

Identifying intersectional prospective predictors of suicidal thoughts and behaviors among sexual minority adults: A conditional inference tree approach

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1. Introduction

Across studies, sexual minority (SM) individuals have consistently higher suicide risk than heterosexual individuals (Haas et al., 2010; Hottes et al., 2016; King et al., 2008; Marshal et al., 2011; Meyer, 2003). The term “sexual minority” encompasses diverse populations but broadly refers to individuals who identify as lesbian, gay, bisexual, pansexual, queer, asexual, or another non-heterosexual sexual orientation; the term also includes individuals who have same-gender romantic or sexual attractions or behaviors (American Psychological Association, 2021). In a representative household survey, SM adults were more likely to report past-year suicidal thoughts (adjusted odds ratio = 2.2, 95 % CI 1.08–4.50; Kidd et al., 2024) than heterosexual adults. Similarly, in a meta-analysis of over 21,000 adults, lifetime prevalence estimates of suicide attempts among SM adults were 11 % in population-based surveys and 20 % in community surveys, relative to 4 % in heterosexual respondents (Hottes et al., 2016). Understanding the factors that are associated with disproportionately prevalent suicidal thoughts and behaviors (STBs) within SM populations is crucial, as it provides evidence

for developing targeted prevention and intervention strategies for this group (Mustanski and Espelage, 2020).

The intersectionality framework (Crenshaw, 1989) explores the ways in which various social identities (e.g., race, gender, sexual orientation, socioeconomic status) are co-constituted and embedded within systems of oppression and structural inequality (e.g., racism, sexism, heteronormativity). Rather than viewing these social identities and forms of inequality in isolation, the intersectionality framework emphasizes that their combined effects create unique experiences of discrimination and privilege, and these experiences can shape individual health outcomes. We use this theory to conceptualize the ways in which social identities and stigma may jointly contribute to suicidal risk profiles in sexual minority populations.

Demographic factors, including age, gender identity, sexual orientation, race/ethnicity, and socioeconomic status (Tajfel and Turner, 1979), are clinically meaningful predictors of STBs. Emerging evidence suggests that these identities not only exert independent effects on suicide risk but may also moderate one another's associations with STBs (English et al., 2022). These identities may play an important role in

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influencing individuals' engagement in STBs, both independently and via their intersections, which may amplify their impact (Baiden et al., 2020; English et al., 2022; Forrest et al., 2023; Meyer et al., 2021; Ramchand et al., 2022). For example, in a large US-based national survey with over 190,000 participants, suicidal thoughts were most prevalent among White adults in each sexual identity category (Ramchand et al., 2022). Among gay and bisexual men, the prevalence of suicidal thoughts was second highest among Hispanic men. Among bisexual women, the prevalence of suicidal thoughts was second highest for multiracial women; among lesbian/gay women, it was second highest among Hispanic women. In addition, the prevalence of suicide attempts was highest among multiracial adults among heterosexual men, heterosexual women, SM women, and White and other gay/bisexual men. The co-occurrence (i.e., intersection) of different demographic factors, such as race and sexual orientation, has also been associated with increased risk for STBs among SM adults. Non-White SM (e.g., Black/African-American lesbian/gay and Hispanic bisexual) adolescents are more likely to report making a suicide attempt than White SM adolescents (Baiden et al., 2020). Among adults, Hispanic and non-Hispanic Black bisexual women have higher prevalence rates of suicidal ideation, planning, and attempts relative to persons who do not hold these identities (Forrest et al., 2023). These patterns highlight the ways in which race, gender, and sexual orientation may intersect to increase risk for STBs in specific subgroups.

Within the intersectionality framework, suicide risk is not solely attributable to the presence of multiple minoritized identities, but to the structural forces that confer or withhold power and privilege in ways that uniquely influence risk or differentially expose individuals to risk. Indeed, studies show that individuals with multiple minoritized identities often have higher suicide rates compared to those with fewer minoritized identities (Baiden et al., 2020; Forrest et al., 2023). Several studies have examined relationships between psychosocial factors, experiences of marginalization or oppression, and STBs among SM individuals (King et al., 2008; Marshal et al., 2011; Meyer, 2003; Plöderl and Fartacek, 2009). SM adults who are exposed to discrimination across settings, particularly in healthcare settings, may develop expectations of rejection (i.e., healthcare stereotype threat) that negatively influences wellbeing (Fingerhut and Abdou, 2017; Ojeda-Leitner and Lewis, 2021; Saunders et al., 2024) and could be associated with STBs. Gender-nonconforming children and adolescents often experience rejection and discrimination by peers and parents (Langlois and Downs, 1980; Maccoby, 1998; Rieger and Savin-Williams, 2012), which are significantly associated with STBs (Plöderl and Fartacek, 2009).

Similarly, general psychological distress and mental health factors may co-occur with demographic and psychosocial factors described above to create unique STB risk among subgroups of SM adults. Psychological distress at both moderate and severe levels is a consistent and strong predictor of STBs across populations (Eskin et al., 2016; Pfaff et al., 2001; Tanji et al., 2018). Among SM adults, the Minority Stress Model suggests that individuals exposed to both distal (e.g., experiences of prejudice, violence) and proximal (e.g., anticipated rejection, internalized homophobia) minority-specific stressors experience a higher risk of mental health difficulties and STBs (Brooks, 1981; Meyer, 2003). SM individuals experience significantly higher levels of depressive symptoms (King et al., 2008; Marshal et al., 2011), associated distress, and higher rates of problematic substance use (King et al., 2008) than heterosexual individuals; both depression and substance use disorders are associated with increased risk for STBs (Kerridge et al., 2017; Marshal et al., 2011; Plöderl and Fartacek, 2009; Schuler et al., 2018).

While a handful of prior studies have explored the relationship between intersecting minoritized identities and STBs (Baiden et al., 2020; English et al., 2022; Forrest et al., 2023; Ramchand et al., 2022), previous research conducted among SM adults and adolescents has primarily focused on identifying independent associations between unitary demographic or psychosocial factors and suicide risk. Limited studies have identified and quantified intersecting identity characteristics,

psychosocial factors (including those associated with discrimination and societal oppression), and mental health factors associated with STBs among SM individuals, and the majority of these have relied on cross-sectional designs, which limit the ability to establish temporal precedence. This is particularly problematic when studying STBs, as it is crucial to determine whether the factors of interest occurred prior to the STB. While cross-sectional studies are valuable for identifying associations, they cannot definitively identify risk factors that precede STBs (Kraemer, 1997). Furthermore, focusing primarily on independent factors overlooks the potential influence of intersecting identities (e.g., interactions between sexual orientation, race, and gender) and associated exposure to stigma on suicide risk. To better inform the development of targeted prevention strategies, research must move beyond cross-sectional to longitudinal designs, through which the timing and causal relationships among STBs and intersecting demographic, psychosocial, and mental health factors can be more clearly understood.

