful experience?"). Participants responded on a five-point Likert scale ranging from "Not at all" (0) to "Extremely" (4). Items were summed to arrive at a composite score (range=0-32), with scores of 19 or higher indicative of PTSD.[74] For the present LCA, response options were dichotomized because, conceptually, PTSD symptoms are binary constructs, being assessed clinically by their presence or absence, as described in the DSM-5; moreover, in the present study, the goal and interest was the presence/absence of symptoms rather than intensity of symptoms. Response options were dichotomized by collapsing all affirmative responses greater than 1 (i.e., mildly bothered by a given symptom), in accordance with prior research to ensure variability and avoid ceiling effects.[48,75,76]

**Distal outcomes**. Distal outcomes are variables used to assess the presumed effects or consequences of being in one latent class versus another.[77] The term "distal" aligns with language used in statistical software and procedures used to measure associations between outcomes and latent class membership. Though the term "distal" connotes a second time point for outcome measurement, the data here were cross-sectional, meaning there was only one time point at which both exposures and outcomes were measured.

Past-year condomless anal sex was assessed with one yes/no item. Among those who answered affirmatively, additional yes/no items were asked to determine whether or not participants had condomless anal sex with a partner of serodiscordant HIV status, and whether that partner was taking HIV prevention or treatment medication (i.e., antiretroviral treatment [ART] if the partner was living with HIV; HIV pre-exposure prophylaxis [PrEP] if the partner was HIV-negative) at the time of sex. Using this information, two TRB variables were created:

(1) any past-year serodiscordant condomless anal sex (hereafter referred to as TRB-1), and (2) any past-year serodiscordant condomless anal sex with a partner who was not taking HIV prevention or treatment medication at the time of sex (hereafter referred to as TRB-2). Serodiscordant was defined as an HIV-negative participant with an HIV-positive or unknown status partner, or an HIV-positive participant with an HIV-negative or unknown status partner.[78]

**Potential moderators**. With regard to race/ethnicity, participants were asked, "Which racial group or groups do you considered yourself to be a part of?" Response options included American Indian or Alaska Native; Asian; Black or African-American; Native Hawaiian or Other Pacific Islander; or white. Participants could select multiple responses. Participants were also asked a yes/no item regarding ethnicity, "Do you consider yourself to be Hispanic or Latino?" As indicated previously, this study was restricted to non-Hispanic Black and non-Hispanic white participants.

Social cohesion was assessed with an eight-item social cohesion scale adapted from the World Bank's Social Capital Tool.[60] Items were focused on social bonds and perceptions of trust within the SMM community and consisted of declarative statements about the extent to which participants could rely on other SMM to provide assistance when in trouble (e.g., "You can count on other gay/bisexual men if you need to talk about your problems"; "You can count on other gay/bisexual men if you need to borrow money"). Response options ranged from "strongly disagree" (1) to "strongly agree" (5). Scores were summed and averaged to arrive at a mean social cohesion score (range=1-5). Higher scores were indicative of greater social cohesion ($\alpha$=0.86).

**Potential confounders**. Selection of potential confounders was based on prior research.[39,43,44] Highest level of education was assessed with six response options: "never

attended school"; "less than high school"; "some high school"; "high school diploma or GED"; "some college, Associate's degree, or technical school"; and "college, postgraduate studies, or professional school." For analysis, four education categories were created: "less than high school"; "high school or equivalent"; "some college or a technical degree"; and "earned a college degree or higher." For HIV status, participants were asked to report the result of their most recent HIV test: "negative," "positive," "never obtained results," "indeterminate," "I prefer not to answer," and "don't know." Those who did not indicate "positive" or "negative" and those who reported not having had an HIV test were categorized as "unknown." This resulted in a three-level categorical variable: "negative," "positive," and "unknown." For sexual identity, participants could select one of five options: heterosexual or straight; gay or homosexual; bisexual; another identity (which they could then write-in); and don't know (considered "questioning"). For analysis, participants reporting heterosexual or straight, another identity, and questioning were combined due to small values.

*Statistical analyses*

Descriptive statistics for variables of interest were computed, and the Kruskal-Wallis rank sum tests (for age and social cohesion) and chi-square tests (for all other variables) were used to examine differences by each outcome. Next, as this was a subsample from prior work (manuscript one), three sets of latent class analyses (LCA) on responses to the R-PCL-5 were performed to confirm configural invariance and to determine if the class structure from the aforementioned prior work would be replicated. LCA is a novel, person-centered analytic approach that can identify distinct patterns in responses to posttraumatic stress symptom indicators that reflect underlying classes of posttraumatic stress symptoms by which SMM with similar response tendencies cluster together.[79]

To confirm configural invariance, LCA was performed on Black SMM and white SMM separately. Next, LCA was repeated on the combined sample. For each LCA, latent class models with two through seven latent classes were considered. Several information criteria (Akaike's Information Criterion [AIC], Consistent AIC [CAIC], Bayesian Information Criterion [BIC], Sample size-Adjusted BIC [SABIC], and Approximate Weight of Evidence [AWE][80]), relative fit indices (Vuong-Lo-Mendell-Rubin Likelihood Ratio Test [VLMR-LRT] and adjusted VLMR-LRT, Bootstrapped Likelihood Ratio Test [BLRT], Bayes Factor [BF],[81,82] and Approximate Correct Model Probability [cmP]), other fit information (Log-Likelihood value [LL], Likelihood Ratio Chi-Square Test [LR $\chi^2$]), model characteristics (entropy statistic of class delineation, lowest classification probability, and lowest class prevalence), and the principles of parsimony and diminishing return were considered to select the best-fitting model.[83] A Full Maximum Likelihood estimator was used under the assumption that data were missing at random to derive estimates based on all available data while simultaneously accounting for any missingness. No data were imputed.

After selecting the optimal unconditional latent class model, stepwise multiple-indicator multiple-cause (MIMIC) modeling[84] was performed to assess measurement invariance and differential item functioning (DIF) of the posttraumatic stress symptom class parameters by race. In other words, the extent to which Black and white participants within each class differentially responded to the R-PCL-5 items was assessed, which would be a possible indication of how Black and white participants diversely conceived of or experienced posttraumatic stress symptoms.[84] An effect size rating system[85] based on logit values was used to determine DIF strength (low, <0.45; medium, ≥0.45<0.90; large, ≥0.90). The model that best accounted for measurement non-invariance (i.e., variance) was used as the base model for outcome analyses.

The outcome analytic model is depicted in Figure 4. The manual three-step Bolck, Croon, and Hagenaars (BCH) method[86] was employed to determine associations between latent classes and serodiscordant condomless anal sex. This is the recommended method for examining associations between latent classes and distal outcomes, as it preserves class structure and reduces bias by using weights to account for measurement error of latent class assignment; because true class membership is latent/unknown, accounting for measurement error in class assignment is necessary to avoid bias, which cannot be achieved with traditional regression approaches.[77,86] First, using the latent class model accounting for measurement variance (above), LCA was performed without covariates or distal outcomes, and the BCH weights were saved. Next, the association between latent classes and each distal outcome were estimated while incorporating the BCH weights and adjusting for covariates of both the latent classes and each distal outcome. It should be noted that differences in distal outcomes by class membership were tested through pairwise Wald tests, while significance of covariates were assessed through multinomial logistic regression of class membership (and outcomes) onto covariates. Finally, moderation of the associations between latent classes and TRB by race and social cohesion were examined by allowing their effects to be freely estimated across classes, again using pairwise Wald tests to assess differences. When appropriate, parameter estimates were exponentiated to generate odds ratios, and Wald tests, with significance set at $\alpha=0.05$, and 95% confidence intervals were calculated and examined. All procedures were conducted in Stata version 15[87] and Mplus version 8.[88]

*Sensitivity analysis*

With regard to the outcomes, no items specifically assessed whether or not participants themselves were taking HIV prevention or treatment medication at the time of sex, only their

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sexual partner. Instead, participants living with HIV were asked if they were currently taking ART, and those living without HIV were asked if they had taken PrEP during the past year. Therefore, assuming the best-case scenario in which participants reporting current ART use or past-year PrEP use were actually taking these medications at the time of sex and were adherent, a third variation of the outcome variable was created: any past-year serodiscordant condomless anal sex with a partner who, *in addition to the participant*, was not taking HIV prevention or treatment medication at the time of sex (hereafter referred to as TRB-3). This variable was subjected to the same analyses as the other outcome variables described above.

**Results**

*Sample characteristics*

Out of 13,433 participants who completed the survey, 11,069 answered the trauma exposure item; of these, 6,319 endorsed trauma exposure and completed the PTSD symptom scale. Restricting the sample to non-Hispanic Black and non-Hispanic white participants left N=4,574. A number of participants (n=288) were missing data on social capital and were excluded, leaving N=4,286 for the present analysis. Those with missing data were significantly less likely to fall in all older age categories (relative to the youngest, aged 15-24 years) and the two higher income categories (relative to the lowest, <$20,000), significantly more likely to be living with an unknown HIV status (relative to negative status), and significantly more likely to be living in a rural area (relative to an urban/central area) and in the Midwest (relative to the Northeast). This indicates the data were missing at random, justifying the use of the Full Maximum Likelihood estimator.

Sample characteristics are presented in Table 10. Median age was 28 years. Roughly half of participants (2,013/4,286) had completed a four-year college degree or higher education.

Seventy-eight percent (3,328/4,286) identified as gay or homosexual. One in nine (453/4,286) were living with HIV, while one in five (861/4,286) did not know their HIV status. Sixteen percent of participants (688/4,286) were non-Hispanic Black, and mean social cohesion score was 3.38. Nearly three quarters of participants (3,145/4,286) reported condomless anal sex, while just over a quarter (1,137/4,286) reported serodiscordant condomless anal sex. Of these, 73% (830/1,137) reported the partner was not taking HIV prevention or treatment medication at the time of sex. Differences in TRBs by sociodemographic characteristics are presented in Table 11.

*Latent class enumeration*

Separate latent class analyses of posttraumatic stress symptoms among Black and white SMM revealed the same four-class structure in both groups, providing rationale to combine them (not displayed). In the combined sample, solutions were replicated using different sets of starting values, suggesting model identification. Fit indices for latent class models with two through seven classes are presented in Table 12. The AIC, CAIC, BIC, SABIC, AWE, and cmP only reached a minimum value in the model with the maximum number of classes (i.e., seven). The VLMR-LRT and aVLMR-LRT indicated a five-class and a seven-class solution, while the BLRT and BF did not indicate any solution. Line plots (Figure 5) identified the point of diminishing return at class five. In other words, substantial improvements in fit (i.e., increase in log-likelihood value) were evident when adding a third class (+535.1) and a fourth class (+329.8), but diminished sharply with each additional class thereafter (fifth class, +78.5; sixth class, +58.6; seventh class, +58.2). Finally, five-, six-, and seven-class solutions each had a class with a prevalence between 3-7%; each also had a class with relatively low classification probability (Table 13). Given these considerations, a four-class solution was selected: class 1, "Intrusive-Avoidant" (n=707, class prevalence=16.5%); class 2, "Dysphoric-Inattentive" (n=782, class

prevalence=18.2%); class 3, "Pervasive" (n=985, class prevalence=23.0%); and class 4, "Resistant" (n=1,812, class prevalence=42.3%).

*MIMIC modeling*

MIMIC modeling results are presented in Table 14. Results revealed evidence of measurement non-invariance (i.e., variance) between Black and white participants ($\chi^2[32]=57.57$, p=0.004). Testing each individual indicator for nonuniform DIF revealed that, for four out of eight items – intrusive memories ($\chi^2[4]=8.69$, p=0.069), upset about reminders ($\chi^2[4]=11.19$, p=0.025), loss of interest in activities ($\chi^2[4]=28.12$, p<0.001), and jumpiness ($\chi^2[4]=11.49$, p=0.022) – models without DIF had significantly or marginally worse fit than models allowing nonuniform DIF. The models specifying uniform DIF for intrusive memories ($\chi^2[4]=4.72$, p=0.194), loss of interest in activities ($\chi^2[4]=0.94$, p=0.816), and jumpiness ($\chi^2[4]=4.70$, p=0.195) did not have statistically significantly worse fit than the models specifying nonuniform DIF. The model specifying nonuniform DIF for feeling upset about reminders of trauma had statistically significantly worse fit ($\chi2[4]=13.48$, p=0.004) than the model specifying uniform DIF. Examination of logit estimates indicated negligible (i.e., <0.45) effect sizes for intrusive memories ($\beta=0.38$), loss of interest ($\beta=0.37$), and jumpiness ($\beta=-0.20$); negligible effect sizes for feeling upset about reminders of trauma in the Intrusive-Avoidant ($\beta=-0.16$), Dysphoric-Inattentive ($\beta=-0.05$), and Resistant classes ($\beta=0.01$); and a large effect size (i.e., $\geq0.90$) for feeling upset about reminders of trauma in the Pervasive class ($\beta=2.19$; Tables 15-16).

*Predictors of latent class membership*

Associations between covariates and class membership are presented in Table 17; Resistant class membership was the reference group. Age and social capital were each negatively associated with Intrusive-Avoidant (aOR=0.98, 95% CI=0.97, 0.99; aOR=0.77, 95% CI=0.67,

0.89), Dysphoric-Inattentive (aOR=0.97, 95% CI=0.96, 0.98; aOR=0.79, 95% CI=0.69, 0.90), and Pervasive class membership (aOR=0.96, 95% CI=0.96, 0.97; aOR=0.58, 95% CI=0.52, 0.65). Relative to less than high school education, having high school or equivalent education (aOR=0.38, 95% CI=0.20, 0.75), some college education (aOR=0.37, 95% CI=0.20, 0.71), and a college degree or higher education (aOR=0.23, 95% CI=0.12, 0.43) were each negatively associated with Pervasive class membership. Black race was positively associated with Intrusive-Avoidant class membership (aOR=0.2.27, 95% CI=1.73, 2.97) and negatively associated with Dysphoric-Inattentive class membership (aOR=0.30, 95% CI=0.17, 0.51). Relative to gay or homosexual identity, other sexual identity was positively associated with Dysphoric-Inattentive class membership (aOR=2.32, 95% CI=1.20, 4.47). Relative to negative HIV status, unknown (aOR=1.28, 95% CI=1.02, 1.62) and positive HIV status (aOR=1.42, 95% CI=1.04, 1.94) were positively associated with Pervasive class membership.

*Associations with sexual behavior outcomes*

Unadjusted and adjusted prevalence estimates of TRBs are presented in Tables 18-19. In the first outcome model, a significantly higher prevalence of TRB-1 was associated with Pervasive (=27.9, 95% CI=18.0, 37.7, p=0.002) and Dysphoric-Inattentive class membership (=26.8, 95% CI=16.3, 37.3, p=0.032) relative to Resistant class membership (=21.7, 95% CI=11.7, 31.6). In the second outcome model, a significantly and marginally higher prevalence of TRB-2 was associated with Pervasive (=27.9, 95% CI=18.0, 37.7, p=0.002) and Dysphoric-Inattentive class membership (=26.8, 95% CI=16.3, 37.3, p=0.032), respectively, relative to Resistant class membership (=16.8, 95% CI=7.4, 26.2) (Figure 6).

Associations between covariates and TRBs are presented in Table 20. Age and social cohesion were negatively associated with TRB-1 (aOR=0.99, 95% CI=0.99, 1.00; aOR=0.97,

95% CI=0.96, 0.99) and TRB-2 (aOR=0.998, 95% CI=0.998, 0.999; aOR=0.97, 95% CI=0.96, 0.99). Relative to negative HIV status, positive HIV status was positively associated with TRB-1 (aOR=1.42, 95% CI=1.35, 1.50) and TRB-2 (aOR=1.27, 95% CI=1.21, 1.34). Black race was positively associated with TRB-1 (aOR=1.07, 95% CI=1.02, 1.11). Relative to gay or homosexual identity, bisexual identity was negatively associated with TRB-1 (aOR=0.97, 95% CI=0.94, 1.00).

Proportions of Black participants and average social cohesion scores across latent classes are presented in Figures 7-8, and moderated effects of race and social cohesion are presented in Table 21. There was no evidence of statistically significant moderation by race or social cohesion. However, in the TRB-2 outcome model, the effect of greater social cohesion was marginally stronger for those in the Dysphoric-Inattentive (aOR=0.94, 95% CI=0.90, 0.99) and Resistant classes (aOR=0.96, 95% CI=0.94, 0.98) relative to those in the Intrusive-Avoidant (aOR=1.00, 95% CI=0.96, 1.05) and Pervasive classes (aOR=1.00, 95% CI=0.97, 1.03).

*Sensitivity analysis*

Nearly 40% (435/1,137; 38%) of participants reported that they, in addition to their partner, were not taking HIV prevention or treatment medication at the time of serodiscordant anal sex. In the third outcome model, a marginally higher prevalence of TRB-3 was associated with Pervasive class membership (=15.0, 95% CI=7.4, 22.6, p=0.099) relative to Resistant class membership (=12.7, 95% CI=4.9, 20.4) (Tables 18-19; Figure 6). Age and social cohesion were negatively associated with TRB-3 (aOR=0.999, 95% CI=0.998, 1.00; aOR=0.98, 95% CI=0.97, 0.99). Relative to negative HIV status, positive HIV status was negatively associated with TRB-3 (aOR=0.92, 95% CI=0.91, 0.94) (Table 20). In the TRB-3 outcome model, the effect of greater social cohesion was marginally stronger for those in the Resistant class (aOR=0.97, 95%

CI=0.95, 0.99) relative to those in the Intrusive-Avoidant class (aOR=1.02, 95% CI=1.00, 1.05) (Table 21).

**Discussion**

This study sought to assess patterns of posttraumatic stress symptoms and associations of these patterns with TRBs, as well as test for measurement invariance in latent classes of symptoms and moderation of their associations with TRBs by race in a sample of trauma-exposed, cisgender, non-Hispanic Black and white SMM in the US. Social cohesion was also explored as a buffer of the relationship between symptom pattern and TRBs. The same number and structure of latent classes that were found in prior research (manuscript one) were replicated in the present study. Despite experiencing comparable patterns of posttraumatic stress symptoms, Black SMM responded differently to posttraumatic stress symptom items than white SMM, possibly indicating that Black SMM conceive of or experience some symptoms differently than white SMM, especially intrusion symptoms. Latent classes of posttraumatic stress symptoms were differentially associated with TRB, but neither race nor social cohesion moderated this relationship, with the exception of some marginal social cohesion as a moderator for TRB-2 and TRB-3.

Pervasive class membership was associated with a higher prevalence of all sexual risk behavior outcomes. This finding is somewhat reflective of prior research with SMM that has found PTSD to be associated with serodiscordant condomless anal sex,[42-44] as a large majority of participants with high probability of belonging to the Pervasive class would have a greater likelihood of meeting criteria for PTSD than participants in the other classes. TRB may serve as an escape or distraction from trauma-related intrusions and associated distress, while simultaneously restoring positive emotions and self-concept.[32,34,37,89] Alternatively, posttraumatic

stress symptoms may maximally tax one's attentional and other cognitive resources, leaving little for the processing of risks and benefits in high-risk situations.[90] When confronted with a decision regarding participation in high-risk sex, SMM with pervasive symptoms may therefore be the least equipped to process the risks involved and take protective measures accordingly. They may also be more likely to seek out high-risk sex as an avoidant form of coping.[22,37,90] Alternatively, confounding may be present: SMM in the Pervasive class may be more broadly socially disadvantaged, as correlates of membership in this class included younger age, less education, less social cohesion, and unknown HIV status. Such conditions may indicate fewer resources overall, including resources to mitigate posttraumatic stress symptoms, resulting in pervasive symptomology and reduced access to HIV prevention/treatment medication and sexual health education. Additional research is needed to understand the mechanisms linking pervasive posttraumatic stress symptoms to sexual risk behavior in this population.

Dysphoric-Inattentive class membership was significantly and marginally associated with a higher prevalence of TRB-1 and TRB-2, respectively. Though a prior study with SMM linked the specific symptom of emotional numbness (which is part of the same negative mood/cognition cluster as some of the symptoms comprising this class) to condomless anal sex, no other studies on posttraumatic stress symptomology have linked the symptoms that comprise this class or their combination to TRB in this population.[41,45] However, some symptoms with high probability of endorsement in this class do overlap with depressive symptomology, and depression has been previously linked to sexual risk behavior among SMM.[36,91,92] The dysphoric symptoms comprising this class (negative beliefs about self, others, the world; anhedonia) could decrease sexual self-efficacy[36] and may reflect a generally low mood in need of upregulation.[32,33] Inattention (difficulties concentrating) may be an indication of reduced cognitive resources, as

described above, which could hamper one's ability to appraise and process risk appropriately.[90] Taken together, such a pattern could then facilitate engagement in TRB. However, like the association with the Pervasive class above, additional research is needed to understand and articulate how this particular pattern is linked to sexual risk behavior. Regardless of the mechanisms, SMM experiencing Dysphoric-Inattentive or Pervasive posttraumatic stress symptom patterns would benefit from trauma-informed coping and sexual risk-reduction counseling.[93,94] Ensuring easy access to HIV prevention and treatment medication with wraparound services to provide adherence maintenance and support may be particularly beneficial to SMM experiencing Pervasive and Dysphoric-Inattentive symptom patterns.

The combination of negative mood/cognition and arousal/reactivity symptoms were common to both the Pervasive and Dysphoric-Inattentive classes, suggesting the unique synergy produced by this symptom combination may strongly underpin or exacerbate sexual risk. The combination of intrusive and avoidant symptoms was less strongly linked to TRBs and did not significantly differ from the Resistant class. The experience of intrusive and avoidant symptoms may be associated with engagement in other health behaviors as a means of coping (e.g., substance use to dull intrusions)[95] not investigated here, and additional research to explore this is needed.

Though lower than in the symptomatic classes, the prevalence of TRB in the Resistant class was still relatively high overall and compared to the other classes. This could be due, at least in part, to the way in which responses to the R-PCL-5 were dichotomized, as participants reporting mild symptoms were included with those reporting no symptoms. Mild posttraumatic stress symptomology could be partially driving engagement in TRB in the Resistant class. Similarly, there are numerous other posttraumatic stress symptoms that were not assessed here

that participants in the Resistant class could be experiencing which may also be linked to TRB. Non-PTSD symptoms (e.g., depressive or anxiety symptoms) that may follow trauma exposure may also characterize participants in the Resistant class and may therefore be contributing to TRB. Regardless of class/symptom pattern, it is apparent that accessible, tailored, and integrated mental and sexual health resources and interventions[4] are needed for trauma-exposed SMM in the US.

Though there was no evidence of moderation by race, there was evidence of differences in responding to the posttraumatic stress items by race. DIF for items from three out of four posttraumatic stress symptom clusters emerged – including intrusive, negative mood/cognition, and arousal/reactivity symptoms – and for four out of eight items included in the posttraumatic stress symptom scale used here. Of the DIF findings, the most significant was the nonuniform DIF effect of Black race on feeling upset about trauma reminders. This effect was large in the Pervasive class and negligible in the others, suggesting that Black SMM with pervasive posttraumatic stress symptoms were more likely to report experiencing moderate or worse feelings of upset in response to trauma reminders than white SMM. The other DIF effects, though they were uniform and negligible, nonetheless indicated that Black SMM were more likely to report moderate or worse intrusive memories and anhedonia, and less likely to report moderate or worse jumpiness, than white SMM. The lived experience of being both Black and a sexual minority, as well as the intersecting stigmas that such lived experience incurs,[52,53] may underly these DIF effects, uniquely shaping vulnerability to, conceptions of, and reactions to trauma. Similarly, this could reflect reduced access to coping or mental health resources (or lack of appropriately tailored resources) to mitigate posttraumatic stress symptoms for Black SMM, resulting in stronger emotional reactions when reminded of trauma. Further research is needed to

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determine the implications of these findings, including the extent to which each DIF effect represents true differences in symptomology and, if confirmed, the way that such differences impact health and wellbeing. Qualitative research with Black SMM may be useful in determining the mechanisms through and ways in which specific symptoms (e.g., feeling upset about trauma reminders) of posttraumatic stress are uniquely perceived and experienced by this population. Phenomenological research in particular could be helpful in this regard.[96] Uniquely tailored posttraumatic stress symptom assessment measures may be warranted for Black SMM.

Though differences in social cohesion across classes were evident, the lack of a significant protective effect of greater social cohesion on TRB in any of the classes was somewhat surprising. Social cohesion, as it was measured here – based on perceptions and restricted to other sexual minority men in participants' networks – may have been too narrowly defined and assessed to accurately capture the construct. Similarly, the type of social cohesion that the scale items were attempting to gauge may be unrelated to or not even target key mechanisms linking posttraumatic stress symptom patterns and TRB. Alternatively, greater social cohesion with other SMM may actually be an indication of greater access to sex partners for some individuals, contributing to TRB rather than preventing it.

It is worth nothing, however, that some marginal moderation was detected. Specifically, the moderation effect of social cohesion was marginally stronger in the Dysphoric-Inattentive class relative to the other symptomatic classes for TRB-2. Because social cohesion has been shown to be protective against depression and suicidality in prior research with SMM,[61-63] the marginal effect seen in the present findings is not surprising given the symptom composition of the Dysphoric-Inattentive class. But the finding could reflect particularities with the social cohesion scale itself, which asked specifically about "other gay/bisexual men" in one's social

network, as well as the racial/ethnic makeup of the Dysphoric-Inattentive class, as it was composed of very few Black SMM. A social cohesion measure centered on relationships with gay- and bisexual-identifying MSM may cater more toward the lived experience of white rather than Black sexual minority men, given the documented differences in socio-cultural environments with regard to homonegativity, sexual identity, social networks, outness/disclosure, and other issues.[97-100] Alternatively, the observed differential effect may indicate that the impact of this particular posttraumatic stress symptom pattern is more easily mitigated by resources such as social cohesion than the other posttraumatic stress symptom patterns are. Programs to assist trauma-exposed SMM to cultivate social cohesion and related resources (e.g., social support and social capital) may facilitate improved coping skills and sexual self-efficacy, potentially reducing TRB. Further, social cohesion and measures tailored to Black SMM may be warranted; this is an area for future research.

These findings should be considered in light of several limitations. First, though the sample of non-Hispanic Black SMM was relatively large (n=688), it was considerably smaller than the sample of non-Hispanic white SMM (n=3,598). Some classes therefore had particularly small proportions of Black participants, possibly preventing the detection of some of the relationships examined, such as moderation by race. Future research should oversample non-Hispanic Black SMM to ensure better comparability of comparison samples. Second, to reduce participant burden, an abbreviated posttraumatic stress symptom scale was used. Using the full version could result in different class structure and composition, which may then yield different findings with regard to associations between class membership and TRB. Third, causality cannot be established, as these were cross-sectional data. However, it is unlikely that engaging in TRB would lead to PTSD symptomology, unless TRB occurred in the context of sexual violence;

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while this is certainly possible, such a scenario would have to have occurred on a large scale (i.e., among a large number of participants) to drive the findings observed in this study. Moreover, assessment of posttraumatic stress symptoms was based on past-month experiences, while assessment of TRBs was based on past-year experiences. TRB may have therefore predated the report of PTSD symptoms, though the symptoms reported could certainly be indicative of experiencing symptoms at an earlier time. Regardless of this common limitation, the associations found here are supported by prior literature that has established a link between trauma/PTSD symptomology and sexual risk behavior.[39,43-45,101]

Fourth, no data were collected to determine if participants were made aware of their sexual partners' not taking HIV prevention or treatment medication before or after sex had occurred. Similarly, no data were collected to determine if participants who reported taking HIV prevention or treatment medication in the past year were taking it at the time of serodiscordant sex, and, if they were, if they had been adherent. As recall could perhaps be difficult in such instances, more frequent survey assessments (in the context of a longitudinal design) may be preferable. Future longitudinal research to establish temporality between symptoms and sexual behaviors is also needed. Fifth, the social cohesion measure was particular to cohesion with other sexual minority men (specifically, gay- and bisexual-identifying men). A more expansive, inclusive, and tailored social cohesion measure may yield alternative findings than what emerged here. Lastly, these findings are particular to non-Hispanic Black and white SMM recruited online and cannot be generalized to SMM of other races/ethnicities sampled through other means. Of particular note, data were collected during the COVID-19 pandemic, which may have affected the ways in which participants experienced posttraumatic stress symptoms, perceived their social cohesion with other sexual minority men, and engaged in sexual behavior.

Among SMM in the US, diverse patterns of posttraumatic stress symptoms are differentially linked to sexual behaviors that increase HIV transmission risk. On top of the contributions made by the diversity of symptom patterns themselves to this relationship, the ways in which subgroups of SMM uniquely conceive of and experience posttraumatic stress symptoms and the distinctive experiences of living with intersecting racial and sexuality stigmas add to the complexity of this relationship. Multi-pronged trauma-informed interventions are needed to address such complexity, and might include sexual risk-reduction, posttraumatic stress symptom-mitigation (tailored to a given symptom pattern), and social support-cultivation components, such as might be found in a group-based format.[94,102] Further, hearing from and working with these communities, as well as recognizing and leveraging existing community strengths, will be critical to ensure that such interventions reflect the needs and experiences of the groups being targeted.

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Table 9. Reduced Posttraumatic Checklist for the DSM-5.

| PTSD symptom clusters | Items<br>*In the past month, how much were you bothered by:* |
|---|---|
| Intrusions | 1. Repeated, disturbing, and unwanted memories of the stressful experience?<br>2. Feeling very upset when something reminded you of the stressful experience? |
| Avoidance | 3. Avoiding memories, thoughts, or feelings related to the stressful experience?<br>4. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)? |
| Negative Cognitions & Mood | 5. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?<br>6. Loss of interest in activities that you used to enjoy? |
| Arousal & Reactivity | 7. Feeling jumpy or easily startled?<br>8. Having difficulty concentrating? |

DSM-5, Diagnostic & Statistical Manual of Mental Disorders; PTSD, posttraumatic stress disorder
Response options: Not at all (0), A little bit (1), Moderately (2), Quite a bit (3), Extremely (4)

Figure 4. Analytic model of the relationship between latent classes of posttraumatic stress and distal outcomes, with moderation.
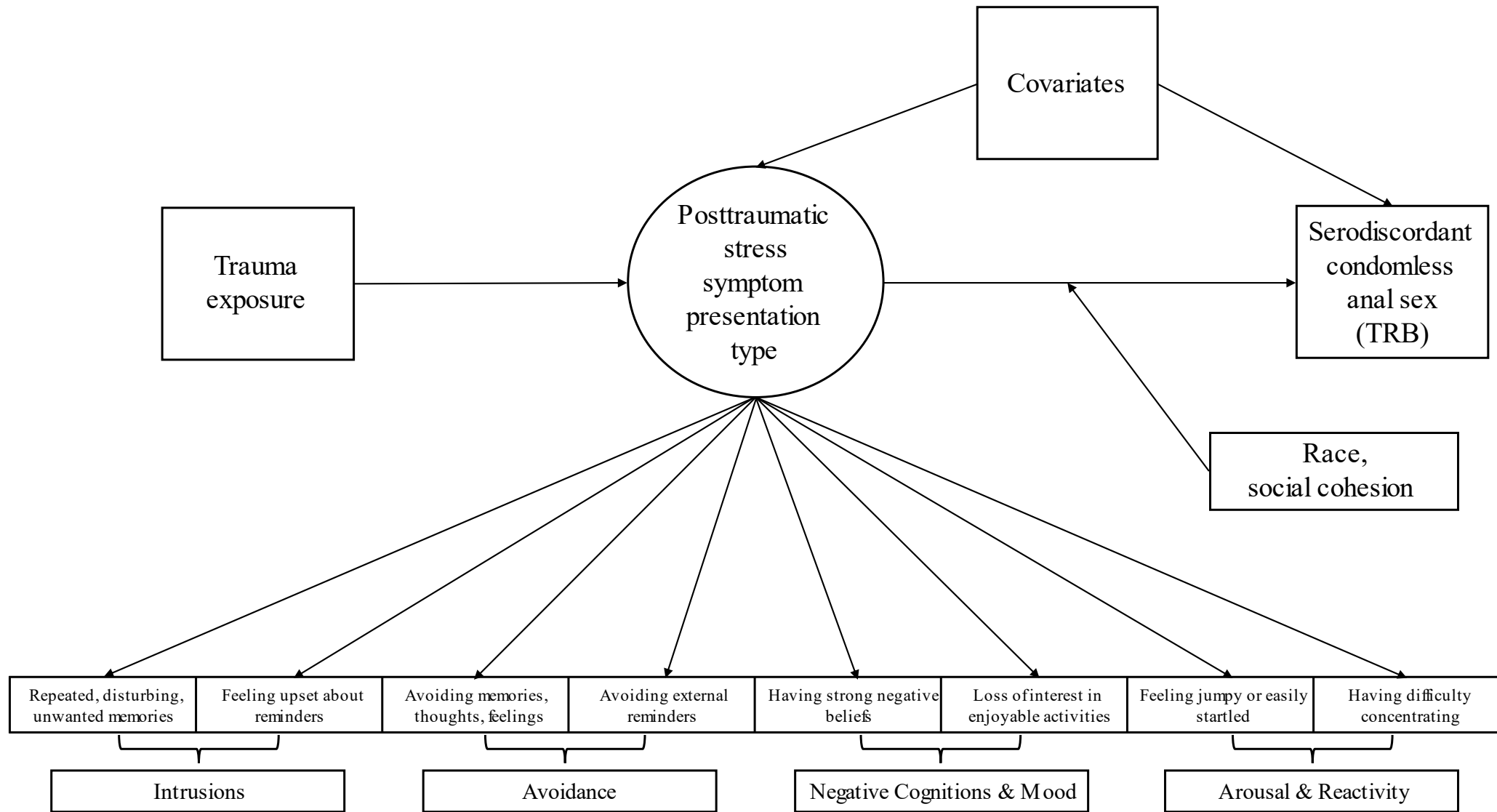
Table 10. Characteristics of trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

|  | Total/overall |
|---|---|
| Age, median (IQR) | 28 (23-51) |
| Education, n (%) | |
|   <High school | 82 (1.9) |
|   High school or equivalent | 626 (14.6) |
|   Some college | 1,553 (36.2) |
|   College degree or higher | 2,013 (47.0) |
|   Missing | 12 (0.3) |
| Race/ethnicity | |
|   Non-Hispanic white | 3,598 (83.9) |
|   Non-Hispanic Black | 688 (16.1) |
| Sexual identity, n (%) | |
|   Gay or homosexual | 3,328 (78.1) |
|   Bisexual | 821 (19.3) |
|   Other | 114 (2.8) |
|   Missing | 23 (0.5) |
| HIV status, n (%) | |
|   Negative | 2,972 (69.3) |
|   Positive | 453 (10.6) |
|   Unknown | 861 (20.1) |
| Social cohesion, median (IQR) | 3.38 (2.75-3.88) |

SMM, gay, bisexual, and other men who have sex with men; US, United States; IQR, interquartile range

Table 11. Outcome differences across sociodemographic and other characteristics among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| | TRB-1 | | TRB-2 | | TRB-3 | |
|---|---|---|---|---|---|---|
| | Yes, 1,137 (26.5) | No, 3,149 (73.5) | Yes, 830 (19.4) | No, 3,456 (80.6) | Yes, 435 (10.2) | No, 3,851 (89.9) |
| Age, median (IQR) | 29 (23-50) | 28 (23-52) | 27 (22-47) | 28 (23-52) | 25 (21-32) | 28 (23-52) |
| Chi-square (p-value) | - | 0.363 (0.547) | - | 13.926 (<0.001) | - | 62.843 (<0.001) |
| Education, n (%) | | | | | | |
| <High school | 26 (2.3) | 56 (1.8) | 21 (2.5) | 61 (1.8) | 13 (3.0) | 69 (1.8) |
| High school or equivalent | 163 (14.4) | 463 (14.7) | 134 (16.2) | 492 (14.3) | 86 (19.9) | 540 (14.1) |
| Some college | 406 (35.8) | 1,147 (36.5) | 314 (38.0) | 1,239 (35.9) | 172 (39.7) | 1,381 (36.0) |
| College degree or higher | 538 (47.5) | 1,475 (47.0) | 358 (43.3) | 1,655 (48.0) | 162 (37.4) | 1,851 (48.2) |
| Chi-square (p-value) | - | 1.364 (0.714) | - | 7.667 (0.053) | - | 23.012 (<0.001) |
| Race/ethnicity | | | | | | |
| Non-Hispanic white | 877 (77.1) | 2,721 (86.4) | 649 (78.2) | 2,949 (85.3) | 359 (82.5) | 3,239 (84.1) |
| Non-Hispanic Black | 260 (22.9) | 428 (13.6) | 181 (21.8) | 507 (14.7) | 76 (17.5) | 612 (15.9) |
| Chi-square (p-value) | - | 53.336 (<0.001) | - | 25.299 (<0.001) | - | 0.723 (0.395) |
| Sexual identity, n (%) | | | | | | |
| Gay or homosexual | 918 (81.2) | 2,410 (77.0) | 662 (80.2) | 2,666 (77.6) | 339 (78.1) | 2,989 (78.1) |
| Bisexual | 183 (16.2) | 638 (20.4) | 136 (16.5) | 685 (19.9) | 79 (18.2) | 742 (19.4) |
| Other | 30 (2.7) | 84 (2.7) | 27 (3.3) | 87 (2.5) | 16 (3.7) | 98 (2.6) |
| Chi-square (p-value) | - | 9.473 (0.009) | - | 6.078 (0.048) | - | 2.132 (0.344) |
| HIV status, n (%) | | | | | | |
| Negative | 266 (23.4) | 187 (5.9) | 179 (21.6) | 274 (7.9) | 10 (2.3) | 443 (11.5) |
| Positive | 665 (58.5) | 2,307 (73.3) | 477 (57.5) | 2,495 (72.2) | 300 (69.0) | 2,672 (69.4) |
| Unknown | 206 (18.1) | 655 (20.8) | 174 (21.0) | 687 (19.9) | 125 (28.7) | 736 (19.1) |
| Chi-square (p-value) | - | 270.140 (<0.001) | - | 139.091 (<0.001) | - | 49.361 (<0.001) |
| Social cohesion, median (IQR) | 3.25 (2.5-3.75) | 3.43 (2.89, 3.89) | 3.25 (2.5-3.75) | 3.43 (2.89, 3.89) | 3.25 (2.5-3.75) | 3.38 (2.86, 3.89) |
| Chi-square (p-value) | - | 25.676 (<0.001) | - | 29.146 (<0.001) | - | 14.644 (<0.001) |

SMM, gay, bisexual, and other men who have sex with men; US, United States; TRB, transmission risk behavior; IQR, interquartile range; HIV, human immunodeficiency virus