The conditional inference tree method, a data-driven analytic approach, has the potential to identify subgroups of SM adults that are at elevated risk of STBs. Researchers who have pioneered the scientific study of intersectionality have called for more sophisticated statistical methods for quantifying intersectionality theory in practice (Bauer et al., 2021; Bowleg and Bauer, 2016). The conditional inference tree method, one such approach, iteratively partitions samples into subgroups of greater homogeneity when working with a specific outcome, such as suicide risk (Hothorn et al., 2006). This allows for the characterization of distinct, empirically derived "profiles" or subgroups characterized by the presence of multiple, co-occurring factors that together can predict an increased likelihood of outcomes like suicidal ideation and intent and suicide plans.

We selected conditional inference trees (CIT) to identify subgroups of SM adults who share intersecting sociodemographic and psychosocial characteristics that predict STB outcomes. CIT is better suited to these analyses than mixture modeling, including latent profile analysis (LPA) for continuous data and latent class analysis (LCA) for categorical data, because it uses outcome-based recursive partitioning rather than unsupervised grouping of individuals by shared traits (e.g., Stanton et al., 2025). This approach allows CIT to model how intersecting identities and experiences shape suicide risk, accommodating categorical and continuous variables, nonlinearity, and high-order interactions. Additionally, we chose CIT over traditional decision-tree methods such as Classification and Regression Trees (CART) or Chi-squared Automatic Interaction Detection (CHAID) due to its statistical advantages,¹ including correction for multiple testing and unbiased variable selection (Hothorn et al., 2006).

To advance understanding of intersecting demographic, psychosocial, and mental health factors on prospective risk for STBs among SM adults, this study leveraged data from a national longitudinal probability study and applied the conditional inference tree approach in pursuit of the following study aims: (1) to examine how the interaction of demographic and psychosocial factors are associated with four specific STB outcomes (suicidal ideation, intent, plans, and attempts) in SM adults, (2) to examine how mental health factors, in combination with demographic and psychosocial factors, are associated with the four STB outcomes; and (3) to identify which factors or combinations of factors are most significantly associated with the four different STB outcomes. By prospectively examining the intersection of demographic

¹ CHAID, CART, and CIT are all recursive partitioning methods, but they differ in how variables and split points are selected. CIT addresses key limitations of earlier approaches like CHAID or CART by using permutation-based significance testing to reduce bias toward variables with many categories or possible cutpoints, and by separating the process of variable selection from split determination (Hothorn et al., 2006). Similar to CHAID and CART, the recursive tree structure, originally formalized in work such as Kass, (1980), allows CIT to capture interaction-like patterns across subgroups.

psychosocial, and mental health factors, the current research may offer critical information for risk identification, which could inform the development of targeted prevention and intervention strategies for subgroups of SM individuals who are at increased risk for STBs.

2. Methods

2.1. Participants and procedures

We conducted this secondary analysis on data collected through the Generations Study, a multi-wave longitudinal study that examined health and well-being across three generations of SM individuals in the U.S. (Meyer, 2023). The Generations Study used a dual-frame complex sampling procedure using random-digit dialing (RDD) to reach both landline and cellphone users, randomly selecting landline respondents, and stratifying the RDD list to proportionate the unweighted samples by U.S. Census region and time zone. Generations respondents were eligible to participate if they identified as sexual minority (and not transgender) and were in the age and race/ethnicity groups targeted for the three cohorts under investigation in the study: ages 18–25, 34–41, or 52–59; Black, Latino, or White or multi-racial. Eligible participants were sent a self-report questionnaire either by mail or via an email link. Data for this study are publicly available (doi:10.3886/ICPSR37166.v1). The pre-registration and analysis code for this study are available at https://osf.io/wq7ey/?view_only=0bc86a99c57241098c40c6f495467151.

The current analysis included three waves of data with predictors from Wave 1 and outcomes from Waves 2 and 3: Wave 1 (March 2016 to March 2017, $n = 1518$), Wave 2 (March 2017 to March 2018, $n = 894$), and Wave 3 (April 2018 to March 2019, $n = 707$).

2.2. Measures

2.2.1. Outcomes

Suicidal thoughts and behaviors. STBs were measured using a modified instrument from the Army Study to Assess Risk and Resilience in Service Members (Army STARRS) (Ursano et al., 2014). Responses measured STBs in the last year only for Waves 2 and 3. Participants responded with either “yes” or “no” to indicate whether or not they had (1) suicidal ideation: “In the past year, did you have thoughts of killing yourself?”, (2) suicidal intent: “In the past year, did you have the intention to act on thoughts of wishing you were dead or trying to kill yourself?”, (3) engaged in suicide planning: “In the past year, did you think about how you might kill yourself (e.g., taking pills, shooting yourself) or work out a plan of how to kill yourself?”, and (4) made a suicide attempt: “In the past year, did you make a suicide attempt (i.e., purposefully hurt yourself with at least some intention to die)?”

Although suicidal intent and suicide planning are conceptually related, we analyzed them separately based on ideation-to-action theories, which distinguish intent (i.e., desire to die) from planning (i.e., formulation of a method or strategy; Klonsky & May 2015). These constructs can have unique predictors and do not always co-occur (Nock et al., 2012). Analyzing them separately allows for more precise identification of distinct risk profiles. However, when we conducted a sensitivity analysis using a composite outcome that combined intent and planning, it yielded similar patterns of results as the analysis that analyzed the constructs as unique predictors (see Supplemental Analysis section).

2.2.2. Predictors

Demographic factors. We included the following demographic factors at Wave 1 as predictors: age, gender identity (cisgender men, cisgender women, nonbinary assigned female at birth, nonbinary assigned male at birth), ethnoracial identity (Non-Hispanic White, Non-Hispanic Black, Non-Hispanic Asian, Hispanic), SM identity (Gay/Lesbian, Bisexual+, other sexual minorities), personal income, and urbanicity (living in a city vs. not a city).

Psychosocial factors. We included the following psychosocial factors as predictors:

Social well-being. The Social Well-Being scale (Keyes, 1998) assesses individual’s perception of their social life across five dimensions: (1) social actualization, (2) acceptance, (3) integration, (4) contribution, and (5) coherence. Respondents rated statements such as “I have something valuable to give to the world” on a seven-point Likert scale ranging from “strongly disagree” to “strongly agree,” with 8 of the 15 items being reverse-coded. The final score for each respondent was calculated as the mean score across all items. The reliability coefficient McDonald’s Omega is 0.847 [0.777, 0.944] and 0.841 [0.84, 0.937] for Waves 1 and 2 respectively.

Internalized homophobia. Internalized homophobia was measured using the Revised Internalized Homophobia Scale (IHP-R; (Herek et al., 2009). The survey uses a five-point Likert scale, ranging from (1) “strongly disagree” to (5) “strongly agree,” to assess negative attitudes about one’s SM identity. The generations team modified the statements to use “LGB,” referring generally to the sexual-minority identity of each respondent. Scores were averaged across all items, with higher scores indicating more negative self-attitudes. The reliability coefficient McDonald’s Omega is 0.886 [0.621, 0.972] and 0.907 [0.795, 0.984] for Waves 1 and 2 respectively.