Table 12. Fit indices for latent class models of posttraumatic stress based on data collected from trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| K | Log Likelihood (improvement) | Npar | LR $\chi^2$, df, p-value | AIC (CAIC) | BIC (SABIC) | AWE | VLMR-LRT, p-value | aVLMR-LRT, p-value | BLRT p-value | BF | cmP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | -17,433.126 | 17 | 1,196.098, 233, p<0.001 | 34,900.252 (35,032.024) | 35,008.425 (34,954.406) | 35,040.524 | 9,814.067 p<0.001 | 9,685.388, p<0.001 | <0.001 | <0.000 | <0.001 |
| 3 | -16,898.027 (+535.099) | 26 | 1,263.574, 228, p<0.001 | 33,848.054 (34,049.588) | 34,013.495 (33,930.877) | 34,062.588 | 1,070.198, p<0.001 | 1,056.166, p<0.001 | <0.001 | <0.000 | <0.001 |
| 4 | -16,568.197 (+329.830) | 35 | 723.985, 220, p<0.001 | 33,206.395 (33,477.690) | 33,429.104 (33,317.888) | 33,495.190 | 659.659, p<0.001 | 651.010, p<0.001 | <0.001 | 0.017 | <0.001 |
| 5 | -16,489.701 (+78.496) | 44 | 566.992, 211, p<0.001 | 33,067.402 (33,408.460) | 33,347.379 (33,207.565) | 33,430.460 | **156.993, p<0.001** | **154.934, p<0.001** | <0.001 | 0.123 | 0.014 |
| 6 | -16,431.106 (+58.595) | 53 | 449.803, 202, p<0.001 | 32,968.213 (33,379.032) | 33,305.458 (33,137.046) | 33,405.532 | 117.189, p=0.1233 | 115.652, p=0.1259 | <0.001 | 0.128 | 0.112 |
| 7 | -16,372.945 (+58.161) | 62 | 333.481, 193, p<0.001 | **32,869.890 (33,350.472)** | **33,264.403 (33,067.393)** | **33,381.472** | **116.323, p<0.001** | **114.797, p<0.001** | <0.001 | - | **0.874** |

K, number of classes; Npar, number of free parameters; LR $\chi^2$, likelihood ratio chi-square test; df, degrees of freedom; AIC, Akaike's Information Criterion; CAIC, Consistent Akaike's Information Criterion; BIC, Bayes' Information Criterion; SABIC, sample size-adjusted Bayes' Information Criterion; AWE, average weight of evidence; VLMR-LRT, Vuong-Lo-Mendell-Rubin likelihood ratio test; aVLMR-LRT, adjusted Vuong-Lo-Mendell-Rubin likelihood ratio test; BLRT, bootstrapped likelihood ratio test; BF, Bayes' Factor; cmP, Approximate Correct Model Probability

Table 13. Characteristics of latent class models of posttraumatic stress based on data collected from trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| K | Entropy | Lowest classification probability | Lowest class prevalence |
|---|---------|-----------------------------------|-------------------------|
| 2 | 0.882 | 0.954 | 39.6% |
| 3 | 0.780 | 0.856 | 24.8% |
| 4 | 0.782 | 0.777 | 16.5% |
| 5 | 0.803 | 0.730 | 7.1% |
| 6 | 0.791 | 0.710 | 3.5% |
| 7 | 0.750 | 0.657 | 3.7% |

SMM, gay, bisexual, and other men who have sex with men; US, United States; K, number of classes

Figure 5. Line plots of improvement in log-likelihood, BIC, SABIC, CAIC, and AWE values for two through seven latent classes of posttraumatic stress symptoms based on data from trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021
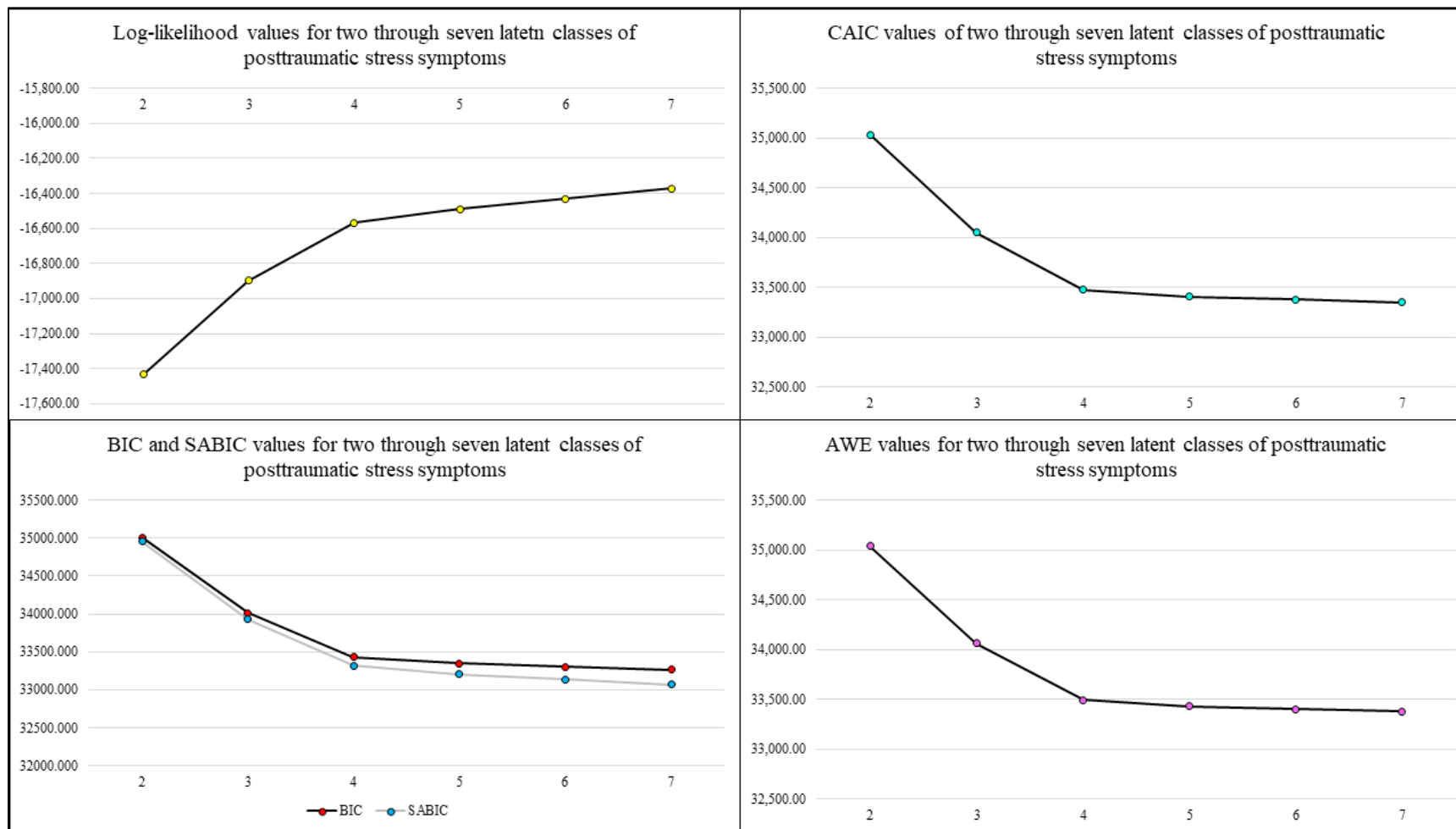


CAIC, consistent Akaike's Information Criterion; BIC, Bayes' Information Criterion; SABIC, sample size-adjusted Bayes' Information Criterion; AWE, approximate weight of evidence; SMM, gay, bisexual, and other men who have sex with men; US, United States

Table 14. Model comparisons for stepwise differential item functioning testing for race/ethnicity with a four-latent class model of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| Step | Model | Description | LL | Par | Comparison | LRTS | Df | p-value |
|---|---|---|---|---|---|---|---|---|
| 1 | M1.0 | MIMIC: No DIF | -16537.640 | 38 | | | | |
| | M1.1 | MIMIC: All DIF | -16508.853 | 70 | M1.0 vs M1.1 | 57.574 | 32 | **0.004** |
| 2 | M2.0.1 | Memory: No DIF | -7119.219 | 14 | | | | |
| | M2.1.1 | Memory: NU-DIF | -7114.872 | 18 | M2.0.1 vs M2.1.1 | 8.694 | 4 | 0.069 |
| | M2.0.2 | Upset: No DIF | -6960.578 | 14 | | | | |
| | M2.1.2 | Upset: NU-DIF | -6954.984 | 18 | M2.0.2 vs M2.1.2 | 11.188 | 4 | **0.025** |
| | M2.0.3 | Avoid: No DIF | -6806.892 | 14 | | | | |
| | M2.1.3 | Avoid: NU-DIF | -6804.323 | 18 | M2.0.3 vs M2.1.3 | 5.138 | 4 | 0.273 |
| | M2.0.4 | Remind: No DIF | -6794.546 | 14 | | | | |
| | M2.1.4 | Remind: NU-DIF | -6791.876 | 18 | M2.0.4 vs M2.1.4 | 5.340 | 4 | 0.254 |
| | M2.0.5 | Negative: No DIF | -7253.197 | 14 | | | | |
| | M2.1.5 | Negative: NU-DIF | -7251.370 | 18 | M2.0.5 vs M2.1.5 | 3.654 | 4 | 0.455 |
| | M2.0.6 | Loss interest: No DIF | -7254.798 | 14 | | | | |
| | M2.1.6 | Loss interest: NU-DIF | -7240.736 | 18 | M2.0.6 vs M2.1.6 | 28.124 | 4 | **<0.001** |
| | M2.0.7 | Jumpy: No DIF | -7369.581 | 14 | | | | |
| | M2.1.7 | Jumpy: NU-DIF | -7363.838 | 18 | M2.0.7 vs M2.1.7 | 11.486 | 4 | **0.022** |
| | M2.0.8 | Concentration: No DIF | -7354.660 | 14 | | | | |
| | M2.1.8 | Concentration: NU-DIF | -7352.614 | 18 | M2.0.8 vs M2.1.8 | 4.092 | 4 | 0.394 |
| 3 | M3.0 | MIMIC: memory, upset, loss interest, jumpy with NU-DIF | -16517.962 | 54 | M1.0 vs M3.0 | 39.356 | 16 | **<0.001** |
| | | | | | M3.0 vs M1.1 | 18.218 | 16 | 0.311 |
| 4 | M4.1 | MIMIC: memory with U-DIF; upset, loss interest, jumpy with NU-DIF | -16520.321 | 51 | M4.1 vs M3.0 | 4.718 | 3 | 0.194 |
| | M4.2 | MIMIC: upset with U-DIF; memory, loss interest, jumpy with NU-DIF | -16524.702 | 51 | M4.2 vs M3.0 | 13.480 | 3 | **0.004** |
| | M4.3 | MIMIC: loss interest with U-DIF; memory, upset, jumpy with NU-DIF | -16518.431 | 51 | M4.3 vs M3.0 | 0.938 | 3 | 0.816 |
| | M4.4 | MIMIC: jumpy with U-DIF; memory, upset, loss interest with NU-DIF | -16520.314 | 51 | M4.4 vs M3.0 | 4.704 | 3 | 0.195 |
| 5 | M5.0 | MIMIC: memory, loss interest, jumpy with U-DIF; upset with NU-DIF | -16522.940 | 45 | M5.0 vs M3.0 | 9.956 | 9 | 0.354 |
| 6 | M6.0 | MIMIC: C on Black @ 0 | -16550.618 | 42 | M6.0 vs M5.0 | 55.356 | 9 | **<0.001** |

SMM, gay, bisexual, and other men who have sex with men; US, United States; LL, log-likelihood; Par, parameters; LRTS, likelihood ratio test statistic; Df, degrees of freedom; M, model; MIMIC, multiple-indicator, multiple-cause; DIF, differential item functioning; NU, nonuniform; U, uniform; C, latent variable
Note: Bolded p-values are significant at p<0.05; shaded row indicates the final, optimal model

Table 15. Statistics for uniform DIF items across latent classes of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| Item (symptom) | Estimate in logits (SE) | Odds ratio (95% CI) | Effect size |
|---|---|---|---|
| 1 (intrusive memories) | 0.375 (0.139) | 1.46 (1.11, 1.91) | Negligible |
| 6 (loss of interest in activities) | 0.369 (0.157) | 1.45 (1.06, 1.97) | Negligible |
| 7 (jumpy or easily startled) | -0.202 (0.136) | 0.82 (0.63, 1.07) | Negligible |

DIF, differential item functioning; SMM, gay, bisexual, and other men who have sex with men; US, United States; SE, standard error; CI, confidence interval; Neg., negligible

Table 16. Statistics for nonuninform DIF items across latent classes of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| Item (symptom) | Intrusive-Avoidant | | | Dysphoric-Inattentive | | | Pervasive | | | Resistant | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate in logits (SE) | Odds ratio (95% CI) | Effect size | Estimate in logits (SE) | Odds ratio (95% CI) | Effect size | Estimate in logits (SE) | Odds ratio (95% CI) | Effect size | Estimate in logits (SE) | Odds ratio (95% CI) | Effect size |
| 2 (upset about reminders) | -0.156 (0.226) | 0.86 (0.55, 1.33) | Neg. | -0.049 (0.429) | 0.95 (0.41, 2.21) | Neg. | 2.187 (1.513) | 8.91 (0.46, 172.76) | **Large** | 0.007 (0.501) | 1.01 (0.38, 2.69) | Neg. |

DIF, differential item functioning; SMM, gay, bisexual, and other men who have sex with men; US, United States; SE, standard error; CI, confidence interval; Neg., negligible

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Table 17. Adjusted odds ratios and 95% confidence intervals between covariates and latent class membership among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| | Intrusive-Avoidant | Dysphoric-Inattentive | Pervasive |
|---|---|---|---|
| Age | **0.98 (0.97, 0.99)*** | **0.97 (0.96, 0.98)*** | **0.963 (0.957, 0.970)*** |
| Education | | | |
|   <High school (ref) | 1.00 | 1.00 | 1.00 |
|   High school/equivalent | 0.79 (0.31, 2.04) | 0.70 (0.27, 1.83) | **0.38 (0.20, 0.75)** |
|   Some college | 0.64 (0.26, 1.62) | 0.77 (0.31, 1.96) | **0.37 (0.20, 0.71)** |
|   College degree+ | 0.45 (0.18, 1.14)~ | 0.63 (0.25, 1.60) | **0.23 (0.12, 0.43)*** |
| Race | | | |
|   White (ref) | 1.00 | 1.00 | 1.00 |
|   Black | **2.27 (1.73, 2.97)*** | **0.30 (0.17, 0.51)*** | 0.97 (0.75, 1.25) |
| Sexual identity | | | |
|   Gay or homosexual (ref) | 1.00 | 1.00 | 1.00 |
|   Bisexual | 1.05 (0.79, 1.39) | 0.86 (0.63, 1.16) | 0.93 (0.73, 1.17) |
|   Other | 1.10 (0.48, 2.52) | **2.32 (1.20, 4.47)*** | 1.70 (0.95, 3.04)~ |
| HIV status | | | |
|   Negative (ref) | 1.00 | 1.00 | 1.00 |
|   Positive | 1.18 (0.82, 1.72) | 1.19 (0.75, 1.87) | **1.42 (1.04, 1.94)*** |
|   Unknown | 1.10 (0.81, 1.49) | 1.24 (0.93, 1.65) | **1.28 (1.02, 1.62)*** |
| Social cohesion | **0.77 (0.67, 0.89)*** | **0.79 (0.69, 0.90)** | **0.58 (0.52, 0.65)*** |

SMM, gay, bisexual, and other men who have sex with men; US, United States; TRB, transmission risk behavior
*p<0.05, **p<0.010, ***p<0.001

Table 18. Unadjusted prevalence estimates of TRBs by latent class of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| | Intrusive-Avoidant | Dysphoric-Inattentive | Pervasive | Resistant |
|---|---|---|---|---|
| **TRB-1** | 27.3 (23.0, 31.6) | 27.6 (23.7, 31.6) | 31.2 (28.0, 34.3) | 23.2 (21.2, 25.3) |
| Intrusive-Avoidant | | | | |
| Dysphoric-Inattentive | P=0.925 | | | |
| Pervasive | P=0.182 | P=0.178 | | |
| Resistant | P=0.101 | P=0.067 | **P<0.001** | |
| **TRB-2** | 20.5 (16.6, 24.4) | 20.9 (17.3, 24.5) | 23.3 (20.4, 26.2) | 16.1 (14.3, 18.0) |
| Intrusive-Avoidant | | | | |
| Dysphoric-Inattentive | P=0.900 | | | |
| Pervasive | P=0.288 | P=0.315 | | |
| Resistant | P=0.050 | **P=0.027** | **P<0.001** | |
| **TRB-3** | 9.6 (6.7, 12.5) | 11.9 (9.1, 14.8) | 13.2 (10.9, 15.5) | 7.9 (6.6, 9.3) |
| Intrusive-Avoidant | | | | |
| Dysphoric-Inattentive | P=0.302 | | | |
| Pervasive | P=0.073 | P=0.509 | | |
| Resistant | P=0.314 | **P=0.017** | **P<0.001** | |

SMM, gay, bisexual, and other men who have sex with men; US, United States; TRB, transmission risk behavior
P-values from pairwise Wald tests comparing prevalence of each outcome by class

Table 19. Adjusted prevalence estimates (%) of TRBs by latent class of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| | Intrusive-Avoidant | Dysphoric-Inattentive | Pervasive | Resistant |
|---|---|---|---|---|
| **TRB-1** | 23.0 (12.4, 33.6) | 26.8 (16.3, 37.3) | 27.9 (18.0, 37.7) | 21.7 (11.7, 31.6) |
| Intrusive-Avoidant | | | | |
| Dysphoric-Inattentive | P=0.208 | | | |
| Pervasive | P=0.088 | P=0.594 | | |
| Resistant | P=0.426 | **P=0.032** | **P=0.002** | |
| **TRB-2** | 18.3 (8.2, 28.3) | 20.4 (10.6, 30.3) | 20.7 (11.4, 30.0) | 16.8 (7.4, 26.2) |
| Intrusive-Avoidant | | | | |
| Dysphoric-Inattentive | P=0.471 | | | |
| Pervasive | P=0.358 | P=0.911 | | |
| Resistant | P=0.527 | P=0.097 | **P=0.034** | |
| **TRB-3** | 12.6 (4.3, 20.8) | 14.8 (6.7, 22.8) | 15.0 (7.4, 22.6) | 12.7 (4.9, 20.4) |
| Intrusive-Avoidant | | | | |
| Dysphoric-Inattentive | P=0.345 | | | |
| Pervasive | P=0.222 | P=0.883 | | |
| Resistant | P=0.960 | P=0.220 | P=0.099 | |

SMM, gay, bisexual, and other men who have sex with men; US, United States; TRB, transmission risk behavior
Controlling for age, education, race, sexual identity, HIV status, and social cohesion
P-values from pairwise Wald tests comparing prevalence of each outcome by class

Figure 6. Adjusted prevalence (%) of TRBs across latent classes of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).
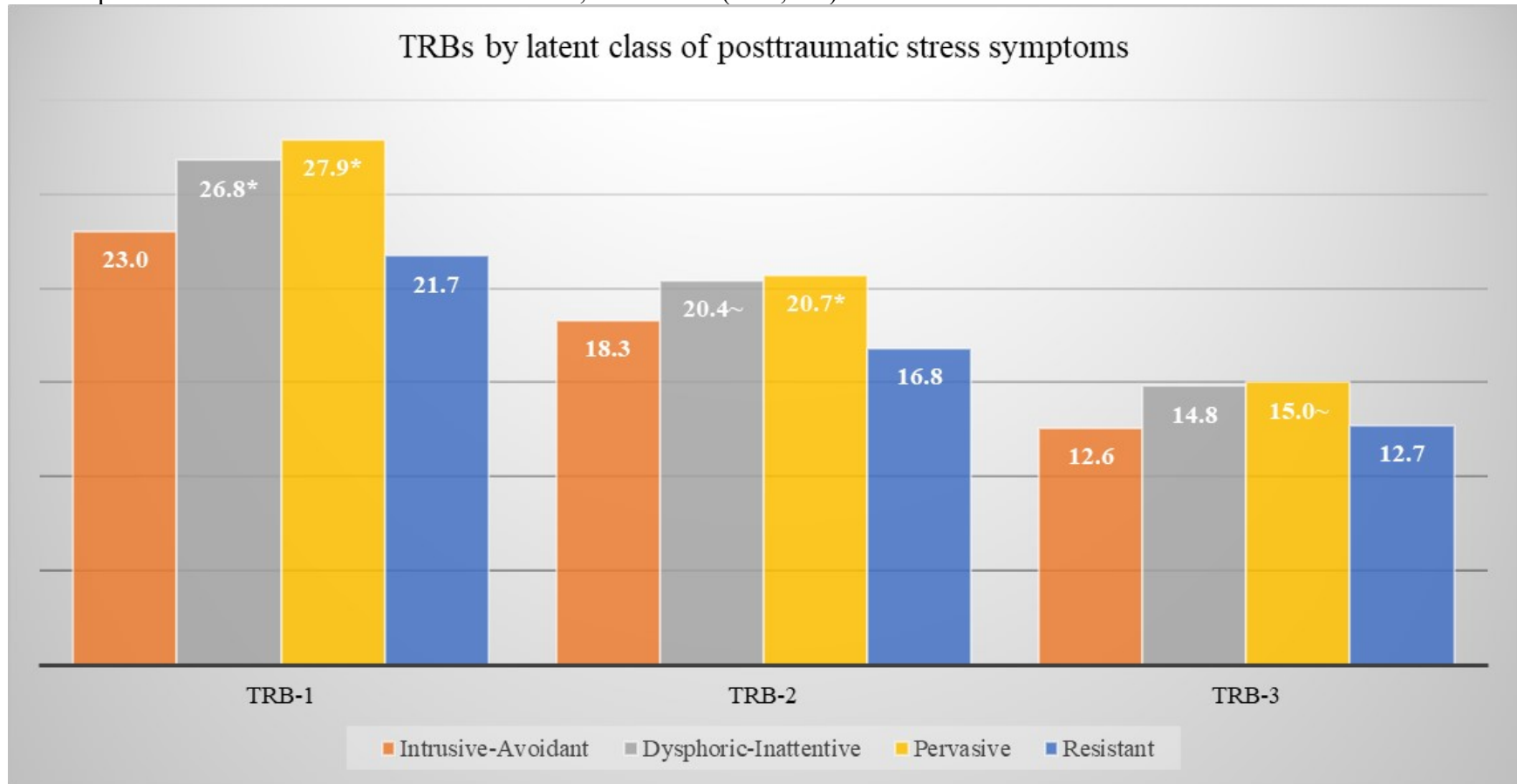


SMM, gay, bisexual, and other men who have sex with men; US, United States; TRB, transmission risk behavior
*Indicates significant (p<0.05) differences compared to the Resistant class.
~Indicates marginal (p<0.10) differences compared to the Resistant class.

Table 20. Associations between covariates and sexual behavior outcomes among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| | TRB-1 | TRB-2 | TRB-3 |
|---|---|---|---|
| Age | **0.999 (0.998, 1.00)\*\*** | **0.998 (0.998, 0.999)\*\*\*** | **0.999 (0.998, 1.00)\*\*\*** |
| Education | | | |
|  <High school (ref) | 1.00 | 1.00 | 1.00 |
|  High school/equivalent | 0.97 (0.87, 1.07) | 0.98 (0.89, 1.08) | 0.99 (0.91, 1.07) |
|  Some college | 0.97 (0.88, 1.07) | 0.98 (0.89, 1.07) | 0.97 (0.90, 1.05) |
|  College degree+ | 1.00 (0.91, 1.10) | 0.98 (0.89, 1.07) | 0.96 (0.89, 1.04) |
| Race | | | |
|  White (ref) | 1.00 | 1.00 | 1.00 |
|  Black | **1.07 (1.02, 1.11)\*\*** | 1.03 (0.99, 1.07) | 1.02 (1.00, 1.05)~ |
| Sexual identity | | | |
|  Gay or homosexual (ref) | 1.00 | 1.00 | 1.00 |
|  Bisexual | **0.97 (0.94, 1.00)\*** | 0.97 (0.95, 1.00) | 0.98 (0.96, 1.00)~ |
|  Other | 0.99 (0.91, 1.07) | 1.03 (0.95, 1.12)~ | 1.01 (0.95, 1.08) |
| HIV status | | | |
|  Negative (ref) | 1.00 | 1.00 | 1.00 |
|  Positive | **1.42 (1.35, 1.50)\*\*\*** | **1.27 (1.21, 1.34)\*\*\*** | **0.92 (0.91, 0.94)\*\*\*** |
|  Unknown | 1.01 (0.97, 1.04) | 1.02 (0.99, 1.05) | 1.03 (1.00, 1.05)~ |
| Social cohesion | **0.97 (0.96, 0.99)\*\*\*** | **0.97 (0.96, 0.99)\*\*\*** | **0.98 (0.97, 0.99)\*\*** |

SMM, gay, bisexual, and other men who have sex with men; US, United States; TRB, transmission risk behavior
*p<0.05, **p<0.010, ***p<0.001

Figure 7. Proportion of non-Hispanic Black SMM across latent classes of posttraumatic stress symptoms, 2020-2021 (N=4,286).
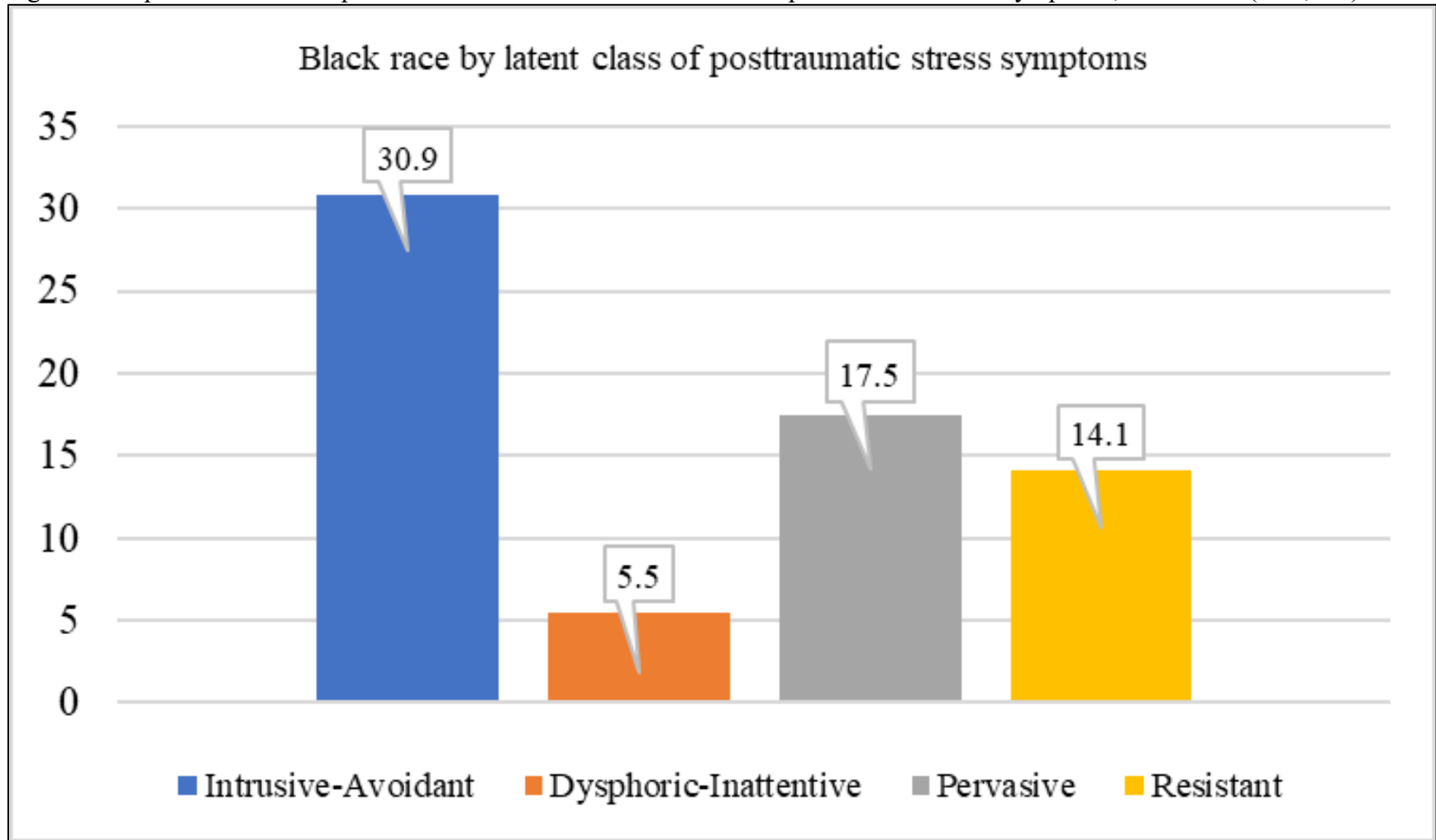


SMM, gay, bisexual, and other men who have sex with men

Figure 8. Average social cohesion scores by latent class of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).



Average social cohesion scores by latent class of posttraumatic stress symptoms
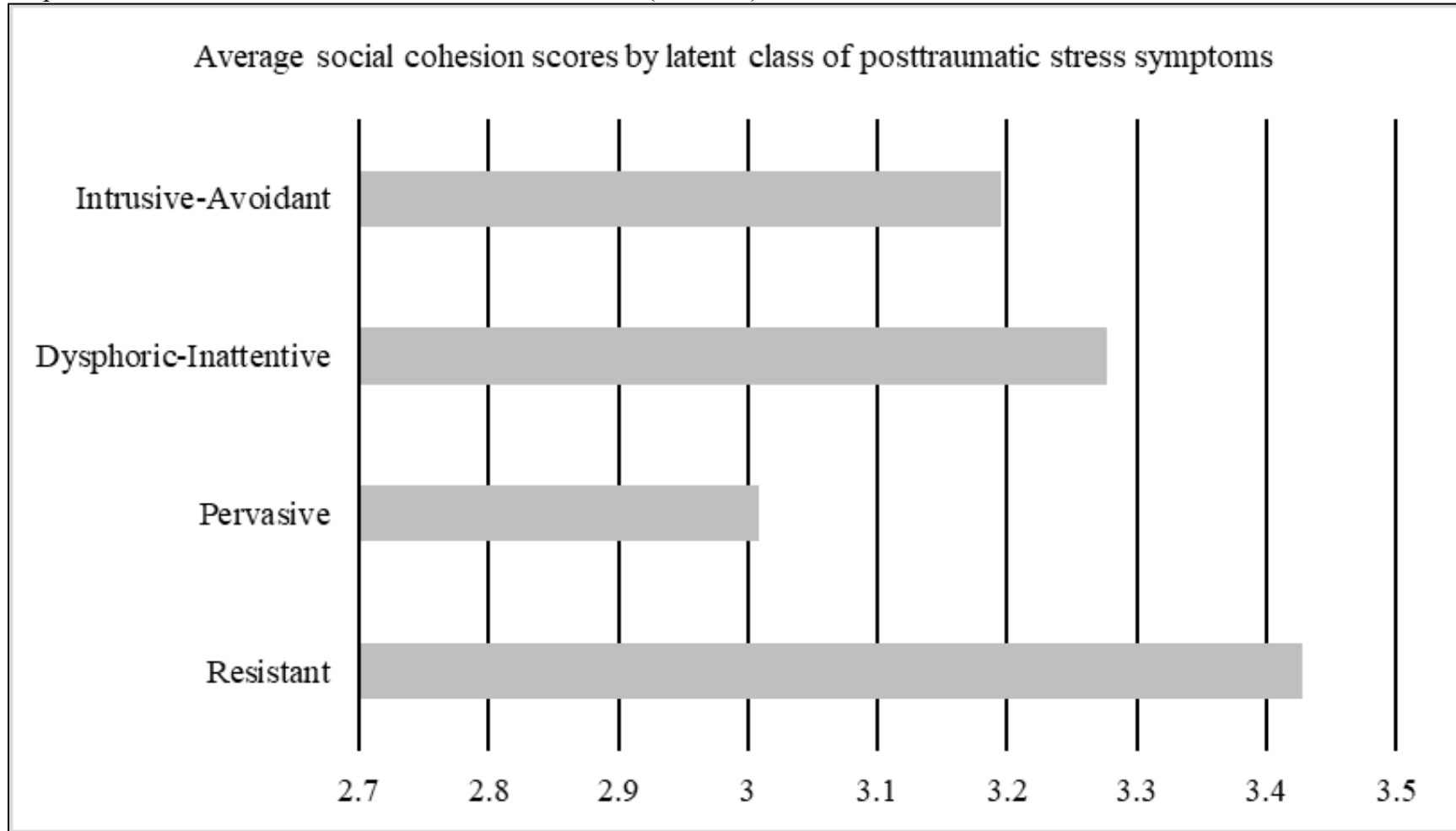
SMM, gay, bisexual, and other men who have sex with men; US, United States

Table 21. Moderated effects of race and social cohesion on TRBs across latent classes of posttraumatic stress symptoms among trauma-exposed, cisgender, non-Hispanic Black and white SMM across the US, 2020-2021 (N=4,286).

| | Intrusive-Avoidant | Dysphoric-Inattentive | Pervasive | Resistant | WTS (p-value) |
|---|---|---|---|---|---|
| TRB-1 | | | | | |
| Non-Hispanic Black | 1.04 (0.95, 1.14) | 1.24 (0.99, 1.56) | 1.09 (1.00, 1.19) | 1.04 (0.97, 1.11) | 2.43 (0.487) |
| Social cohesion | 0.95 (0.91, 1.00) | 0.96 (0.91, 1.01) | 1.00 (0.96, 1.03) | 0.97 (0.95, 1.00) | 2.94 (0.401) |
| TRB-2 | | | | | |
| Race | 1.03 (0.95, 1.12) | 1.16 (0.93, 1.43) | 1.07 (0.98, 1.16) | 0.98 (0.93, 1.04) | 4.11 (0.250) |
| Social cohesion | 1.00 (0.96, 1.05)[a] | 0.94 (0.90, 0.99) | 1.00 (0.97, 1.03)[b] | 0.96 (0.94, 0.98) | 7.15 (0.067) |
| TRB-3 | | | | | |
| Race | 1.03 (0.97, 1.09) | 1.02 (0.87, 1.20) | 1.04 (0.97, 1.11) | 1.01 (0.97, 1.05) | 0.635 (0.888) |
| Social cohesion | 1.02 (1.00, 1.05)[c] | 0.96 (0.93, 1.00) | 0.99 (0.97, 1.02) | 0.97 (0.95, 0.99) | 4.23 (0.238) |

TRB, transmission risk behavior; SMM, gay, bisexual, and other men who have sex with men; US, United States; WTS, Wald test statistic

Moderated effects are not statistically different unless noted

[a]Marginally higher than Dysphoric-Inattentive (p=0.079), Resistant (p=0.084)

[b]Marginally higher than Dysphoric-Inattentive (p=0.058), Resistant (p=0.062)

[c]Marginally higher than Resistant (p=0.097)

**MANUSCRIPT THREE: "I have elasticity...the bounce-back ability": An interpretative phenomenological analysis of the effects of trauma and the processes of resilience among Black cisgender sexual minority men**

**Abstract**

**Background**

Black cisgender sexual minority men (SMM) in the United States experience a high level of trauma and posttraumatic stress disorder. However, little is known about how these men conceptualize, perceive, and experience the effects of trauma, or about how resilience emerges and functions to help them manage and adapt.

**Methods**

Trauma-exposed Black SMM (N=9) who were recruited from a parent study involving home-based HIV/STI testing and treatment participated in three in-depth interviews on the effects of trauma exposure and resilience processes. The third interview involved photo/image elicitation, during which participants shared photos representative of their experiences to facilitate deeper discussion. Interviews were conducted via telephone or online video conference software, audio-recorded, transcribed verbatim, and subjected to interpretative phenomenological analysis.

**Results**

Two superordinate themes were identified from the data: "A transformed self, a transformed world," reflecting a sense of change due to experiences of trauma and the ensuing impacts on self and perspective; and "Adaptation to a new self, new world," reflecting the emergence and function of resilience processes as participants navigated and responded to the effects of trauma. Subthemes of "A transformed self, a transformed world" included "Depletion/disconnection," "Encumbrance/fixation," and "Turmoil/pain." Subthemes of "Adaptation to a new self, a new world" included "Purpose-giving/meaning-making," "Reestablishing worth/goodness of self/world," "Reconstituting, cultivating self," and "Surviving/stifled."

**Conclusions**

Findings allow for a deeper understanding of the lived experience of the effects of trauma exposure for these Black SMM participants. Such a humanized account conveys in vivid detail the impact of trauma and the associated needs of participants in ways that can perhaps be more readily grasped and leveraged to improve both assessment of trauma impact and efforts to mitigate it. Likewise, results show how resilience processes emerge and function in response to trauma and its lasting impact, yielding new insights to better inform extant resilience theory and intervention development. Socio-structural conditions such as racism, stigma, and resource-inaccessibility can stifle resilience processes and must be continually countered.

**Introduction**

Across the United States (US), cisgender sexual minority men (SMM) experience a disproportionate burden of both trauma exposure and posttraumatic stress disorder (PTSD).[1-8] Though this burden has been demonstrated across racial/ethnic subgroups of SMM, intersecting sexual stigmas, racism, and other lived experiences[9-11] may contribute to the types of traumas encountered by SMM of Color. These intersecting stigmas may also shape how the effects of trauma are perceived and experienced, especially for Black SMM, given the legacy of slavery and anti-Black racism that continues to pervade the US context.[12,13] However, there is a dearth of research that has explored how Black SMM perceive and experience the impact of trauma.

As described in the fifth edition of the Diagnostic & Statistical Manual of Mental Disorders (DSM-5), PTSD symptoms are numerous (20 symptoms total) and diverse (across 4 symptom clusters: intrusions, avoidance, negative cognitions and mood, arousal and reactivity),[14] yet quantitative research has been restricted to approaches for assessing posttraumatic stress symptoms (e.g., continuous, non-descript numerical score; PTSD/no PTSD binary variable) that mask possible heterogeneity.[15-20] Qualitative research offers an opportunity to explore how the effects of trauma are experienced in a richer, more nuanced, and humanized fashion. Prior qualitative research with Black SMM has examined specific experiences of trauma (e.g., HIV diagnosis, childhood sexual abuse, homonegative encounters, violence), but minimal or incidental attention has been given to associated mental or other forms of distress,[21-25] or other ways trauma impacts this population. Conducting qualitative research could yield important information on how the impact of trauma operates and is perceived in this population and lead to new theoretical insights that could inform intervention development.

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An additional focus on the resilience that may counter trauma's impact is also necessary, as this will contribute to a better understanding of how resilience processes can be leveraged to mitigate the effects of trauma, improve psychosocial and other health outcomes for SMM, contribute to the elimination of health disparities in this population, and inform better research practices and intervention development in this population.[26] Resilience is commonly conceptualized as being processual in nature and as involving positive adaptation despite risk and adversity, as reflected in this definition by Fergus and colleagues: "the process of overcoming the negative effects of risk exposure, coping successfully with traumatic experiences, and avoiding the negative trajectories associated with risk."[26]

Though the literature remains sparse,[26] prior research has examined resilience to potentially traumatic experiences through several lenses and has provided some indication of how resilience processes operate in the face of adversity for Black and other SMM of Color. Harper and colleagues applied the Adolescent Resilience Framework to accounts of Black and Latino SMM on resilience and identified four different processes following HIV diagnosis: engaging in health-promoting cognitive processes, enacting healthy behavioral practices, enlisting social support from others, and empowering other young sexual minority men.[22] Similar processes were noted in a separate study with a sample of Black SMM of mixed serostatus who were coping with stigma and discrimination.[27] In additional qualitative work, Buttram applied the Multi-Layered Social Resilience Framework[28] and the concept of hidden resilience[29] to a study with substance-using Black SMM, and identified resilience in the form of (a) avoidance of sexuality disclosure to maintain social, economic, and cultural capital, and (b) engagement in substance use and sexual behaviors to cope with depression.[21]

These similar yet divergent conceptions of resilience formed from the narratives and perspectives of Black and other SMM of Color cannot necessarily be assumed to be representative of resilience processes in all other contexts. Different scenarios and environments may elicit or demand different resources, and individuals within such contexts may be differentially equipped to respond to the needs of the moment. Moreover, while all resilience processes may contribute to successful adaptation (or perceived successful adaptation) in the wake of exposure to trauma, the exact ways in which these processes function to facilitate such adaptation may differ. The objectives of this study were to explore perceptions and experiences of the impact of trauma, and activation and function of resilience processes among Black SMM in the mid-Atlantic US.