Everyday discrimination. Everyday discrimination was measured with an adapted version of the 9-item Everyday Discrimination Scale (Williams et al., 1997). The survey utilized a four-point Likert scale, ranging from one (“often”) to four (“never”), in which respondents were asked to recall within the past year how often they had experienced events of discrimination in their day-to-day lives. Scores were reverse-coded, with higher averaged scores indicating more experiences of everyday discrimination. The reliability coefficient McDonald’s Omega is 0.94 [0.789, 0.958] and 0.940 [0.89, 0.989] for Waves 1 and 2 respectively.

Healthcare stereotype threat. Healthcare stereotype threat was measured using an adapted version of the 4-item scale originally developed to assess Black women’s experience of stereotype threat in healthcare settings (Abdou and Fingerhut, 2014). The Generations team modified the items to pertain to the sexual and gender minority population, with statements such as “when seeking healthcare ... I worry about being negatively judged because of my sexual orientation or gender identity.” Respondents rated each item on a Likert-type scale from (1) strongly disagree to (5) strongly agree. The final score was an average across all items, with higher scores indicating higher healthcare stereotype threat. The reliability coefficient McDonald’s Omega is 0.933 [0.927, 0.999] at Wave 1.

Childhood gender non-conformity. The Generations team chose four of the original 23 items from the Recalled Childhood Gender Identity/Gender Role Questionnaire (Zucker et al., 2006) to create the childhood gender non-conformity measure used in this study. The quantitative data is only meaningful when paired with the sex of each respondent. Respondents rated each item on a five-point semantic differential scale in which higher values represent female-typical responses, and lower scores represent male-typical respondents. A sixth option indicated feeling neither masculine nor feminine. Questions 3, 6, 8, and 10 were taken from the original questionnaire. The reliability coefficient McDonald’s Omega is 0.885 [0.849, 0.940] at Wave 1.

Mental health factors. We included the following mental health factors as predictors:

Alcohol use. The Alcohol Use Disorder Identification Test (AUDIT-C) is a three-item screening test designed to identify heavy drinking behaviors (Bush, 1998). The survey uses a six-point Likert scale (ranging from 0 to 5) to assess (1) general weekly alcohol consumption, (2) number of standard alcoholic drinks consumed in a typical day, and (3) how often 6 or more standard drinks are consumed on one occasion. A higher composite score indicates heavier drinking behaviors and thus a higher risk of active alcohol dependence or abuse. The reliability coefficient McDonald’s Omega is 0.87 [0.823, 0.971] and 0.82 [0.750,

0.866] for Waves 1 and 2 respectively.

Drug use. The Drug Use Disorders Identification Test (DUDIT) is an 11-item self-report screening instrument to identify individuals with problematic drug use (Berman et al., 2005). The survey measures three factors of drug use behavior: (1) intensity of use, (2) dependence, and (3) drug-related problems. A higher composite score indicates problematic drug-use behaviors. The reliability coefficient McDonald’s Omega is 0.95 [0.946, 0.979] and 0.95 [0.746, 0.966] for Waves 1 and 2 respectively.

Psychological distress. The Kessler-6 scale (Kessler et al., 2003) was used to measure nonspecific psychological distress. The survey utilizes a five-point Likert scale ranging from “all of the time” to “none of the time” where respondents indicate how often they have felt: (1) nervous, (2) hopeless, (3) restless, (4) depressed, (5) lethargic, and (6) worthless. A higher composite score indicates greater psychological distress. The reliability coefficient McDonald’s Omega is 0.918 [0.824, 0.959] and 0.916 [0.882, 0.986] for Waves 1 and 2 respectively.

2.3. Statistical analysis

Leveraging the longitudinal design of the Generations Study, we used conditional inference trees (Hothorn et al., 2006) to identify subgroups with intersecting demographic, psychosocial, and mental health factors measured at Wave 1 to predict suicidal ideation, intent, plan, and attempts at Wave 2. Unlike traditional regression approaches, which assume additive and linear relationships among predictors, conditional inference trees allow for the detection of non-linear interactions and automatically account for higher-order interactions without requiring manual specification. They also use statistical stopping rules to reduce overfitting and variable selection bias. This data-driven approach selects the most relevant predictors for each outcome from a large pool of candidates, allowing for nonlinearity and high-order interactions, and highlighting differences in predictor relevance across subgroups. We used single imputation by chained equations with predictive mean matching to impute missing values for the psychosocial variables (Little, 1988). Missing data on demographic variables were assigned based on the responses to the survey.

In the first set of models (Model 1), we examined demographic factors at Wave 1 as predictors of the four STBs at Wave 2. In the second set of models (Model 2), we examined the intersection of demographic and psychosocial factors at Wave 1 as predictors of the four STBs at Wave 2, excluding mental health factors. This decision was primarily driven by the consistently prominent and strong association between poor mental health, especially psychological distress, and STBs (Eskin et al., 2016; Pfaff et al., 2001; Tanji et al., 2018). We anticipated that the presence of mental health factors in the models may mask contributions from other intersecting factors that are more distal risk factors of STBs. In the third set of models, we included the mental health factors.

To improve generalizability and reduce the risk of overfitting in our exploratory models, we implemented external stopping rules through hyperparameter tuning. Specifically, we conducted a grid search across combinations of two hyperparameters: the minimum criterion for node splitting (i.e., the p-value threshold for permutation tests, tested at values of 0.95, 0.99, 0.995, 0.999, 0.9995, and 0.9999) and the maximum tree depth (tested at depths of 1, 2, 3, 4, or 5). Each model was trained using 10-fold cross-validation to select the parameter combination that minimized overfitting and optimized predictive performance. The final selected hyperparameters for each model are reported in Table 1 of the Supplementary Materials. This decision reflects a trade-off between model complexity and interpretability, prioritizing robust generalizable results over exhaustively modeling all potential splits in the data. While deeper trees may reveal additional interactions, our aim was to identify the most stable and interpretable intersections of predictors.

We calculated mean-squared errors to represent how the predicted probability differed from observed outcomes and then conducted paired

Table 1
Participant demographics.

% (N)	Wave 1 (N = 1518)	Wave 2 (N = 894)	Wave 3 (N = 707)
Age, M (SD)	36.48 (14.7)	38.81 (14.87)	40.74 (15.04)
Gender			
Cisgender Women	49.4 % (750)	47.8 % (427)	46.5 % (329)
Cisgender Men	44.4 % (674)	45.8 % (409)	47.4 % (335)
Non-binary, AFAB	4.1 % (62)	4.3 % (38)	5.0 % (35)
Non-binary, AMAB	2.1 % (32)	2.2 % (20)	1.1 % (8)
Sexual minority identity			
Lesbian/gay	54.9 % (833)	56.5 % (505)	59.3 % (419)
Bisexual	32.5 % (493)	30.4 % (272)	26.7 % (189)
Other sexual minority identity	11.9 % (181)	12.2 % (109)	13.2 % (93)
Urbanicity – % Urban	88.0 % (1336)	88.3 % (789)	89.8 % (635)
Race			
White	61.3 % (931)	71.5 % (639)	75.0 % (530)
Black	11.9 % (180)	7.5 % (67)	7.6 % (54)
Latine	10.4 % (158)	7.9 % (71)	7.5 % (53)
Other	16.4 % (249)	13.1 % (117)	9.9 % (70)
Personal income			
Under \$720	10.8 % (164)	9.4 % (84)	7.8 % (55)
\$720 to \$5999	11.9 % (181)	11.3 % (101)	10.8 % (76)
\$6000 to \$11,999	10.9 % (166)	11.5 % (103)	11.7 % (83)
\$12,000 to \$23,999	15.2 % (231)	14.2 % (127)	14.4 % (102)
\$24,000 to \$35,999	12.1 % (183)	12.2 % (109)	12.5 % (88)
\$36,000 to \$47,999	7.7 % (117)	7.4 % (66)	7.6 % (54)
\$48,000 to \$59,999	8.1 % (123)	9.0 % (80)	8.9 % (63)
\$60,000 to \$89,999	10.7 % (163)	12.3 % (110)	12.6 % (89)
\$90,000 to \$119,999	5.8 % (88)	5.6 % (50)	6.2 % (44)
\$120,000 to \$179,999	4.4 % (66)	4.3 % (38)	4.8 % (34)
\$180,000 to \$239,999	1.5 % (23)	1.8 % (16)	1.6 % (11)
\$240,000 and over	0.9 % (12)	1.1 % (10)	1.1 % (8)

Abbreviation. AFAB = assigned female at birth; AMAB = assigned male at birth.

Wilcoxon rank sum tests to determine if the difference in mean squared errors between models were significant. To contextualize these comparisons, we included the base rate model (Model 0), which assigns each individual the sample-wide prevalence of each STB outcome as a minimal-effort benchmark. This model reflects the predictive accuracy achievable without incorporating any individual-level information. Comparing against this benchmark allows us to quantify the added value of the conditional inference tree models. Additional comparison with regression-based models are included in the supplemental materials. A reduction in mean squared error (MSE) indicates improved calibration: that is, the predicted probabilities are closer to the observed outcomes. Because our models are probabilistic rather than binary classifiers, lower MSE reflects more accurate risk stratification, a critical consideration for clinical applications. To avoid optimistic bias, all mean squared error (MSE) values were calculated using out-of-sample predictions. Specifically, the trees were grown using wave 1 predictors with wave 2 outcomes, and MSE was estimated on new data (wave 2 predictors with wave 3 outcomes) that were not used in model construction. Thus, all reported MSE values reflect cross-validated performance rather than in-sample fit. This out-of-sample validation strategy tests whether the model retains predictive accuracy across time, offering a stronger and more ecologically valid assessment of generalizability than a conventional random train/test split. Whereas random splits often mix observations from similar time points, risking inflated performance estimates, our longitudinal approach simulates a real-world scenario in which risk factors measured at one time point are used to forecast future outcomes. This design supports both methodological rigor and applied relevance, especially in the context of suicide prevention, where the goal is to identify individuals at elevated risk before outcomes occur. Thus, improvements over the base rate model support the models’ practical relevance and generalizability in identifying individuals at elevated risk of STBs.

Furthermore, we computed sensitivity (i.e., probability to correctly identifying the presence of STBs) and specificity (i.e., the probability of

correctly identifying the absence of STBs) for both the conditional inference tree and the base rate predictions.² Sensitivity reflects the model’s ability to detect individuals at risk, a critical priority in suicide prevention. While specificity helps gauge how well the model avoids false positives.

3. Results

A diverse array of participants was sampled, including persons who identified as ethnoracial minorities (*n* = 587, 38.7 %), cisgender women (*n* = 750, 49.4 %), and nonbinary (*n* = 94, 6.2 %). In addition, the sample included participants making less than \$36,000 per year (*n* = 925, 60.9 %). The average age at Wave 1 was 36.5 (*SD* = 14.7). See Table 1 for detailed demographic information, and descriptive statistics for study variables are reported in Table 2.

3.1. Conditional inference trees that included demographic factors

The results from the first set of models identified age, gender identity, and sexual minority as predictors of various suicidal outcomes. Fig. 1 depicts the intersection of all demographic Wave 1 variables that predicted each of the four STB outcomes at Wave 2.

For suicide ideation, age emerged as the sole differentiating factor with participants 25 and younger having a 52.6 % conditional likelihood of reporting suicidal ideation compared to 32.3 % of participants over 25 years old. Suicidal intention had no significant differentiating factor.

Table 2
Descriptive statistics of study variables.

Mean (SD) or % (N)	Wave 1 (N = 1518)	Wave 2 (N = 894)	Wave 3 (N = 707)
Alcohol use	2.78 (2.28)	2.78 (2.42)	–
Drug use	3.32 (5.57)	2.83 (5.22)	–
Psychological distress	7.67 (5.49)	7.37 (5.11)	–
Everyday discrimination	1.9 (0.69)	1.76 (0.65)	–
Social wellbeing	4.66 (0.9)	4.52 (0.9)	–
Healthcare stereotype threat	2.57 (1.07)	N/A	–
Internalized homophobia	1.63 (0.76)	1.49 (0.71)	–
Childhood gender nonconformity	2.72 (0.86)	N/A	–
Suicidal Outcomes - % Yes*			
Suicidal Ideation	69.6 % (1057)*	39.0 % (349)	36.1 % (255)
Suicide Intent	38.5 % (585)*	11.0 % (98)	9.6 % (68)
Suicide Plan	55.1 % (837)*	29.8 % (266)	25.9 % (183)
Suicide Attempt	24.1 % (366)*	2.4 % (21)	2.0 % (14)

Note. Variables not used in the current study are represented by dashes. Wave 1 predictors and Wave 2 suicidal outcomes were used in our models, and Wave 2 predictors and Wave 3 outcomes were used to validate our models. Additionally, at Wave 1, participants were asked about lifetime incidence of suicidal/suicide ideation, intent, plan, and attempt, whereas at waves 2 and 3 participants were asked about incidence of the same behavior outcomes in the last year. The wave 1 responses choices were: “(1) No,” “(2) Yes, once” and “(3) Yes, more than once”, and the “% Yes” for this wave is calculated as the sum of the “(2) Yes, once” and “(3) Yes, more than once” responses. N/A indicates that the measure was not administered in a given wave.

² We compared the conditional inference tree models to traditional regression-based alternatives (e.g., ordinal regression, Cox proportional hazards models), which provide a global view of predictor effects. In contrast, conditional inference trees reveal complex, nonlinear interactions and empirically derived subgroups, making them well suited for intersectional research questions. Results from these comparative models are detailed in our previous paper (see Stanton et al., 2025).

3.2. Gender identity emerged as a primary predictor for suicide plan and suicide attempt

For suicide plan, gender identity emerged as a significant, primary predictor. For participants who identified as cisgender women or cisgender men, age emerged as a secondary predictor with participants 35 or younger having a higher conditional likelihood of planning for suicide (37.3 %) compared to participants older than 35 years old (22.4 %). For participants who identified as cisgender women or cisgender men, age emerged as a secondary predictor with participants who identified as nonbinary assigned female at birth and nonbinary assigned male at birth, sexual minority identity emerged as a secondary predictor. Bisexuals had the highest conditional likelihood of planning for suicide (90.9 %) and lesbian/gay and other sexual minorities had a 59.6 % conditional likelihood.