**Methods**

*Approach*

An interpretative phenomenological analysis (IPA) approach best suited the study's objectives. IPA is informed by phenomenology, hermeneutics, and idiography, and is appropriate for exploring how individuals make sense and meaning of a phenomenon (or experience) of interest.[30] The goal is to help bring the experience into an individual's conscious foreground and facilitate effortful, intentional reflection upon the experience to aid in the sense-making process.[30] The researcher and participant engage in co-construction of the meaning of the experience.[30] This approach has been used previously in research exploring the experience of mental health[31-33] and trauma-related phenomena,[34] and has also been used with SMM populations.[35]

In addition, IPA informs the types of questions to be asked when collecting data, such as those focused on experiences, perceptions, and perspectives; and the method of data collection,

such as the use of multiple IDIs and photo-elicitation techniques to draw out more detailed, nuanced accounts of participant experiences. IPA is intended for small samples with some degree of homogeneity among participants, and the results are intended to reflect a deep, interpretative analysis rather than a purely descriptive one.[30,36-39]

*Data source and recruitment*

Participants were recruited from Project STAR, a pilot randomized controlled trial to promote home-based testing and treatment of HIV and STIs. Recruitment for Project STAR was conducted using a variety of convenience sampling methods in physical and virtual venues specific to Black SMM in the Baltimore, Maryland metropolitan area. Hard-copy study advertisements were posted at venues including cafes, community-based organizations, and health clinics, and virtual advertisements were posted on social media. Due to recruitment difficulties related to COVID-19, the catchment area was eventually expanded to include the Washington, DC metropolitan area, as well as mobile dating applications specific to SMM (e.g., Jack'd). Eligibility criteria included self-reported male sex at birth, current male gender identity, two or more male sex partners in the prior six months, Black race, 17 years of age or older, and weekly internet usage.

*Present study, participants, and procedures*

Purposive sampling was used to recruit participants from the parent study. Criteria for participation in this qualitative sub-study included a history of trauma exposure and any current posttraumatic stress symptoms (to ensure recruitment of participants who were actively experiencing effects of trauma), which were assessed by the Primary Care PTSD for the DSM-5 screener (PC-PTSD-5; Appendix B)[40] and which was administered to all Project STAR participants. Due to timeline constraints and COVID-19 adjustments, recruitment for the present

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study occurred concurrently with recruitment for Project STAR. That is, as participants from Project STAR screened eligible for the present study, they were immediately contacted and recruited until the sample size goal (N=8-10) was reached. Therefore, homogeneous sampling was not possible beyond the eligibility criteria for the parent study and sub-study.

Eligible participants who expressed interest and provided verbal consent to participate underwent three individual in-depth interviews (IDIs) via telephone or online video conference software (depending on participant preference) over the course of several days to several weeks (depending on participant availability and preference). IDIs allowed for a targeted elicitation and in-depth probing of participant accounts of the effects of trauma, and repeated interviews over time allowed for a greater depth of information to be elicited from participants by allowing for reflection between interviews and by the mere fact of there being multiple encounters and increased time with participants than would be afforded by a single interview. The first two IDIs were conducted with a flexible, semi-structured interview guide (see Appendix C). Ample time and space were allowed for participants to respond freely and for the interviewer to probe deeply. Topics in IDI #1 included conceptions of trauma; assets, resources, and strategies utilized to cope with past trauma; and trauma's place in and impact on one's life. Topics in IDI #2 included perceived current impacts of trauma exposure; assets, resources, and strategies utilized to cope with those impacts; lessons from trauma; and changes in perspective on the world, future, and self. A member of the local Baltimore community representative of the target population but who was not a participant reviewed the interview guides and provided suggested edits and other feedback, which were incorporated into the final versions of the guides.

For IDI #3, participants were asked to provide at least five photos/images that represented (1) how trauma affects them and (2) how they overcome the effects of trauma, which would

serve as the basis of the entire interview. Participants were asked to describe how each photo/image related to either of the prompts, and additional questions were built around that description. Photo/image-elicitation facilitated dialogue by giving participants an alternative means of expression, a technique that can be particularly useful when the topic under investigation is complex or sensitive in nature.[41,42] Moreover, the mutual focus on photographs can change the researcher-participant dynamic and can facilitate a different, and perhaps richer, interaction and account of participant experience.[41-43] IDIs with photo-elicitation and other media components have been used in prior IPA studies.[44-49]

Relevant information shared by participants in each interview naturally informed subsequent interviews as appropriate; i.e., information shared during IDI #1 informed IDI #2 and IDI #3 to some extent, and information shared during IDI #2 informed IDI #3 to some extent. After each interview, the interviewer checked-in with participants to assess if they were emotionally well and had any mental health needs. After the final interview, the first author, who conducted the interviews and has a background in clinical social work, provided interested participants with information on free, local mental health resources. The accounts presented represent the first nine participants who provided consent to participate and who could be successfully contacted for the first interview. This met the initial target range of eight to ten interviewees, which was determined based on the recommended maximum of ten participants for IPA studies.[30,50] Participants received $25 for each interview, and $25 for completing the photo-elicitation component, totaling $100. This study was approved by the Johns Hopkins University Institutional Review Board.

*Analysis*

In accordance with an IPA approach, the first author analyzed the data following procedures outlined by Smith, Flowers, and Larkin.[30] However, as this approach is intended to be flexibly adapted to the researcher's needs,[30] an additional step – narrative summarizing[51] – was incorporated into these procedures: (1) reading and re-reading, (2) narrative summarizing, (3) initial noting, (4) developing emergent themes, (5) searching for connections across emergent themes, (6) moving to the next case, and (7) looking for patterns across cases.

The first step involved multiple, close, line-by-line readings of Participant A's transcript (comprised of all three IDIs) to gain familiarity with Participant A's account, but also to highlight any words or passages indicative of (a) what Participant A perceived to be trauma-related impacts on domains of functioning and (b) Participant A's methods of coping with and managing those impacts. This was done with an inductive approach to allow participants' experiences to freely emerge from the data without being constrained by a priori hypotheses. Though questions in the interview guide and supplemental probing served to elicit participants' accounts of perceived impacts and changes related to trauma exposure, as well as resilience processes, the questions were neither intended nor utilized to frame the analytic process.

Supporting information to contextualize Participant A's account (e.g., conceptions and examples of trauma; factors that may shape how Participant A experienced and responded to trauma-related impacts); use of linguistic devices, such as similes, metaphors, etc. (e.g., "it feels like you're being dumped on or that you're a dumpster or a receptacle for all of the garbage"); oft-repeated words and phrases when explaining trauma-related impacts and coping; and any seeming contradictions between passages, were also marked. Next, a narrative summary[51] of each IDI and of the transcript set was written to synthesize Participant A's account of experiencing and managing the effects of trauma. The third step, initial noting, involved

returning to the text and writing descriptive (i.e., briefly restating or summarizing key takeaways from a particular passage), linguistic (i.e., remarking on linguistic devices and patterns), and conceptual notes (i.e., interpreting the text at a higher level beyond what was explicitly stated in the text) on the highlighted passages of Participant A's transcript. The primary purpose of noting was to allow the analyst to become more fully immersed in Participant A's account and facilitate the identification of how Participant A discussed, understood, thought about/perceived, and made sense of their experience of living with trauma.

In step four, relying on the notes and the supporting interview text, relevant themes were identified for Participant A. An example of noting and thematizing is presented in Table 22. Searching for connections across emergent themes involved placing each identified theme in a table, assessing patterns across themes, and analyzing ways in which the themes could be logically and meaningfully clustered together. By clustering themes together, higher-level superordinate themes could then be identified. After completing this entire process (steps 1-5) for Transcript A, it was repeated on Transcript B, Transcript C, and so on until all transcripts had been analyzed in this fashion. Finally, superordinate themes were compared across transcripts to explore the extent to which themes converged and/or diverged. The photos/images that participants shared were not the focus of analysis but were instead used only during the third interview as a tool to facilitate deeper reflection and discussion.

A qualitative researcher provided a credibility check by reviewing and providing feedback on a sample of a coded, annotated transcript that had been analyzed by the first author. The first-author assessed the quality of the research on an ongoing basis using Yardley's criteria of Sensitivity to Context, Commitment and Rigor, Transparence and Coherence, and Impact and Importance (Table 23).[30,52,53]

The first author (who was also the interviewer and primary analyst) is a cisgender male, non-Hispanic white, gay-identifying PhD student with a background in clinical social work who conducted this research as part of his doctoral dissertation and whose prior research and educational experiences have pertained to the sexual and mental health needs of racial/ethnic minority SMM. The first author is invested in increasing understanding of the unique experiences of living and coping with the impacts of trauma for Black SMM, and in the practical and programmatic implications of the findings to improve care, resource access, and quality of life for trauma-exposed Black SMM. Given these issues, the first author kept a reflexive journal (to record initial reactions, thoughts, and feelings to interviews/transcripts; to reflect on how past experiences, knowledge, identity, and privilege may be affecting the research process) during the study as a means of confronting potential biases that may have influenced data interpretation.

**Results**

One third of participants were 25-34 years of age, and another third were 45-54 years of age. Just under half had completed some college or earned a Bachelor's degree, and just over half were employed full-time. Most participants identified as gay, homosexual, or same gender-loving. Two superordinate themes were identified from the data: "A transformed self, a transformed world" and "Adapting to a new self, new world." Three subthemes further expanded on the first theme: "Disconnection/depletion," "Encumbrance/fixation," and "Pain/turmoil." These themes, which pertained to experiential features of the effects of trauma, were based on texts in which participants conveyed their belief, perception, or suspicion that past trauma exposure was at the root of the development of the feature under discussion. Four subthemes expanded on the second superordinate theme: "Purpose-giving/meaning-making,"

"Reestablishing worth/goodness of self/world," "Reconstituting, cultivating self," and
"Surviving/stifled."

*A transformed self, a transformed world*

Across a majority of accounts, it was implicitly and explicitly evident that participants perceived their encounters with trauma to have been transformative experiences, both for their sense of self and their conception of the world. The notion of transformation was evident through the language participants used to describe how they perceived themselves post-trauma compared to pre-trauma, and through the diverse impact trauma had across multiple domains of their lives. One participant exclaimed, "It's just weird how an incident can actually change a person's whole life." Similarly, when describing current experiential features of trauma's impact (e.g., isolative, loss of appetite, substance use), participants would often use words such as "abnormal" or phrases such as "this is not who I am" (or their derivatives), showing how the trauma had shaped them into someone different from who they once were.

For some participants, their conception of the world was also impacted by trauma. Several participants simply indicated that trauma showed them how the world was "unfair" or a "dog-eat-dog" environment. Others explained how their experiences of trauma brought them into a state of knowing, of realization – seeing themselves as part of a previously distant world in which trauma now existed and could happen to them:

> *I guess that some of the things that we see in movies, and, you know, read in books or whatever the case be, on the news – we sometimes feel like a little bit distant from all that. Like, 'Oh there's somebody else's life,' or 'Other people deal with that.' Or, 'That's not something that I actually will experience....' But in some way shape or form, I got an aspect of that when this happened to me.*

Similarly, several participants viewed inhabitants of this so-called new world through a trauma frame of mind, or trauma lens, seeing others as potential inflictors of trauma. One participant

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described how it was necessary to "get them before they get you" in order to protect himself from being victimized as he had been in the past, while another indicated:

> *I'm concerned once I get out[side].... Like, if someone is walking behind me, I will deviate from what I'm doing, like, I'll stop and pretend to check for something, you know, look at a house or something, for them to walk by and get in front of me. Yeah, I don't like people walking behind me.*

There was also a processual component to this transformation of self/world, as a few participants seemed to be in a state of seeking answers about it, as evidenced by this individual: "I start thinking, 'How did things get so wrong? What decision did I make that put me in this position? What could I have done to make me like this, to put me in this place?'" Another participant remarked how he was "always thinking or wondering, wasn't sure, didn't know why things happened, [was] confused...always thinking of – just questioning the reasons why." Several subthemes represented in more detail the ways in which participants had been transformed by experiences of trauma.

**Depletion/disconnection**. A sense of depletion characterized a majority of participants' lived experience of trauma. Experiential features described by participants represented loss, lack, or deduction of a range of qualities, capacities, and conditions, such as joy, self-worth, security, motivation, and hope. One participant explained how he experienced periods in which his capacity to feel – especially in regard to positive emotions – was completely absent:

> *You know, one thing that kind of lasts with me is – and this is the part that I hate – is being numb to stuff.... When you're numb, there is almost no feeling there...so that's one of the biggest, lasting things from trauma.... Like, this is closed for business, you're closed for business, as in the business of caring or loving or whatever.... There's no sign of what used to be love, what used to be care.... When you're numb, you don't have a sign of what was the former.*

Another participant spoke of "not hav[ing] the energy to do things that I'm usually and genuinely interested in," as well as "not feeling like there is a true reason to get up out of bed."

Relatedly, a sense of disconnection characterized participants' experiences following trauma exposure. Some participants found themselves reconsidering the role and place of social relationships in their lives, intentionally choosing to disconnect from them, while other participants seemed to perceive such disconnection as a much more natural consequence of the trauma they had experienced, i.e., they wanted such relationships but fearfulness or distrust prevented them from engaging with others. Disconnection pertained to the maintenance of ongoing social relationships and/or the development of new ones. One participant explained:

> *I don't have a desire to build relationships much anymore because of the fear that it'll end abruptly. That [trauma] was the start of me not trusting people, which has affected me when it comes to dating. It's affected me when it comes to relationship-building.... It's really just affected my trust so negatively that anything and everything makes me question loyalty and trust. So, I think that's the biggest effect on me is just that I just have so much issue trusting anybody and anything these days.... I always go back to 'How are they going to neglect me?'*

A few participants perceived that such disconnection may not necessarily be acceptable or viewed favorably by others, but believed it to be wise and beneficial for them nonetheless. Two participants noted:

> *I lost the most important person to me, and anybody else can just walk [out of my life] and I'm okay with that. It's like I don't care about it. People come and go every day. And that might not be the best mantra to have, but it's where I am.*

> *I tend to isolate myself, which I am told, that's a bad thing. But for me, it's not, because one, I don't want to be a burden to somebody else.... [and two], it's hard enough that I'm dealing with it and then to have people giving opinions.... And it's like everybody always got something that they want to say, and I know it's them just showing that they care, but.... It doesn't feel like anybody care or don't nobody understand basically.*

The latter excerpt reveals an additional layer to this feature of social disconnection that was evident among a near-majority of participants, i.e., disconnection due to the inherent unrelatability and incomprehensibility of trauma. Participants noted that other people, including those in their social network, simply could not relate to or understand the experiences and

impacts of trauma in participants' lives, leaving them feeling lonely and ostracized. This was

further demonstrated by a minority of participants who expressed relief and hope at having made

friendships with individuals who had experienced comparable trauma and could therefore

meaningfully relate and support them as they desired/needed.

**Encumbrance/fixation**. A sense of encumbrance was revealed in much of the language

that participants used to convey how they experienced the effects of trauma. Terminology related

to heaviness, stunted movement, darkness, and pathways was prominent, evoking images of the

participants as attempting to navigate through their lives under conditions that constrained their

efforts to maneuver. One participant, whose trauma was sexuality- and race-based, explained:

> *When you look at someone else who maybe didn't have that same [traumatic]*
> *experience, you can see that they actually maneuver through life a lot differently*
> *because they don't have the same mental and emotional stronghold on them. And*
> *people don't understand the heaviness of a mental and spiritual and emotional*
> *stronghold. You can be physically able to do something, but because there's*
> *such a stronghold mentally, it can completely stop you.... When you as a gay*
> *person look at a straight person's life and you see how certain things they can do*
> *with ease that you can't, you may think, 'OK, if I hadn't had this [traumatic]*
> *experience, maybe I could do that.' If you see, as a Black person, a white person*
> *doing certain things with ease, you say to yourself, 'If I didn't have this*
> *[traumatic] experience maybe I could do that, and I wouldn't have this mental*
> *stronghold.'*

What is also notable here is the social, identity-based comparison the participant makes,

which seems to illustrate for the participant the extent of the strongholds he experiences

from past trauma.

Related to this theme of encumbrance was fixation, both passive and active,

which characterized a majority of participants' accounts. The indelibility of the trauma or

aspects related to it meant that participants were literally living with their trauma,

unavoidably or intentionally ruminating over it, seeing images of it (awake or sleeping),

or encountering triggers (e.g., cooking, television, holidays/events, people/relationships)

while going about their day-to-day lives. The following quote illustrates the first

scenario:

> *[The trauma's] constantly on my mind, I can't control what I think. I feel*
> *pressured, like a hopeless type feeling. Like it's not under my control, and*
> *I just hope and pray that I can get behind this. Just to get it off my mind.*

**Turmoil/pain**. A third defining effect of trauma was emotional turmoil. The intensity,

complexity, and dysregulated nature of emotional states was experienced as chaotic and

overwhelming. One participant remarked how "the trauma is causing different emotions" and he

was in the process of "dealing with how to control it or to handle it." Likewise, another

participant explained:

> *It feels like you're being dumped on or that you're a dumpster or a receptacle for*
> *all of the garbage. Maybe it's garbage that people are putting on you, or you feel*
> *like you're being dumped on with just the feelings of the traumatic*
> *experience...you feel like a dumpster of just crazy emotions.*

This piling-up of emotions was reflected in other participants' accounts as well, but was wrapped

in an additional layer of complexity, as it was the consequence of attempts to suppress rather

than express the emotions. One participant described this scenario as "always be[ing] in a tunnel

of emotion" because suppression inevitably caused one to "internalize" the trauma and its

attendant emotions.

For a minority of participants, this turmoil was not characterized by emotional volume or

intensity, but rather by a sort of emotional tension, most commonly demonstrated by sadness or

fear being paired with anger/aggression. For some participants, these emotions were perceived as

naturally co-occurring together. Others, however, explained that anger/aggression served to

protect them from whatever they feared, or that anger/aggression was preferable to sadness

because it was more actionable and conferred a sense of strength rather than weakness.

Relatedly, emotional or psychic pain characterized participants' experiences. Participants succinctly described feelings of "pain" or being "heartbroken" due to past trauma, while others talked of being "hurt," describing it further with such phrases as "the hurt is so deep," "the hurt is so potent," and "live in hurt." One participant, who was using an image of a broken heart to convey his pain, described it as follows:

> [The heart's] a little bit broken. It's a little bit cracked in some places.... It's an emotional injury.... I think it's more like that sacred place in you...that sacred kind of inner space has been kind of violated, and by 'sacred,' I mean the innermost sensitive parts of self, the innermost fragile place...that kind of injury to a very sacred, sensitive space...the core place.

*Adapting to a new self, new world*

Participants' accounts revealed the extent to which resilience processes emerged and functioned to aid their adaptation to their transformed selves and worlds. In fact, several participants used the word *resilience* or related language (e.g., "inner strength," "I'm a fighter") to denote how they were able to manage and overcome the effects of trauma. Several likened such a quality to being able to "bounce-back" from adversity, such as this participant:

> No matter how much pressure you put on a rubber band, until it's at its capacity is when it will pop. But that rubber band is designed to hold through. The elasticity in that rubber band is designed to hold things together, to keep things together. I was always infatuated by no matter how much you could pull that thing, it wouldn't break. And that's what I have inside of me. I have elasticity. So, that's what helped me, the elasticity, the bounce-back ability.

It was also clear from a majority of transcripts that bouncing-back from trauma was an ongoing process. Participants explained, "I'm still picking up the pieces from that experience in becoming the man that I am today"; "I'm still coping through it"; "I'm still healing and growing from that situation." Participants commonly used movement-related language and imagery as well, such as "keep going," "keep moving," "moving on," "moving forward," and so on, with a few adding the component of "letting go" followed by "moving forward." There were three subthemes that

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characterized in more detail exactly how resilience processes arose and functioned for participants; a fourth subtheme pertained to resilience-constraining factors.