For suicide attempt, gender identity was the sole differentiating factor with participants who identified as cisgender women, nonbinary assigned female at birth, and nonbinary assigned male at birth having a higher conditional likelihood of attempting suicide (7.4 %) compared to cisgender men (1.0 %).

3.3. Conditional inference trees that included demographic and psychosocial factors

The results from the second set of models revealed distinct patterns in the predictors of various suicidal outcomes. Everyday discrimination consistently emerged as a central predictor across all suicidal outcomes; in general, higher instances of everyday discrimination at Wave 1 was the primary differentiating factor for all suicidal outcomes at Wave 2, albeit at different levels. For certain outcomes, including suicidal ideation and planning, lower levels of everyday discrimination intersected with other factors (e.g., sexual minority identity and increased stereotype threat, or increased healthcare stereotype threat and lower personal income, for ideation and planning, respectively) to predict increased risk. Fig. 2 presents the intersections of all demographic and psychosocial Wave 1 variables that predicted each of the four outcomes at Wave 2.

For suicidal ideation, everyday discrimination emerged as a significant, primary predictor. Among participants with everyday discrimination levels ≤2.556, the model split twice, with SM identity (i.e., identifying as lesbian, gay, or bisexual vs. identifying with another minority sexual orientation that was not specified in the survey) and healthcare stereotype threat emerging as secondary and tertiary predictors respectively. Those who identified as lesbian/gay or bisexual (versus those who identified with another sexual minority orientation) and had a healthcare stereotype threat score above 4 had the highest Conditional Likelihood of reporting suicidal ideation among the four subgroups differentiated by the model (77.6 %), whereas those who identified as having another sexual minority orientation (i.e., “other” as their SM identity, as presented in Fig. 2) had a 58.8 % conditional likelihood of suicidal ideation. Those who identified as lesbian/gay or bisexual and had a lower healthcare stereotype threat score (≤4) had the lowest conditional likelihood of suicidal ideation (34.1 %). Among participants with everyday discrimination levels ≥2.556, the conditional likelihood of reporting suicidal ideation was 67.4 %.

For suicidal intent, everyday discrimination emerged as the sole differentiating factor. The model identified a clear gradient, with higher everyday discrimination levels associated with an increased likelihood of suicidal intent; participants with everyday discrimination levels (>2.556) had a higher conditional likelihood of reporting suicidal intent (33.0 %) compared to those with lower everyday discrimination levels (≤2.556; 10.4 %).

For suicide plan, everyday discrimination emerged as a significant, primary predictor. For participants with lower everyday discrimination levels (≤2 0.778), the model split twice: healthcare stereotype threat emerged as a secondary predictor, and SM identity and personal income

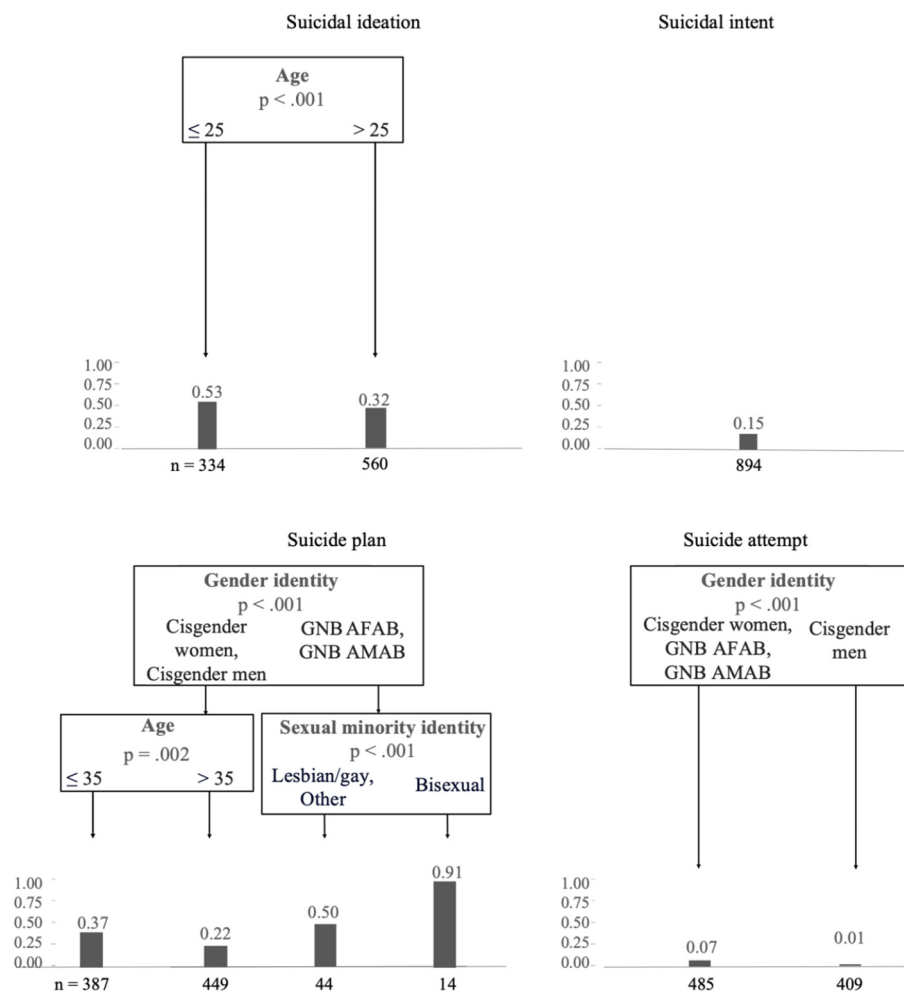


Fig. 1. Tree diagrams with demographic factors predicting Wave 2 suicidal ideation, suicide intent, suicide plan, and suicide attempt. Abbreviations. GNB=gender nonbinary, AFAB=assigned female at birth, AMAB=assigned male at birth

emerged as tertiary predictors. For those with lower healthcare stereotype threat levels (≤ 4), the model identified SM identity as a tertiary predictor; for those with higher healthcare stereotype threat, personal income was as a tertiary predictor. Specifically, participants with lower everyday discrimination levels (≤ 2.778), higher healthcare stereotype threat (> 4), and lower personal income ($\leq \$35,999$) had the highest conditional likelihood of planning for suicide (83.6 %) among the five identified subgroups. Participants with higher everyday discrimination levels (> 2.778) had the second highest conditional likelihood of planning for suicide (70.9 %). Respondents with lower everyday discrimination levels (≤ 2.778), lower healthcare stereotype threat levels (≤ 4), and SM identities in the “other” had a 46.5 % conditional likelihood of planning for suicide. Participants with lower everyday discrimination levels (≤ 2.778) and lower healthcare stereotype levels (≤ 4) who identified as lesbian/gay or bisexual had a 27 % conditional likelihood of planning for suicide. Finally, those with lower everyday discrimination levels (≤ 2.778), higher healthcare stereotype threat (> 4), and higher personal income ($> \$35,999$) had the lowest conditional likelihood of planning for suicide at 19 %.

For suicide attempts, the model identified everyday discrimination as the sole differentiating factor, with a clear threshold effect.

Participants with everyday discrimination scores above 3.667 had a 46.8 % conditional likelihood of attempting suicide. Participants with everyday discrimination scores between 2.778 and 3.667 had a likelihood of 14.8 %, whereas participants with discrimination scores ≤ 2.778 had the lowest likelihood of suicide attempt (3.2 %).

3.4. Conditional inference trees that included demographic, psychosocial, and mental health factors

The results from the third set conditional inference tree analyses demonstrated the critical role of psychological distress in predicting STBs over time. Psychological distress was a consistent factor impacting all outcomes, such that those with higher levels of psychological distress endorsed more frequent suicidal outcomes at Wave 2, albeit differentiating at different levels. Fig. 3 depicts the intersection of all demographic, psychosocial, and mental health Wave 1 variables that predicted each of the four STB outcomes at Wave 2.

For suicidal ideation, psychological distress emerged as the primary differentiating factor, with higher distress levels associated with an increased conditional likelihood of ideation. Specifically, participants with distress scores greater than 10 had the highest conditional

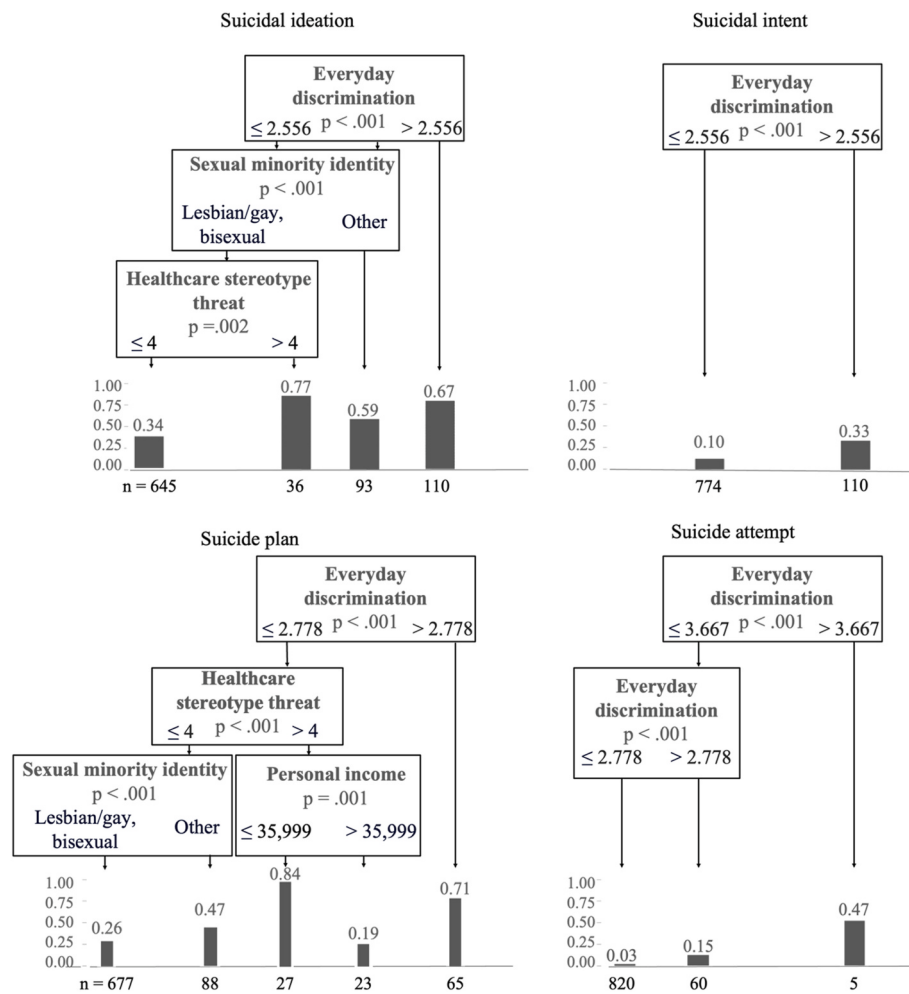


Fig. 2. Tree diagrams with demographic and psychosocial factors predicting Wave 2 suicidal ideation, suicide intent, suicide plan, and suicide attempt.

likelihood of suicidal ideation (69.7 %), followed by participants with distress scores between 6 and 10 (40.4 %). Participants with distress scores lower than 6 had the lowest conditional likelihood of suicidal ideation (22.3 %).

For suicidal intent, the model also identified psychological distress as a significant, primary predictor, with everyday discrimination as a secondary predictor. Participants with higher distress levels (>12) and elevated everyday discrimination (>2) had the highest conditional likelihood of suicidal intent (46.8 %). Among those with high distress but lower levels of discrimination, the conditional likelihood of suicidal intent was 19.2 %. Participants with distress levels <12 had the lowest conditional likelihood for suicidal intent (6.9 %).

For suicide plan, psychological distress again emerged as the sole differentiating factor, with higher distress levels associated with increased risk of planning for suicide. Specifically, participants with higher distress (>12) had the highest conditional likelihood of planning for suicide (65.6 %). Participants with distress scores between 6 and 12 had a 32.5 % conditional likelihood of suicide planning. Lastly, participants with distress scores lower than 6 had a 17.3 % conditional likelihood of planning for suicide.

For suicide attempts, the model identified psychological distress as the sole differentiating factor, with a clear threshold effect. Participants with distress scores above 17 had a higher risk of attempting suicide (32.1 %). Participants with distress scores between 9 and 17 had a conditional likelihood of 8.1 %, whereas no participants with distress scores below 9 reported a suicide attempt (0.0 %). In this third set of models, once psychological distress was included, no additional

demographic or psychosocial variables contributed significant splits, suggesting that distress may account for much of the variance explained by those factors.

Table 3 presents comparisons of conditional inference tree models (Models 1–3) to the base rate model (Model 0) using Wave 2 predictors to forecast Wave 3 suicidal outcomes. Model 3 consistently outperformed simpler models for ideation, intent, and plan, with significantly lower MSE³ than Model 0 ($ps < 0.001$) and Models 1 and 2 ($ps < 0.01$). For ideation, Model 3 was the only model to improve significantly upon baseline ($p < .001$), with higher sensitivity (0.711 vs. 0.347) and acceptable specificity (0.660), enabling better identification of at-risk individuals without excessive false positives. For intent, Model 0 had high specificity (0.888) but very low sensitivity (0.034), while Model 1 predicted everyone as high risk (sensitivity = 1.000, specificity = 0.000). Model 3 achieved a more balanced profile compared to the other models (sensitivity = 0.483, specificity = 0.875). However, sensitivity below 0.50 means that fewer than half of the true positive cases were identified, limiting our ability in detecting all individuals at risk for intent. A similar pattern held for planning, where Model 3 improved sensitivity (0.688 vs. 0.299 in Model 0) with moderate specificity (0.594). For suicide attempt, a low base rate outcome, Model 3 yielded moderate sensitivity (0.727) and reasonable specificity (0.694), outperforming Model 1 (which again had perfect sensitivity but no

³ Because MSE was estimated using out-of-sample predictions, these values reflect predictive accuracy for unseen data rather than descriptive fit within the training sample.