**Purpose-giving/meaning-making**. Resilience emerged among a majority of participants through a process of purpose-giving, or meaning-making. This was evident in two scenarios across accounts, including directly finding purpose in the trauma itself, and leveraging the trauma for self-growth, altruism, and empowerment of others. When asked about how one's traumas fit into their overall life story, one participant answered:

> *[It's] getting a sense of life...experiencing what life really is. Because life isn't just like this normal thing where everything is always fine and dandy, and everyone's always mentally stable and in their right mind.... I guess it kind of, like, makes life what it is, instead of something just, like, plain and ordinary.*

For this participant, experiencing trauma was inherently meaningful, providing him with a sense of the richness and texture of life, of this transformed world that he was now inhabiting. This next participant created purpose and meaning out of his experiences of trauma by creating positive things from it, both for himself and others. He noted:

> *I discovered a kindness about myself...kindness that comes from, you know, overcoming a lot of this stuff...which puts me in a position sometimes to be more of a help to others than I thought I could. Kindness to me comes out of trauma because it's a way of taking that trauma and turning it around for the good of someone else, so that they won't have or suffer the same way that you did, won't have the same experience or maybe suffer the same that you did. You know, sometimes when you grow up with certain trauma, people make you feel so inadequate, and...you have these experiences and you come out of them and you bounce back and you gain different things from them, you take away tools from them, you start to see that you're not as inadequate as you were made to believe.*

These sentiments were commonly reflected across transcripts, with participants drawing compassion and empathy out of their own traumatic experiences, and seeing more clearly the inherent humanity of others. Notably, the above excerpt shows how purpose-giving/meaning-making can overlap with the next subtheme.

**Reestablishing worth/goodness of self/world**. Alluded to previously, some participants experienced a loss of self-worth and an altered perspective of the world following trauma exposure. In adapting to and overcoming the effects of trauma, some participants therefore engaged in a process of reestablishing both their sense of self-worth and the existence of, or potential for, goodness in the world. Reestablishing self-worth was accomplished through acts of altruism and empowering others, as shown above, as well as through image (re)making. One participant, who, like others talked at length about the loss of self-worth that trauma imparted, noted:

> *Having confidence, cleaning up, dressing good, looking good, smelling good, and always keeping a smile on your face.... You don't have to look like what you've gone through. Dressing up is one of the things that I like to do because it helps me. I like to dress up. I like to look nice. I take pride in how I look. I always want to present myself on a high level, with high esteem, and high confidence.*

Though reported by a minority of participants, this process of image (re)making was emphasized and discussed in detail by each of them. For other participants, reestablishing worth/goodness was accomplished through positive self-talk, reminding oneself of past successes (including surviving trauma), and recalling positive memories, as this participant indicated, "It ain't that I don't still see the trauma that was there and the process of it, but I also got to remember, 'You made it through it. You made it through it.' So, that's the positive point about it." Similarly, another participant expressed:

> *So, being that I've gone through those things, I really don't have a reason not to celebrate, to celebrate myself, to celebrate all of the accomplishments that I've made. I have a little slogan, a little phrase that my friend and I use, and it's just saying, 'The success and the things that I have were not just given to me. I pulled them out of the mud.'*

Though the methods whereby participants carried out the process varied, they were all in service of reestablishing self-worth, whether in the eyes of others, participants themselves, or both.

In reestablishing their belief in goodness in the world, participants engaged in a process of positive reframing of trauma, clinging to positivity (as indicated by the oft-stated phrase "trying to stay positive"), and envisioning positive experiences beyond their traumatic or posttraumatic circumstances. Reflecting the positive reframing of trauma, one participant had a motto of sorts: "One thing I always say...opposition is a clear indication that you're in position." In other words, for this participant, trauma was evidence of potential forthcoming goodness. In addition, participants commonly stated that, based on prior trauma, they now knew that any future trauma was temporary and would eventually end, i.e., "things will get better." One participant explained:

> *Knowing it's going to get better [sustains me]. It might take some time, but it will get better. It's what I believe.... It's a rough world out there...but if you dedicate yourself and stay away from the things that are negative, it'll be all right.*

Others found goodness in everyday things outside of themselves, as reflected by this participant:

> *It's so beautiful to go out and see kids playing...they're laughing and hollering and screaming.... It reminds you of the innocence you once had...reminds you of good, warm, beautiful days, so yeah, that kind of stuff helps.*

**Reconstituting, cultivating self**. Resilience was demonstrated through a variety of processes that functioned to reconstitute and cultivate aspects of one's newly transformed self. One of the primary ways in which participants did this was through developing insight into how trauma had affected them. This involved engaging in one or several exercises, including allowing oneself to experience and "sit with" trauma-related emotions, exerting focused effort to reflect on and understand one's trauma-related emotions, sharing one's trauma experience with others, and openly expressing one's trauma-related emotions to others. One participant explained:

> *If I'm allowed to step into my truth, step into my emotions...I'm allowing myself to be who I truly am. I'm allowing myself and my emotions to be expressed. So, I think that's kind of like the first step to overcoming the effects, allowing yourself*

*to feel those emotions, allowing yourself to display those emotions, allowing other
people to see you display those emotions.*

A minority of participants currently worked with a therapist to do this, using phrases such as

"working through," "checking in," "helping me to deal with things and...process," and "guide me

and direct me" to describe the therapeutic work (most others had received some sort of

therapeutic counseling in the past).

Reconstituting and cultivating oneself was also demonstrated by leveraging one's own

assets and attributes, such as personality traits, other personal qualities, and talents and hobbies.

Reflecting a combination of these things, one participant explained:

> *I'm a comedian.... I also feel like when seeing other people happy, it tends to
> make me happy. So, that for me is a quality [that helps me]. And I – I don't think
> that that's ever been broken in me. I think that's always been a trait that I carry.
> As far as I can remember, even back in school, I was always the class clown. So, I
> don't think that that spirit was broken out of me yet.... Cooking is a coping
> mechanism for me. That is actually one of my businesses that I have now.... I try
> to stay on YouTube, I'm looking for different things to do, as far as cooking and
> stuff like that, to help enhance my skills with it.... You'd be surprised what cooking
> can do. It keeps you occupied and your mind on the go....*

Other participants spoke of tenacity, agency, creativity, and determination, as well as yoga,

meditation, exercise, and playing boardgames and videogames.

Social support, such as that from family (biological and chosen) and friends, served

several functions. Participants accessed and leveraged social support as a means of improving an

emotional state, reoccupying their minds with something positive, and garnering advice or

comfort. A minority of participants specified that social support was most useful when it was

provided when they asked for it rather than when it was imposed upon them unsolicited, and, as

noted previously, when it was provided by individuals who had experienced similar traumas who

could therefore better relate to them and their experience.

Religion/spirituality acted as a reliable, sustaining source of support for participants. However, participants described a complex relationship with religion and spirituality. Many had had negative experiences with religion due to encountering homonegativity in churches and religious communities, but they had also had positive experiences by finding inspiration and joy in the music, outreach/service activities, sermon messages, and other aspects. Given this complexity, as one participant put it, "You have to take church for what you can get out of it and leave the rest there." Others had left church behind – at least the physical space and associated religious community – and practiced religion/spirituality on a more personal level, taking what they found useful and utilizing it for "strength," "wisdom," "forgiveness," and "compassion." When asked about how their personal religion/spirituality aided them in overcoming the effects of trauma, one participant indicated:

> *My faith – it brings peace, peace of mind. It brings assurance. When I feel down or depressed or whatever...it's a great uplifter.... It's almost like it's a tool. It's a tool that I must have in order to live.*

Another participant added:

> *I've always relied on my faith in order to keep myself going.... I'm also not going to turn away from something that I feel I've seen happen or work in my life because of the negative instances.... I've seen prayer do and move and work in ways that I know a man did not do for me, so I just can't give up on my religion.*

**Surviving/stifled**. For several participants, at some point in the process of overcoming the effects of trauma, either currently or in the past, there appeared to be a period of acting in a survival mode of sorts, wherein the focus was on escape (of the effects of trauma) and self-preservation rather than engagement with and resolution of the impact of the trauma. This survival mode was characterized by actions that some participants described as unhealthy/harmful, unsuccessful, or socially frowned upon, including effortful suppression of thoughts and emotions related to the trauma, intentional isolation, excessive sleeping, excessive

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eating, and/or beginning use/excessive use of alcohol or drugs. Notably, intentional isolation acted both as an effect of trauma exposure and as a coping strategy, and for some participants was viewed positively (as evidenced in the excerpts under the "Depletion/disconnection" subtheme above).

Aside from this survival mode, in a broader sense, participants described factors that constrained or counteracted their efforts to adapt to the effects of trauma, such as cumulative (and in some cases, ongoing) trauma exposures. Struggles associated with cumulative traumas emerged implicitly among some participants, as their accounts reflected a piling-on of trauma exposures in a relatively short time period, which they then linked to their resultant distress. Other participants were more explicit about the unique complication of multiple, successive traumas, as indicated by this participant who stated, "It's difficult when you haven't truly overcome one situation and then you find yourself trying to overcome another one."

Lack of social and community resources, whether at key moments immediately following the trauma or currently as participants were still in the process of overcoming its impact, was commonly reported as a constraining factor. For some participants, this took the form of absent support from one's biological family; for others this took the form of absent professional therapeutic services or community organizations tailored to Black and/or sexual minority men. One participant noted:

> *The one thing that I want to reiterate is finding or being provided the tools and the resources to help with the trauma. Whether it's some type of therapy/ counseling to deal with mental health issues, whether there's resources to help people that are LGBTQ, maybe, that might deal with trauma, people of color, whether it's women – whatever kind of thing that's going on with that person and they've experienced trauma, they need help. The help should look like a safe space and a safe place and a safe opportunity to express the traumatic experience or at least express that you feel the trauma and you're having effects from the trauma.*

Similarly, another participant explained:

> *We need some kind of groups that are specific to the LGBT community, because some other communities just don't understand what we go through, how we feel, why we feel. All those different things are valid points to who we are, and if nobody around us, if nobody during our childhood, nobody truly associated with us understands – they can't help.*

Cultural norms, societal conditions, and national events were also implicated in exacerbating trauma-related distress and/or stifling resilience processes. Specifically, racism and homonegativity, both separately and interactively, appeared to exert an ongoing, yet complex, influence on participants as they sought to adapt to and overcome the effects of trauma. For a few participants, societal racism and racial trauma – and in particular police brutality against Black men and the increased media coverage of it during 2020 – was the norm in their worlds. One participant said, "It's absolutely, absolutely nothing new to Black people about police brutality.... That's like a regular thing for Black people – feeling persecuted." A majority of participants agreed that this was indeed the norm for Black people, and, as such, they had become sensitized, even numb, to racial trauma. Others, however, noted that their trauma-related distress (e.g., anger, sadness) had been "intensifie[d]" because of it. One participant had an alternative perspective on the impact of recent racial trauma:

> *I don't lean on or depend on [the Black community] for any kind of help.... There is a very big disconnect between the Black community and the gay community.... I do feel the negative effects of police officers killing Black men, because at the end of the day, I'm still a Black man. But I don't think I fight as hard for them as much as I would if I felt like the Black community stood behind me as a gay man.... I have to worry about the police as well as the Black [straight] man...it's just my plate is a little more full, so again, I'm not going to support somebody that's not supporting me. It'd be easier for us as Black gay men to fight for the Black [straight] man if the Black [straight] man fought for us.... It's Black Lives Matter until it's a gay Black life, then it's OK for y'all to kill us or to harass us, or to beat us down. So again, why would we stand up and fight for somebody that's beating us up?*

While one aspect of this participant's identity (Black) felt the "negative effects" of national, racial trauma, the other aspect of his identity (gay) did not, and was perhaps unsympathetic toward the plight of Black men facing police brutality. Moreover, he felt unable to draw support from the Black, non-gay community because that same community was a source of trauma for him as a gay man.

Participants also discussed the culture of silence and stigma with regard to trauma and emotional expression/mental health in the Black community, generally, and in the Black male community, specifically. One participant explained that "Black men...we have to look a certain type of way. We have to be, like, hard on the outside, like this very rough exterior, holding in our emotions." Another participant noted:

> *Anything that causes pain, hurt or disturbances, our communities, especially in the African-American community and the Dominican community, Latino community, we don't like to discuss it.... In our community, we are not comfortable enough to sit down and to literally talk about what hurt us, when it hurt us, who hurt us, why they did it.... Even in the church they say, 'Oh, we'll just pray about it. We'll just pray on it.' Even in your home, 'Oh, don't talk about that. Don't bring shame to my house....' Silence is trauma, too.*

**Discussion**

This study sought to understand how the impact of trauma was perceived and experienced, and how resilience processes emerged and functioned in its midst among Black SMM in the mid-Atlantic US. This lived experience of trauma was marked by a perception of transformation of self and world, which manifested in a sense of depletion and disconnection, encumbrance and fixation, and turmoil and pain. Through processes of purpose-giving and meaning-making, reestablishing worth and goodness of self and world, and reconstituting and cultivating self, participants were able to adapt to their transformed selves and worlds. However, cumulative trauma, lack of social and community resources, socio-structural conditions, and self-

described unhealthy or unhelpful coping strategies acted to constrain the activation and function of resilience processes.

The themes representing the effects of trauma map onto many of the DSM-5 PTSD symptoms (e.g., depletion/disconnect maps onto lack of positive emotions and social detachment). However, notions of encumbrance and emotional or psychic pain do not, perhaps due to their more abstract nature, though they could certainly be interpreted to represent symptoms of negative mood, apathy, or feeling upset. Regardless, that such notions emerged in the results illustrate their salience for participant experiences. Overall, experiential themes demonstrate how the effects of trauma are perceived and experienced in real people's lives. Moreover, they reveal the depth and pervasiveness of the impacts of trauma exposure for Black SMM. Such a personalized conceptualization of lived experience makes clear how trauma pervades multiple domains of functioning and can reduce one's health-related quality of life.[54] The body of literature demonstrating a disproportionately high burden of trauma exposure and PTSD among SMM, regardless of race/ethnicity,[1-8] coupled with findings from the present study, highlight how a large proportion of SMM may be experiencing similar features of trauma-related distress and warrant urgent action. In primary care and other health-service settings where utilization of PTSD screening instruments may be the norm, employing phenomenological assessment techniques (e.g., eliciting narratives from patients rather than administering a checklist) commonly used by psychiatric providers may be useful for better capturing the impacts of trauma on patients' lives, especially those who may have limited access to formal psychiatric care.[55,56]

The findings on resilience answer calls for more such research among SMM,[26,57] and align with findings from prior studies. Specifically, several resources and strategies for living

and coping with trauma that emerged from participant narratives were reflective of those found in prior resilience work with SMM: empowering others; leveraging social support; and relying on personal qualities (or cognitive processes) and behaviors,[22,27] which resemble Fergus and Zimmerman's concept of promotive factors (consisting of internal assets and external resources) in the presence of risk.[58] The ways in which participants were able to meaningfully leverage religion and religious institutions, despite encounters with homonegativity, are reflective of Obrist and colleagues' concept of multi-layered social resilience.[28] In other words, participants demonstrated competence in being able to navigate to a particular form of capital in their environment and negotiate the resources they needed. Some strategies, such as intentional isolation and substance use, were experienced positively by participants, in terms of benefits to their mental health, indicative of hidden resilience.[21,29] Other resources and strategies, such as acts of altruism and growth from adversity, have been reflected in research with other sexual minority populations and non-sexual minority populations.[59,60]

The themes representing resilience extend prior research by explicating how resilience processes function to facilitate adaptation to adversity. In this particular case centered on the effects of trauma, these processes served to restore things that were lost and provide things that were needed to help participants acclimate to a transformed existence, which has implications for intervention development. For example, while resilience-building interventions could provide opportunities for Black SMM to empower others (the resource/strategy) who have encountered trauma in order to create purpose and meaning, it may be more beneficial to focus on the actual creation of purpose and meaning (function) more broadly, which may be accomplished in a multitude of ways depending on the participant and context. The same approach may be applied to reconstituting and cultivating self, and reestablishing worth and goodness of self and world.

Findings presented here also illustrate how structural factors can constrain resilience processes for Black SMM. Though some participants had been or were engaged in therapy, they also discussed the lack of and need for mental health services to treat the effects of trauma tailored specifically to Black sexual minorities, given the uniqueness of their lived experiences as doubly marginalized individuals. A lack of accessible mental health services has been reported previously by Black SMM,[61] which may contribute to underutilization of mental health services in this population.[62,63] Similarly, participants remarked on the culture of silence, stigma, and masculine norms surrounding trauma, emotional expression, and mental health more broadly, constraining engagement in mental health care and services further, which has been documented among both Black sexual minority and majority populations in the US.[64-66] There remains a pressing need to destigmatize mental health issues, make mental health services more accessible and tailored to Black SMM, and empower Black SMM to utilize such services.

Structural racism and violence, which has inundated various forms of media in recent years and reached an apex of sorts in 2020,[67,68] exacerbated or compounded the mental distress of several participants and remained a constant background presence in the lives of all of them. However, as a few participants somberly clarified, such conditions were commonplace for them and the broader Black community. Participants' accounts demonstrated that racial trauma, whether collective or individual, was an inherent part of living in the US as a Black person. Any attempts at intervening to mitigate the effects of trauma among Black SMM must necessarily be informed by this awareness. In addition, some participants felt blocked from being able to access spiritual and social support from their religious and/or broader Black community due to homonegativity. Such conditions have been commonly reported by Black SMM,[64,69-73] and though many participants were able to creatively navigate some of these circumstances to meet

their own needs and desires, ongoing stigma-mitigation work is needed, as are alternative sources of affirmative social support.

These findings should be considered in light of several limitations. Due to COVID-19-related recruitment difficulties and delays, the catchment area for participant recruitment had to be expanded, and participants had to be recruited as they became eligible. This resulted in the sample's being less homogeneous than desired. This research should be replicated with a more homogeneous sample beyond what was able to be achieved here; for example, a sample restricted to Black sexual minority men residing in the same city, within a certain age range, such as 18-29 years, and with comparable socioeconomic status. Future studies could also consider restricting the sample to participants who have experienced the same trauma, such as childhood sexual abuse, which has garnered significant research attention given its high prevalence among SMM.[74] Relatedly, participants were recruited from a parent study focused on home-based HIV/STI testing and treatment and had only incidentally experienced trauma. Targeted recruitment for a study explicitly focused on trauma and resilience may have yielded a different sample and potentially different findings. Additionally, interviews were conducted via telephone or online video conference software rather than in person, which may have affected rapport-development and participants' openness in responding to the interviewer's questions. Fourth, this research was conducted during the COVID-19 pandemic and in the midst of heightened socio-political and racial turmoil in the US. Such a uniquely traumatic environment may have affected participants' experience and discussion of distress and coping. Results may have differed had this research been conducted prior to these events.

The impacts of trauma exposure can be profound, long-lasting, and life-changing, and may be misunderstood or overlooked if not thoughtfully assessed. Findings revealed the former

to be true in this sample, but also revealed that Black SMM possess a degree of resilience that remains untapped and understudied. In the midst of managing the effects of trauma stemming from their own personal experiences, Black SMM must also confront ongoing structural violence, systemic racism, and sexuality-based stigma, for which they must leverage a range of assets and resources as they engage in a process of self-restoration to adapt and overcome. By grounding this research in phenomenology, this study served to amplify Black SMM's voices and illustrate the lived experience of the impact of trauma and the activation and function of resilience processes to counter it. Further research using an IPA approach on trauma and resilience, as well as other conditions affecting Black SMM, coupled with closer engagement with this creatively and diversely resilient population, may reveal new theoretical insights to inform intervention development to improve psychosocial health and wellness.