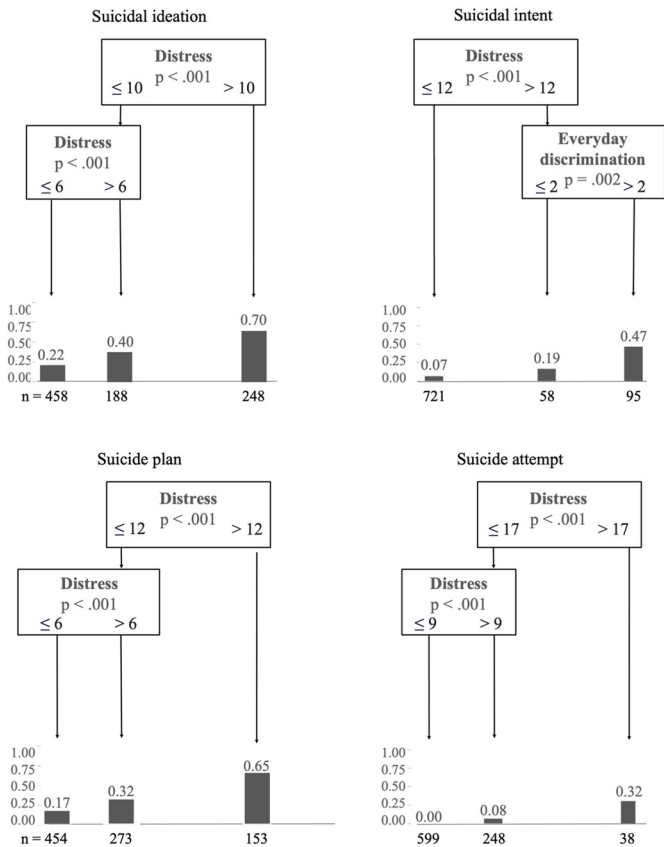


Fig. 3. Tree diagrams with demographic, psychosocial, and mental health factors predicting Wave 2 suicidal ideation, suicide intent, suicide plan, and suicide attempt.

specificity) and Model 2, though not Model 0 ($p = .70$), which had perfect specificity but zero sensitivity. That is, Model 0 accurately predicted who would not attempt suicide but failed to identify any individual who did. While Model 3 does not perfectly detect all cases, it improves substantially over base rate prediction in identifying those at risk while retaining clinically acceptable specificity, offering a more useful balance for suicide prevention efforts.

4. Discussion

In this sample of SM adults, we identified distinct patterns and combinations of prospective predictors of suicidal ideation, intent, plan, and attempts. Out of the three model sets, the central predictors of suicidal outcomes were as follows: age and gender identity in models that included demographic variables only; everyday discrimination in models that included demographic and psychosocial variables; and psychological distress in models that included demographic, psychosocial, and mental health variables. The models also revealed important differences in how additional demographic and psychosocial factors like income, sexual orientation, and healthcare stereotype threat, interact with discrimination and distress to predict different suicide outcomes. Overall, our findings are consistent with ideation-to-action theories of suicide, such as the Interpersonal Theory of Suicide (Joiner, 2005) and the Three-Step Theory (Klonsky & May 2015), which propose that psychological and contextual factors influence the emergence of suicidal ideation versus the progression to planning or attempts. Which suggest that different risk factors may be implicated at different stages of suicidal thoughts and behaviors. For instance, age and gender identity emerged as salient demographic predictors across suicide outcomes, indicating foundational disparities in risk. Everyday discrimination was most predictive when psychosocial variables were introduced,

Table 3
Mean Squared Error and Wilcoxon Rank Sum test for the baseline and the expanded variable model at wave 2 for suicidal ideation, suicidal intent, suicide plan, and suicide attempt at wave 3.

		Suicidal Ideation	Suicidal Intent	Suicide Plan	Suicide Attempt
Mean Squared Error	Model 0	0.234	0.087	0.194	0.018
	Model 1	0.222	0.089	0.186	0.019
	Model 2	0.222	0.084	0.190	0.019
	Model 3	0.193	0.08	0.173	0.020
Sensitivity	Model 0	0.347	0.034	0.299	0.000
	Model 1	0.431	1.000	0.580	0.818
	Model 2	0.378	0.276	0.350	1.000
	Model 3	0.711	0.483	0.688	0.727
Specificity	Model 0	0.617	0.888	0.704	0.980
	Model 1	0.786	0.000	0.637	0.492
	Model 2	0.850	0.927	0.868	0.000
	Model 3	0.660	0.875	0.594	0.694
Comparison	Model 0 vs Model 1	98,483 (0.09)	33,379 (< .001)	85,340 (0.18)	47,877 (< .001)
	Model 0 vs Model 2	97,403 (0.15)	137,815 (< .001)	105,393 (< .001)	6330 (< .001)
	Model 0 vs Model 3	124,140 (< .001)	130,756 (< .001)	126,921 (< .001)	89,462 (0.70)
	Model 1 vs Model 2	9363 (0.59)	137,815 (< .001)	90,910 (0.97)	120,998 (< .001)
	Model 1 vs Model 3	105,198 (< .001)	145,364 (< .001)	102,982 (.01)	108,708 (< .001)
	Model 2 vs Model 3	118,371 (< .001)	131,815 (< .001)	95,611 (0.28)	100,490 (.02)

Note. Model 0 is the base rate model that predicts outcomes based solely on overall prevalence. Model 1 is the conditional inference tree including only demographic predictors. Model 2 includes both demographic and psychosocial predictors, and Model 3 includes demographic, psychosocial, and mental health predictors. Comparison test entries include the V-statistic and corresponding p-value (in parentheses). Bolded values indicate significantly lower mean squared error compared to a simpler model. For suicide intent, Model 1 yielded a sensitivity of 1 and specificity of 0 because no predictors were selected, i.e., the model identified no informative splits and assigned the same high-risk probability to all individuals. For suicide attempt, extreme values of sensitivity or specificity (i.e., 0 or 1) reflect the substantial class imbalance (592 “No” vs. 11 “Yes”), which can distort model discrimination.

underscoring its role in the emergence of suicidal ideation. However, in the full models, psychological distress became the dominant predictor across all outcomes—particularly for suicidal intent, planning, and attempts—highlighting its proximal relevance to behavioral enactment. Notably, the differences from ideation to action was further shaped by interactions between discrimination, distress, and contextual factors such as income, sexual orientation, and healthcare stereotype threat. These patterns support the view that contextual stressors may operate through co-occurring psychological vulnerabilities and structural barriers to escalate risk from thoughts to action. In the first set of models, age was strongly linked to suicidal ideation while gender identity showed a strong path to suicide plan when intersected by sexual minority identity. Suicidal intent and attempts were strongly linked to everyday discrimination alone in the second set of models, but suicidal ideation and planning had more complex predictor patterns, with intersecting factors such as SM identity, healthcare stereotype threat, and income also playing important roles. In the third set of models, distress alone, at varying levels, predicted three of the four

STBs, with everyday discrimination intersecting with higher levels of distress to increase risk for suicidal intent. These findings underscore the need for multifaceted approaches to assess STBs and design risk reduction interventions for specific subgroups of SM adults, such as those who report high levels of discrimination, especially in the healthcare setting. Without thoughtful consideration of the nuanced interplay of demographic, social, and psychological determinants of suicide-related outcomes, prevention interventions may not be effective.