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Table 22. Example of steps 3-4 (initial noting and identifying emergent themes) of IPA data analysis approach.

| Themes | Transcript text | Notes on highlighted passages |
|---|---|---|
| TI: apathy (no motivation)<br><br>TI: changes to routine (sleeping, eating)<br><br><br>Trauma as transformative (norm vs abnormal)<br><br>TI as burdensome (anchored)<br><br>TI: hopelessness (no true reason to get up) | So, this [picture] goes back to, I think, something I believe I touched on in an earlier interview, just like-- I guess just like the general like lack of motivation that like I experience like through like all of those experiences or whatever. Waking up, you know, not even necessarily at like a decent time sometimes.<br><br>So, you know, now that I am better and I'm like-- I'm doing better, I've, you know, healed and went through therapy and stuff like that, it's-- I'm kind of like going back to my norm of waking up around like, you know, six o'clock in the morning, getting started. At the latest, like sometimes like seven is kind of like late for me to be waking up that late, like it's usually been like six or six-thirty or somewhere in between.<br><br>So, like going through these experiences, there were times that I was like waking up at nine, nine-thirty, getting my day started at like ten, and, you know, like the sun's out, and I'm-- technically I missed breakfast-time and stuff like that. So, that was very abnormal for me, to be, you know, sleeping that late. Or even when I do wake up, even though I might not be sleeping that late, to kind of just like be anchored to my bed, in the sense of not wanting to get up, or like not feeling like there is a true reason to get up out of bed or whatever. | *Has used 'or whatever' frequently.* <u>Just a speech habit or unsure of himself?</u><br><br>Here, effects of trauma include increased sleeping, apathy, loss of routine/structure (not waking up, getting up, having breakfast), <u>and perhaps a sense of hopelessness ('no true reason' to get out of bed)? Does one symptom cause the others?</u><br><br>*Uses words 'norm' and 'abnormal' when reflecting on the changes he noticed following trauma, which he's done previously.* <u>These effects of trauma seem to illustrate to him how trauma changed him from his pre-trauma self into someone else.</u><br><br>*Uses words to indicate a sense of heaviness, which he's also done previously; specifically, here, he uses 'anchored' – i.e., anchored to his bed.* <u>He's stuck, can't move or progress forward, literally and figuratively. Trauma-related thoughts and emotions weigh him down.</u> |

Note: Key passages are highlighted; descriptive notes are in plain text; linguistic notes are in italicized text; conceptual notes are in underlined text.
IPA, interpretative phenomenological analysis; TI, trauma impact

Table 23. Yardley's criteria[30,52,53] for demonstrating validity and quality in qualitative research.

| | |
|---|---|
| Sensitivity to Context | Demonstrated in (a) the choice of and rationale for interpretative phenomenological analysis in a given population, (b) appreciation of the interactional nature of data collection within the interview situation, (c) immersion in participants' accounts to make meaning of their meaning-making, (d) staying close to the data by frequently using the voice of participants and making claims based on the data, and (e) demonstrating knowledge of relevant literature on the subject matter. |
| Commitment and Rigor | Commitment should be demonstrated by (a) attentiveness to participants during data collection and (b) intentional care and discipline to conduct a careful analysis of each case. Rigor, or the thoroughness of the study, should be assessed through (a) the appropriateness of the sample to answer the research question, (b), the quality of the interviews, and (c) the completeness of the data analysis, which in this case would include the systematic employment of IPA methods and principles and sufficient quotes to reflect results. |
| Transparence and Coherence | Transparency is based on the extent to which the researcher clearly describes the stages of the research process in the write-up. Coherence is determined by (a) the clarity and logic of the arguments made in the write-up and (b) the extent to which the now-completed research fits with the underlying theoretical assumptions of the approach being implemented (in this case, interpretative phenomenological analysis). |
| Impact and Importance | Pertains to the extent to which the research makes a valuable contribution to the literature or practical significance in real-world situations. |

**DISCUSSION**

This dissertation research was intended to offer a reconceptualization of posttraumatic stress symptoms and the effects of trauma more broadly, particularly as experienced by cisgender sexual minority men (SMM) in the United States (US). Further, this dissertation sought to examine how the impacts of trauma may be linked to HIV transmission risk behavior and how resilience processes emerge and function following traumatic experiences. In addition to demonstrating a heavy burden of posttraumatic stress disorder (PTSD; 18%) and a heavy burden of posttraumatic stress symptoms (93%), the first study revealed at least four patterns of posttraumatic stress symptoms among trauma-exposed SMM: Intrusive-Avoidant, Dysphoric-Inattentive, Pervasive, and Resistant. Participants under age 25 years were more likely to fall in the first three classes, while non-Hispanic Black and Multiracial participants were more likely to fall in the Intrusive-Avoidant class. The second study showed that the Intrusive-Avoidant, Dysphoric-Inattentive, and Pervasive patterns were positively associated with a higher prevalence of serodiscordant condomless anal sex, with the Pervasive and Dysphoric-Inattentive patterns being significantly associated; there were no significant moderation effects by race or social cohesion. The third study yielded an in-depth understanding of how Black SMM perceived and experienced the effects of trauma exposure. Findings went beyond what may be generally conveyed by PTSD symptom-listing or diagnosing to illustrate the extent to which, and the ways (e.g., emotionally, socially) in which, participants felt transformed by trauma exposure. Likewise, the results highlighted how resilience processes emerged and functioned (e.g., reestablishing self-worth, reconstituting self) to help participants adapt to the effects of trauma.

*Limitations and strengths*

The scale used to build the latent classes of posttraumatic stress symptoms in the first study was only comprised of 40% of the DSM-5 PTSD symptoms. Use of a scale comprised of

all symptoms could reveal that a higher number of patterns, as well as differentially configured patterns, better characterize the manifestation of posttraumatic stress symptoms in this population. The outcome for the second study was assessed with a binary past-year sexual behavior variable. For this cross-sectional survey, assessing a more diverse range of sexual behaviors across varying time periods, including those that coincide with the exposure, would be more useful for validating the relationships detected. Additionally, the sample sizes of Black and white participants were not comparable, which should be addressed in future research (e.g., through oversampling Black and other racial/ethnic minorities).

For both studies one and two, the data were cross-sectional, preventing causal inferences, and data-collection occurred during the COVID-19 pandemic, which may have influenced who elected to participate (e.g., some individuals may have had more free time and therefore decided to join; others may have experienced financial difficulties due to loss of employment and therefore decided not to join due to lack of compensation when they otherwise would have). Similarly, the pandemic and events related to it could have been traumatic for some participants and exacerbated posttraumatic stress symptoms. Quarantine measures may have limited availability of sex partners and influenced decision-making with regard to sexual behaviors. In study three, the onset of the COVID-19 pandemic resulted in substantial difficulties in recruiting participants, leading to delays in obtaining the target sample size and an eventual expansion of the recruitment catchment area. These issues limited the extent to which homogeneous sampling could be implemented, as well as prevented in-person interviews.

Data from studies one and two were from a large, nationwide, relatively diverse sample of SMM. This is among the largest – if not the largest – study to examine trauma exposure, posttraumatic stress symptoms, and PTSD in this population. In addition, novel methods (i.e.,

latent class analysis) were used to examine and reconceptualize posttraumatic stress symptoms, and, given the large sample size, this study was able to examine how racial/ethnic groups differentially experienced posttraumatic stress symptoms. Study two used novel methods as well (i.e., multiple-indicator, multiple-cause modeling; latent class analysis with outcome modeling), both to examine nuanced differences in experiences of posttraumatic stress symptoms by race/ethnicity, and to illustrate how posttraumatic stress symptom patterns were differentially linked to the sexual risk behavior outcome. Limited qualitative research has been conducted to explore how Black SMM conceive of and experience the impact of trauma, which was done here through the novel approach of interpretative phenomenological analysis (with in-depth interviews and photo/image-elicitation). Such an approach allowed for a more in-depth examination and understanding of Black SMM's experiences. There was also a strengths-based component (i.e., resilience) to this study, showcasing the resilience of this population and contributing to the development of a more balanced, positive public health narrative with regard to Black SMM. Collectively, these studies intentionally employed methodologies and methods that were aimed at centering the person and the potential heterogeneities and commonalities in experience following trauma exposure.

*Public health implications*

There are several public health implications to these dissertation research findings. Findings across studies demonstrated the distinct, diverse ways in which posttraumatic stress symptoms and the broader effects of trauma are experienced by SMM, both in terms of the patterns of posttraumatic stress symptoms that manifested, and in terms of the ways in which racial/ethnic and other demographic subgroups of SMM experienced posttraumatic stress symptoms. Such nuance and richness are lost when traditional assessment and modeling

techniques are employed. In primary care and other traditionally non-psychiatric clinical settings, phenomenological approaches to assessment may be useful to understand how patients are impacted by trauma so that appropriately tailored services can be rendered. In research settings, assessment may need to be differentially tailored to racial/ethnic subgroups of SMM so that posttraumatic stress symptomology is accurately represented. In addition, rather than modeling posttraumatic stress symptoms continuously or at the diagnostic level (i.e., PTSD versus no PTSD), latent variable modeling (e.g., latent class analysis, factor analysis) and other novel approaches may be useful for arriving at understandings of posttraumatic stress symptoms that are more reflective of the lived experiences of participants, similar to how Black and white men have been shown to experience depression differently.[1] Doing so will better inform intervention development to mitigate the adverse effects of particular patterns of posttraumatic stress symptoms. Prior research with SMM has shown some posttraumatic stress symptom clusters and configurations to be more amenable to mitigation depending on the intervention.[2,3] Findings from this dissertation could therefore inform intervention research to target specific posttraumatic stress symptom patterns. That these patterns are differentially linked to sexual risk behavior necessitates sexual risk-reduction intervention components for some but not all patterns. While mitigation of posttraumatic stress would be expected to mitigate sexual risk (given the hypothesized relationship between posttraumatic stress symptom patterns and sexual risk), interventions that integrate posttraumatic stress symptom mitigation (again, tailored to a given posttraumatic stress symptom pattern) and sexual risk-reduction – perhaps modeled after O'Cleirigh and colleagues' Cognitive Behavioral Therapy for Trauma and Self-Care intervention – may be more beneficial and efficient.[2]

Findings from study three reveal how trauma exposure and its sequelae impact Black SMM and how resilience processes function to mitigate that impact, perhaps providing clearer targets for intervention. Moreover, findings show that Black SMM are diversely and creatively resilient, and possess a range of assets and strategies through which their resilience is expressed. Taken together, interventions that (a) thoughtfully, intentionally, and respectfully engage Black SMM communities and that (b) leverage existing strengths and assets to facilitate purpose-giving/meaning-making, reconstituting and cultivating self, and reestablishing worth/goodness could be particularly effective for increasing this population's quality of life. Community-based participatory approaches would likely be ideal in these efforts.

*Future research*

Studies one and two should be replicated using a full, 20-item measure of PTSD symptoms and a relatively detailed trauma exposure measure (e.g., Life Events Checklist-5, Extended Version).[4] This would allow for the identification of patterns using all DSM-5-identified PTSD symptoms, and would also allow for the detection of relationships between specific trauma exposures and specific posttraumatic stress symptom patterns. For cross-sectional studies, asking a wider range of sexual behaviors questions, including questions that coincide with the same assessment period for the posttraumatic stress symptom items, would help further articulate how and what sexual behaviors are more likely to be strongly linked to posttraumatic stress symptoms. However, longitudinal research would be most effective so that temporal ordering of the exposure and outcome could be established. Posttraumatic stress symptom patterns could be identified at baseline, and participants could then be followed over time and re-assessed to collect sexual behavior data; an added benefit of such an approach would allow for additional novel methods to examine trajectories of baseline latent classes over time.

Research is also needed to explore potential mechanisms through which posttraumatic stress symptom patterns operate to impact sexual behavior. Other outcomes, such as substance use and suicidal ideation, should be explored as well, as these may also be differentially associated with posttraumatic stress symptom patterns. Given the differential response patterns of Black SMM in the second study, as well as the associations between race/ethnicity and latent class membership in the first study, additional quantitative and qualitative research with SMM of Color may be warranted to determine in more detail how posttraumatic stress symptoms are uniquely experienced by these populations and what consequences may result. Study three should be replicated with more homogeneous samples in diverse contexts across the US, which could contribute to theory development concerning how the effects of trauma are experienced and concerning the activation and function of resilience processes among Black SMM. This could also contribute to more nuanced development of assessment measures in this population.

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**Appendix A. Trauma and posttraumatic stress measures for Aims 1-2**

Trauma exposure item: Sometimes things happen to people that are very upsetting and stressful, like being in a life-threatening situation, such as a flood, earthquake, or other major disaster or extreme weather event; being involved in a serious accident or fire; being physically abused, assaulted, or mugged; being sexually abused, assaulted, or harassed; being incarcerated in jail or prison; being harassed by police; seeing another person killed or dead; someone making a threat to harm you; having a serious medical emergency or being diagnosed with a chronic illness, like HIV; seeing another person injured or badly hurt; having someone close to you suddenly die; or hearing about something horrible that has happened to someone you are close to. Have you ever experienced something like this? Yes / No

If yes, then participant answered items from the Reduced PTSD Checklist for the DSM-5[1]:

In the past month, how much were you bothered by:

1. Repeated, disturbing, and unwanted memories of the stressful experience?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

2. Feeling very upset when something reminded you of the stressful experience?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

3. Avoiding memories, thoughts, or feelings related to the stressful experience?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

4. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

5. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

6. Loss of interest in activities that you used to enjoy?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

7. Feeling jumpy or easily startled?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

8. Having difficulty concentrating?

    0 – Not at all    1 – A little bit    2 – Moderately    3 – Quite a bit    4 – Extremely

**Appendix B. Trauma and posttraumatic stress items for Aim 3 eligibility criteria**

Primary Care PTSD Screen for DSM-5[2]:

Sometimes things happen to people that are unusually or especially frightening, horrible, or traumatic. For example:

- a serious accident or fire
- a physical or sexual assault or abuse
- an earthquake or flood
- a war
- seeing someone be killed or seriously injured
- having a loved one die through homicide or suicide

Have you ever experienced this kind of event?

Yes / No

If yes, please answer the questions below.

In the past month, have you...

1. Had nightmares about the event(s) or thought about the event(s) when you did not want to?

   Yes / No

2. Tried hard not to think about the event(s) or went out of your way to avoid situations that reminded you of the event(s)?

   Yes / No

3. Been constantly on guard, watchful, or easily startled?

   Yes / No

4. Felt numb or detached from people, activities, or your surroundings?

   Yes / No

5. Felt guilty or unable to stop blaming yourself or others for the event(s) or any problems the event(s) may have caused?

   Yes / No

**Appendix C. Interview guides for Aim 3**

*This is participant #_____, and today is [date] _____.*

*Before we start, I just want to acknowledge the many traumatic things going on right now in this country. There's a pandemic, and the news is finally covering a lot of the police violence that Black men have been enduring for many years. So, this is a particularly traumatic time, and I acknowledge that, and we can touch on these specific issues a little bit later on.*

IDI #1

First, we'll talk a little bit about the concept of trauma and what it means.

1. When I say the word trauma, what comes to mind for you?
    *If participant doesn't understand, try*:
    When you hear the word trauma, what do you think about?
    *If participant is still having trouble, try*:
    This could be an event, images, feelings, or anything else.
        i. For some people, when they hear the word trauma, they think about dangerous events, such as war, assault, witnessing violence, being abused, things like that.
        ii. Some people think about images in their mind, like images of people hurt, car crashes, people crying/screaming, etc.
        iii. Some people think about feelings, like fear or terror, or sounds, like gunshots.
2. What are some other words you might say instead of 'trauma'?
3. What are some examples of trauma?

Next, we'll talk a little bit about traumatic events in your community.

4. Tell me about trauma [or words they used instead of trauma] in your community in _____.
    a. How has it impacted the community here?
    b. Why do you think this kind of trauma happens in your community?
    c. What can be done about it?
    d. What do you think is your community's attitude toward all of this trauma?

Now, I'd like to touch on some issues related to your personal experience with trauma. You're here doing this interview because you've had some traumatic experience(s) in your life, right? But you're not required to go into detail about any of these experiences, although you can if you would like. And, as you respond to some of the questions in this interview, you may find yourself providing some of that information anyway. But I want to be clear up front that it's not required of you, and I won't ask you to discuss anything you're uncomfortable discussing. Do you have any questions before we start?

5. About how many experiences like this have you had in your life up until now?
    a. How common have these kinds of experiences been for you throughout your life?

    b.  How does your experience compare to other people you know – to your friends, family, neighbors? Has their experience been better, worse, similar to yours?

    c.  Why do you think this kind of trauma has happened to you?

    d.  Thinking about the most impactful traumas you experienced – at the time that each trauma occurred, how did you cope?

        i.  What personal qualities or actions did you rely on to help you?

        ii.  What people or relationships in your life helped you?

        iii.  What are some things in your community that helped you?

        iv.  What is something you didn't have, that you think would have helped you cope better with these experiences?

6.  How do these experiences of trauma fit into your overall life story of who you are?

*If participant doesn't understand, try*:

Thinking about where you are now in your life, looking back over the course of your life, how would you describe these experiences of trauma fitting into your life?

*If participant is still having trouble, try*:

When you think about who you are and the course that your life has taken, where would you say these experiences of trauma fit in?

*Could also try*: What role have these experiences played in your life?

    a.  What do these experiences mean to you?

    b.  How have you come to understand and make sense of these experiences of trauma?

    c.  What has influenced you to understand these trauma experiences in this way?

7.  How have your traumatic experiences impacted your perspective on life?

    a.  If these had not occurred, how do you think you would be different now?

        i.  How do you think your life would be different now?

Finally, I want to talk about the pandemic and racism in the US.

8.  As you know, right now there's a pandemic and many people are getting sick and dying. Racism in the US, and police brutality toward Black people in the US, is common and there's a lot of media coverage on these things. For some people, the pandemic has been traumatic, and seeing the police brutality has been traumatic. What about you?

Next interview:

_____

*This is participant #_____, and today is [date] _____.*

Thank you for coming back and doing a second interview. If you recall, last time we talked about experiences of trauma, and you shared a lot of valuable information. Today, we're going to talk a little bit about how those experiences are affecting you now. I want to remind you that this will be confidential, and if you feel uncomfortable or want to take a break, just let me know, okay?

9. Trauma affects people differently and can have a lasting impact on people, even if the trauma happened long ago. Some people experience changes after trauma – changes to their health, body, behavior, emotions, and relationships. What about you – what changes have experienced?
   a. *If they describe symptoms*:
      i. Tell me more about _____. Could you paint me a picture of what it's like to experience that?
      *Could also try*: Slowly walk me through what it's like to experience that.
      ii. What goes through your mind when you experience that?
      iii. How do you feel when you experience that?
      iv. What do you do when you experience that?
      v. How do you know it's related to trauma you experienced?
      vi. How have you adapted to it over time?
      vii. [*Repeat for each change/symptom mentioned*]
10. Before, in the last interview, you described some things that helped you cope with the traumatic events you experienced. Now, we've been talking about how those experiences have affected you and caused some changes in your life, right? Tell me about how you cope with these things – [*list the changes/symptoms they've described*] – that you've told me about.
    a. What personal qualities do you think help you get through it?
    b. What actions do you take to help you get through it?
    c. What relationships, people in your life, help you get through it?
    d. What are some things in your community that help you get through it?
11. What are some things that have made it difficult for you to cope well with these symptoms?
12. For some people, after they experience trauma, they find qualities within themselves that maybe they didn't know they had, qualities that they might not have realized otherwise. What about you?
    a. *If not evident*: What has sustained you?
13. How has this experience you've been telling me about – your experience with trauma, the effects of trauma, and coping and adapting to it – how has all of this influenced your view of the world?
    a. Your view of yourself?
    b. Your view of the future/your future?

Lastly, I want to ask about the pandemic and police brutality again. Last time, we talked about how these may have been traumatic for you. Now, I want to ask you about how they have affected any of the things you've mentioned today – [*list the changes/symptoms they have described*].

14. How has the pandemic affected _____? [*list changes*]
15. How has the increased media coverage of racism and police brutality affected _____? [*list changes*]
16. What about the storming of the capitol on January 6?
    a. How do you feel about that? How has that impacted you/your management of your own trauma?


Next interview:

_____

Photo themes:

1. Living with trauma: "This is how trauma affects me"
2. Coping with trauma: "This is how I overcome the effects of trauma"

**John Mark Wiginton (he/him/his)**
Master of Public Health, Master of Social Work
Doctoral Candidate | Department of Health, Behavior, & Society
Johns Hopkins University Bloomberg School of Public Health
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**RESEARCH INTERESTS**
- HIV and STI prevention, sexual health care access
- Mental health, particularly sequelae of trauma and stigma
- Links between sexual and mental health
- Interventions for sexual and gender minorities and people living with HIV, especially those who are also racial/ethnic minorities or otherwise multiply marginalized
- Sexual rights as human rights, resilience and community empowerment
- Social/structural determinants of health, minority stress, intersectionality
- Quantitative, qualitative, and mixed/multi method research methodologies

**EDUCATION**

2017 - 2021   PhD candidate, Social & Behavioral Science
Johns Hopkins University, Baltimore, MD
Bloomberg School of Public Health
Department of Health, Behavior & Society

2014 - 2016   MPH, University of Michigan, Ann Arbor, MI
School of Public Health
Department of Health Behavior & Health Education
Specialization in Gender, Sexuality, & Population Health

2014 - 2016   MSW, University of Michigan, Ann Arbor, MI
School of Social Work
Specialization in Interpersonal Practice & Mental Health

2003 - 2007   BA, Austin College, Sherman, TX
Majors: Psychology, Religious Studies
Minor: Sociology

**RESEARCH, TEACHING, AND OTHER PROFESSIONAL EXPERIENCE**
2020 - *present* **Research Assistant**, Institute for Collaboration on Health, Intervention, & Policy
University of Connecticut, Storrs, CT

2019 - *present* **Research Assistant**, Center for Public Health & Human Rights
Department of Epidemiology, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2019 - 2021   **Teaching Assistant**, Social & Behavioral Aspects of Public Health

Summer Institute, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2019 - 2020    **Teaching Assistant**, Issues in LGBTQ Health Policy
Department of Health Policy & Management, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2019 - 2020    **Teaching Assistant**, Statistics for Psychosocial Research: Measurement Models
Department of Mental Health, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2019 - 2020    **Teaching Assistant**, Statistics for Psychosocial Research: Structural Models
Department of Biostatistics, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2018 – 2019    **Intern / Consultant**, HIV/AIDS Program, Population Council
Washington, DC

2017 - 2019    **Research Assistant**, Lighthouse Studies at Peer Point
Department of Health, Behavior, & Society, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2017 - 2019    **Student Coordinator**, LGBTQ Working Group
Bloomberg School of Public Health,
Johns Hopkins University, Baltimore, MD

2018    **Research Assistant**, Dr. Michelle Kaufman
Department of Health, Behavior, & Society, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2017    **Research Assistant**, BESURE
Department of Health, Behavior, & Society, Bloomberg School of Public Health
Johns Hopkins University, Baltimore, MD

2017    **Research Associate / Study Coordinator / Interventionist**, Center for Sexuality & Health Disparities, School of Nursing
University of Michigan, Ann Arbor, MI

2016 - 2017    **Research Assistant**, Department of Microbiology and Department of Health Behavior & Health Education
University of Michigan, Ann Arbor, MI
Lusaka, Zambia

2016    **Research Assistant**, Center for Sexuality & Health Disparities, School of Nursing
University of Michigan, Ann Arbor, MI

| 2015 - 2016 | **Social Work Intern / Psychotherapist**, University of Michigan Health System |
| | Adult Ambulatory Psychiatry |
| | Ann Arbor, MI |

2015 - 2016     **Social Work Intern / Psychotherapist**, University of Michigan Health System
Adult Ambulatory Psychiatry
Ann Arbor, MI

2014     **Volunteer**, Youth Advocacy Program / Center for Children with Learning Disabilities
Accra, Ghana

2009 - 2013     **ESL Instructor**, Japanese Exchange & Teaching Program
Okinawa Board of Education
Naha City, Okinawa Prefecture, Japan

2006 - 2008     **Writer / Clinical Assistant**, Center for Psychological Development
Sherman, TX

**HONORS AND AWARDS**

2016     Merit Scholarship Recipient
University of Michigan, School of Public Health, Ann Arbor, MI

2016     Center for Japanese Studies Alumni Fellowship Recipient
University of Michigan, Center for Japanese Studies, Ann Arbor, MI

2015     Merit Scholarship Recipient
University of Michigan, School of Public Health, Ann Arbor, MI

2015     Phi Kappa Phi Academic Honor Society Inductee
University of Michigan, School of Social Work, Ann Arbor, MI

2015     School of Social Work Dean's Mission Scholarship Recipient
University of Michigan, School of Social Work, Ann Arbor, MI

2014 - 2015     Eleanor Cranefield Scholarship Recipient
Awarded for outstanding potential for professional practice
University of Michigan, School of Social Work, Ann Arbor, MI

2014 - 2015     School of Social Work Michigan Scholars Program Scholarship Recipient
University of Michigan, School of Social Work, Ann Arbor, MI

2003 - 2007     Merit Scholarship Recipient
Phi Beta Kappa, Alpha Chi, Psi Chi Academic Honor Societies Inductee
Austin College, Sherman, TX

**MANUSCRIPTS**

**Published or in press**

1. Stephenson, R., Blalock-Tharp, M., **Wiginton, J.M**, & Metheny, N. (2018). Sex composition of twins and associations with mortality and morbidity outcomes in resource poor settings. *Journal of Biosocial Science, 50*(4), 491-504.

2. **Wiginton, J.M.**, King, E.J., & Fuller, A.O. (2019). 'We can act different from what we used to': Findings from participant experiences of an HIV-prevention intervention in Zambia. *Global Public Health, 14*(5), 636-648.

3. Xu, W., Kaufman, M., **Wiginton, J.M.**, & Zheng, Y. (2019). Alcohol use and binge drinking among men who have sex with men in China: Prevalence and correlates. *Drug and Alcohol Dependence, 202*, 61-68.

4. **Wiginton, J.M.**, Fleming, P.J., Lerebours, L., Donastorg, Y., Barrington, C., & Brito, M. (2020). Masculine gender norms, male circumcision, and men's engagement with health care in the Dominican Republic. *Global Public Health, 15*(5), 654-665.

5. Maksut, J., Sanchez, T., **Wiginton, J.M.**, Scheim, A., Logie, C., Zlotorzynska, M., Lyons, C., & Baral, S. (2020). Gender identity and sexual behavior stigmas, severe psychological distress, and suicidality in an online sample of transgender women in the United States. (*Annals of Epidemiology*).

6. Kaufman, M., Casella, A., **Wiginton, J.M.**, Xu, W., DuBois, D.L., Sanders, R., Simon, J., & Levine, D. Mentoring young African American men and transgender women who have sex with men on sexual health: Formative research for an HIV mobile health intervention for mentors. (*JMIR Formative Research*).

7. Zlotorzynska, M., Baral, S., Scheim, A., Lyons, C., Maksut, J., **Wiginton, J.M.**, & Sanchez, T. Transgender women's internet survey and testing (TWIST): Protocol and key indicators report. (in press at *Transgender Health*).

8. Earnshaw, V.E., Eaton, L.A., Watson, R.J., Brousseau, N.M., Layland, E.K., Berman, M., **Wiginton, J.M.** Sexual minority outness and HIV/STI stigma over first year post-HIV/STI diagnosis among Black MSM. (in press at *Annals of LGBTQ Public and Population Health*).

9. **Wiginton, J.M.**, Murray, S., Maksut, J., Augstinavicius, J., Delpech, V., Kall, M., & Baral, S. HIV-related stigma and discrimination in health care and health-related quality of life among people living with HIV in England and Wales: A latent class analysis. (in press at *Stigma & Health*).

10. **Wiginton, J.M.**, Murray, S., Augustinavicius, J., Maksut, J., Anderson, B.J., Sey, K., Ma, Y., Flynn, C.P., German, D., Higgins, E., Menza, T.W., Orellana, R.E., Flynn, A.B., Al-Tayyib, A., Kienzle, J., Shields, G., Lopez, Z., Wermuth, P., & Baral, S.D. Characterizing optimal metrics of sexual behavior stigmas among gay, bisexual, and other men who have sex with men in nine cities across the United States. (in press at *American Journal of Epidemiology*).

**Under review**

11. **Wiginton, J.M.**, Maksut, J., Scheim, A., Zlotorzynska, M., Sanchez, T., & Baral, S. Sexual behavior stigma, gender identity stigma, and sexual health among transgender women across the United States. (R&R at *BMC Public Health*).

12. Maksut, J., Murray, S., Augustinavicius, J., **Wiginton, J.M.**, Delpech, V., Kall, M., & Baral, S. Brief report: HIV stigma and discrimination and unmet needs among persons living with HIV in the United Kingdom. (R&R at *Preventive Medicine Reports*).

13. **Wiginton, J.M.**, Eaton, L.A., Watson, R.J., Maksut, J., Earnshaw, V., & Berman, M. Sex positivity, medical mistrust, and PrEP conspiracy beliefs among cisgender Black sexual minority men in Atlanta, Georgia. (R&R at *Archives of Sexual Behavior*)

14. Berman, M., Watson, R.J., Earnshaw, V.E., Layland, E.K., **Wiginton, J.M.**, & Eaton, L.A. Factors associated with disclosure of sexual orientation among Black sexual minority men. (under review at *Psychology of Sexual Orientation and Gender Diversity*)

15. **Wiginton, J.M.**, Eaton, L., Kalinowski, J., Watson, R.J., Caliendo, A., Sam, S., & Kalichman, S. Lifetime prevalence of syphilis infection among predominantly Black sexual and gender minorities living with HIV in Atlanta, Georgia. (under review at *Race and Ethnicity*)

16. **Wiginton, J.M.**, Murray, S., Poku, O., Augustinavicius, J., Jackman, K., Kane, J., Diouf, D., Ba, I., Mothopeng, T., Njindam, I.M., Turpin, G., Tamoufe, U., Sithole, B., Zlotorzynska, M., Sanchez, T., & Baral, S. Sexual behavior disclosure and health-care stigma among men who have sex with men in five countries across sub-Saharan Africa. (under review at *BMC Global Health*).

17. **Wiginton, J.M.**, Mathur, S., Gottert, A., Pilgrim, N., Chipeta, E., Mwapasa, V., Siu, G., Cawood, C., & Pulerwitz, J. Recent testing, care and treatment experiences among men living with HIV: Perspectives from four high-prevalence African countries. (under review at *PLOS One*).

18. Dibble, K.E., Murray, S.M., Maksut, J.L., Aggarwal, R., **Wiginton, J.M.**, Augustinavicius, J.L., Lyons, C.E., Anderson, B.J., Sey, K., Ma, Y., Flynn, C.P., German, D., Higgins, E., Menza, T.W., Orellana, R.E., Flynn, A.B., Al-Tayyib, A., Kienzle, J., Shields, G., Lopez, Z., Wermuth, P., & Baral, S.D. Hierarchical associations between HIV testing and stigma among HIV negative, cisgender, sexual minority men – National HIV Behavioral Surveillance, 9 US cities, 2017. (under review at *American Journal of Preventive Medicine*)

**Completed, submission pending**

19. **Wiginton, J.M.**, Tobin, K., Maksut, J., & Latkin, C. Stigma, branched sexuality, and sexual health among cisgender Black sexual minority men in Baltimore, Maryland. (*Culture, Health & Sexuality*).

20. **Wiginton, J.M.**, Murray, S., Anderson, B.J., Sey, K., Ma, Y., Flynn, C.P., German, D., Higgins, E., Menza, T.W., Orellana, R.E., Flynn, A.B., Al-Tayyib, A., Kienzle, J., Shields, G., Lopez, Z., Wermuth, P., & Baral, S.D. Prevalence and correlates of sexual behavior stigma among cisgender men who have sex with men in nine cities across the United States. (*JMIR*)

21. Algarin, A.B., Chapin-Bardales, J., **Wiginton, J.M.**, Hernandez-Avila, M., Baruch-Dominguez, R., & Smith, L.R. Patient sexuality disclosure and experience: Exploration of the influence of negative or positive experiences when seeking health services. (*AIDS Patient Care and STDs*)

22. **Wiginton, J.M.**, Tobin, K., Owczarzak, J., Murray, S., Baral, S., & Sanchez, T. "I have elasticity...the bounce-back ability": An interpretative phenomenological analysis of the effects of trauma and the processes of resilience among Black cisgender sexual minority men. (journal TBD)

23. **Wiginton, J.M.**, Tobin, K., Murray, S., Musci, R., Baral, S., & Sanchez, T. Posttraumatic stress symptoms among cisgender sexual minority men in the United States: A latent class analysis. (journal TBD)

24. **Wiginton, J.M.**, Tobin, K., Murray, S., Musci, R., Baral, S., & Sanchez, T. Associations between latent classes of posttraumatic stress symptoms and HIV transmission risk behavior among cisgender sexual minority men in the United States. (journal TBD)

**In preparation**

25. **Wiginton, J.M.** & Kaufman, M. Mentoring young African-American men who have sex with men: A topical review. (*Public Health Reports*).

26. **Wiginton, J.M.**, Eaton, L., Maksut, J., et al., & Kalichman, S. Factors promotive of ART adherence among predominantly Black sexual and gender minorities living with HIV in Atlanta, Georgia: A latent profile analysis. (*AIDS*)

27. **Wiginton, J.M.**, Murray, S., Augustinavicius, J., Zlotorzynska, M., Baral, S.D., Smith, L., Algarin, A., Sanchez, T., et al. Sexual behavior stigma among cisgender men who have sex with men in Mexico: Exploratory and confirmatory factor analyses. (*Stigma & Health*)

28. Aggarwal, R., Murray, S.M., Dibble, K.E., Lyons, C., **Wiginton, J.M.**, Sanchez, T.H., & Baral, S.D. Associations between stigma, psychological distress, and sexuality disclosure with alcohol consumption in a multisite sample of men who have sex with men in the United States (journal TBD).

29. Dibble, K.E., Murray, S.M., Zlotorzynska, M., **Wiginton, J.M.**, Lyons, C., Rainey, J.C., Ortiz, J.C., Lynn-Barber, J., Sanchez, T.H., & Baral, S.D. Associations of sexual behavior stigma and salivary cortisol among men who have sex with men in the 2019

American Men's Internet Survey: Limitations and recommendations for future research. (journal TBD)

**CONFERENCE PRESENTATIONS**
1. **Wiginton, J.M.** [presenter] (April 2016). The fire across the river: HIV / AIDS in Japan (oral presentation). Japan Studies Graduate Student Conference. University of California, Berkeley, CA.

2. **Wiginton, J.M.** [presenter], Fleming, P.J., Lerebours, L., Donastorg, Y., Barrington, C., & Brito, M. (March - April 2017). Perceived masculinity, HIV testing, and healthcare seeking among heterosexual men in the Dominican Republic (oral presentation). American Men's Studies Association's 25th Conference on Men and Masculinities. Ann Arbor, MI.

3. **Wiginton, J.M.** [presenter], Tobin, K., Davey-Rothwell, M., & Latkin, C. (November 2018). Characteristics associated with sexual orientation concordance and discordance among Black men who have sex with men in Baltimore, Maryland (poster presentation). American Public Health Association. San Diego, CA.

4. Kaufman, M., Casella, A., Simon, J., & **Wiginton, J.M.** (March 2019; canceled due to COVID-19). Exploring the role of youth mentoring in HIV prevention and care among African American adolescent MSM/T/GNB in three cities (poster presentation). Society of Behavioral Medicine. Washington, DC.

5. **Wiginton, J.M.** [presenter], Mathur, S., Gottert, A., Pilgrim, N., Chipeta, E., Mwapasa, V., Siu, G., Cawood, C., & Pulerwitz, J. (July 2019). Recent testing, care and treatment experiences among men living with HIV: Perspectives from four high-prevalence African countries (oral presentation). AIDS Impact. London, UK.

6. **Wiginton, J.M.** [presenter], Murray, S., Maksut, J., Augstinavicius, J., Delpech, V., Kall, M., & Baral, S. HIV-related health care stigma and discrimination and quality of life among people living with HIV in the United Kingdom: A latent class analysis (poster presentation). AIDS 2020 Virtual.

7. Zlotorzynska, M., Baral, S., Scheim, A., Lyons, C., Maksut, J., **Wiginton, J.M.**, & Sanchez, T. Medical gender affirmation treatment is associated with increased HIV/STI testing in an online sample of transgender women in the US (poster presentation). AIDS 2020 Virtual.

8. Maksut, J., **Wiginton, J.M.**, Zlotorzynska, M., Lyons, C., Sanchez, T., Scheim, A., & Baral, S. (March 2020). Associations between hormone use, PrEP use, and stigma in US transgender women (poster presentation). Conference on Retroviruses and Opportunistic Infections. Boston, MA.

9. Zlotorzynska, M., Baral, S., Scheim, A., Lyons, C., Maksut, J., **Wiginton, J.M.**, & Sanchez, T. (September 2020). STI testing and piloting of home-based testing in an

online sample of transgender women in the United States (oral presentation). STD Prevention Conference. Atlanta, GA.

10. **Wiginton, J.M.** [presenter], Kaufman, M., Casella, A., Xu, W., DuBois, D., Arrington-Sanders, R., Simon, J., & Levine, D. (February 2021). Leveraging mentorships to promote sexual health among Black sexual and gender minority youth at risk for HIV (oral presentation). Connecticut Mentoring Summit: Advancing Social Equity in Youth Mentoring (virtual).

11. **Wiginton, J.M.** [presenter], Murray, S., Tobin, K., Uzzi, M., Zlotorzynska, M., Baral, S., & Sanchez, T. (June 2-4, 2021). Posttraumatic stress among Black and white cisgender men who have sex with men in the United States (oral presentation). Society for Prevention Research (virtual).

12. **Wiginton, J.M.** [presenter], Murray, S., Tobin, K., Baral, S., & Sanchez, T. (November 2-5, 2021). Racial/Ethnic Differences in Patterns of Posttraumatic Stress and Coping Behaviors among Gay, Bisexual, and Other Men Who Have Sex with Men in the United States (oral presentation). International Society for Traumatic Stress Studies (virtual).

**FUNDING SUPPORT**
**Dean's PhD Tuition Scholarship**
**Department of Health, Behavior & Society | Bloomberg School of Public Health**
**Johns Hopkins University, Baltimore, MD**                      Summer 2021
This was for continued dissertation research support.

**Department of Health, Behavior & Society | Bloomberg School of Public Health**
**Johns Hopkins University, Baltimore, MD**                      June 2020 ~
**Doctoral Distinguished Research Award**
This was for my dissertation research examining posttraumatic stress and HIV risk among cisgender men who have sex with men in the United States.

**Center for Qualitative Studies in Health & Medicine | Bloomberg School of Public Health**
**Johns Hopkins University, Baltimore, MD**                      July 2020 ~
**Dissertation Enhancement Award**
This was for the qualitative component of my dissertation research examining traumatic stress and resilience among cisgender Black men who have sex with men in the Baltimore/Washington, D.C. area.

**International Institute**, **Department of African Studies, School of Public Health**
**University of Michigan, Ann Arbor, MI**                      May - August 2016
**Qualitative Evaluation of an HIV-Prevention Intervention in Zambia**
The goal of this research was to evaluate an HIV-prevention intervention (i.e. Trusted Messenger Intervention) in Zambia.

**Office of Global Activities, School of Social Work**
**University of Michigan, Ann Arbor, MI**                      August 2015

**Global Special Studies in Dharamsala, India**
The goal of this short-term immersion project was to explore experiences of escape and migration, cultural transmission and adaptation, and community-based coping resources in a Tibetan refugee community.

**PROFESSIONAL MEMBERSHIPS**
National Association of Social Workers
American Public Health Association
International AIDS Society
International Society of Traumatic Stress Studies

**LANGUAGES**
English (native)
Japanese (advanced)