Our findings from the first set of models using demographic predictors alone offer valuable insight into how structural inequities shape suicide risk among SM adults. Specifically, younger age, gender diversity, and non-heterosexual identity emerged as important differentiators of risk for suicidal ideation, planning, and attempts. These patterns are not simply individual risk markers, but rather reflect the unequal distribution of stress, stigma, and access to protective resources across social locations (Bowleg, 2012; Crenshaw, 2013). For instance, younger SM individuals may be more exposed to peer-related stigma, housing instability, or unsupportive familial environments during early identity development (Baams et al., 2015). Similarly, gender-diverse individuals, including nonbinary people and cisgender women, often face higher levels of gender-based discrimination and structural barriers to healthcare access (Reisner et al., 2015; James et al., 2016). That bisexual participants were less likely than lesbian/gay/other SM individuals to show elevated risk in the context of suicide planning may reflect distinct patterns of invisibility or erasure that manifest differently across suicidal outcomes (Ross et al., 2010; Friedman et al., 2014). These results reinforce the need for intersectional and identity-affirming approaches to suicide prevention. **Intervention efforts tailored to high-risk groups such as SM adults under 25, gender-diverse individuals, and those whose identities place them at risk of marginalization within both queer spaces and broader society.** These interventions should move beyond individual-level coping strategies and incorporate structural components like access to affirming healthcare providers, anti-discrimination protections, and community-based supports that address the social and institutional conditions underlying these disparities. Intervening at these structural levels may be especially important for those subgroups that showed the highest conditional probabilities of suicidal outcomes in our models.

In the second set of models, everyday discrimination emerged as a primary differentiating factor for all STBs. At Wave 1, everyday discrimination alone, although at different levels, predicted suicidal intent and suicide attempts at Wave 2. Data from other minoritized populations supports the relationship between discrimination and increased likelihood of attempting suicide. For example, in an ethnically diverse sample of emerging adults, perceived discrimination was associated with over five times higher odds of a suicide attempt (Gomez et al., 2011); in a separate sample, Black young adults who experienced discrimination daily were almost twice as likely to report having attempted suicide than those who did not (Boyd et al., 2024). In alignment with the minority stress model (de Lange et al., 2022; Meyer, 2003), distal factors like discrimination may contribute to a profound sense of hopelessness, despair, and worthlessness, all of which may increase proximal risk for STBs.

For suicidal ideation and planning in the second set of models using demographic and psychosocial variables, everyday discrimination played a critical role but also combined with factors like SM identity, healthcare stereotype threat, and personal income, establishing subgroups with increased risk for those outcomes. The highest risk for suicidal ideation at Wave 2 was among SM adults who, at Wave 1, had relatively low everyday discrimination scores (<2.556); identified as lesbian, gay, or bisexual as opposed to another non-heterosexual orientation; and had relatively high healthcare stereotype threat scores (>4). The second highest risk for suicidal ideation was among individuals with high everyday discrimination, suggesting that those who think about suicide are likely experiencing higher levels of discrimination, whether daily or in healthcare settings. The suicide

planning findings followed the same general pattern, with additional differentiation by level of personal income; that is, those with the highest likelihood of planning for suicide had relatively low everyday discrimination, relatively high healthcare stereotype threat, and an income less than \$35,999. Healthcare stereotype threat has a significant negative association with self-related health and psychological distress among sexual and gender minority individuals, above and beyond associations with discrimination and stigma (Saunders et al., 2024). Focusing on discrimination within the healthcare setting may have important implications for reducing suicide-related disparities among SM adults. With respect to the role of income, inverse associations between income and suicidal ideation have been documented, with differences by race, such that non-Hispanic white individuals had a much stronger, negative relationship between income and ideation, whereas the association for other races was either weak or nonexistent (McMillan et al., 2010). Though our models did not differentiate by race, these unique relationships are critical to identify in the context of suicide planning.

In the third set of models, which included the mental health factors, psychological distress emerged as the primary and only predictor of three of the four STBs. That is, distress at Wave 1, at differing levels, was the only factor that meaningfully predicted suicidal ideation, planning, and attempts at Wave 2. Across populations and contexts, including among SM adults, distress is a noted correlate of suicidal ideation (Chamberlain et al., 2009; Cho and Haslam, 2010; Lea et al., 2014; McMillan et al., 2010). The fact that higher distress levels were associated with an increased likelihood of ideation suggests that, while distress is a key factor, its impact is not uniform and depends on the intensity of the distress experienced. Similarly, distress was the sole differentiating factor for suicide attempts, with a clear threshold effect. No additional psychosocial factors, nor any demographic factors, intersected with distress to predict later attempts. The focus on distress alone suggests that, for suicide attempts, the intensity of psychological distress may be the most critical factor. These findings, alongside those of the current study, suggest that mental healthcare providers should assess both distal (e.g., discrimination) and proximal (e.g., distress) predictors of STBs in SM adults.

For suicidal intent, everyday discrimination emerged as an important secondary factor after distress. Participants with higher distress levels and elevated everyday discrimination were at higher risk of suicidal intent. In other words, the intersection of higher distress and greater everyday discrimination compounded risk for suicidal intent. This comparison highlights a key difference from the other STBs in this set of models, in which discrimination did not play a prominent role. Discrimination was, however, a strong predictor of STBs in the models that did not include psychological distress, suggesting that distress likely overpowers the role of discrimination for all STBs but intent. Everyday discrimination may both contribute to psychological distress and amplify its association with suicidal intent, a possibility consistent with minority stress theory, but one not directly testable using the tree-based method employed here. Future work should examine whether discrimination acts as both a mediator and a moderator of the relationship between minority stress and suicide outcomes using analytic strategies that can formally assess such mechanisms.

Methodologically, the use of the conditional inference tree models allowed us to uncover complex predictors of STBs, informed by intersectionality theory, that provide a more nuanced understanding of these outcomes in SM adults than conventional linear models. This approach revealed the ways in which co-occurring factors (e.g., such as psychological distress, everyday discrimination, healthcare stereotype threat, and income) interact to shape suicide risk in ways that traditional models often miss. Although this approach does not represent a formal 3-way interaction as modeled in regression, the conditional inference tree structure can reveal emergent, non-additive combinations of risk through recursive partitioning, a concept that is foundational to decision-tree methods (Kass, 1980) and operationalized in our analyses

using CITs (Hothorn et al., 2006). We acknowledge that CIT does not provide statistical estimates of interaction effects, as would be possible in regression models (e.g., Mahendran et al., 2022), and therefore cannot formally test intersectionality in the traditional epidemiologic sense. We use the term intersectional not to imply a statistical interaction between arbitrary predictors, but to reflect the convergence of marginalized identities and societal forces that jointly shape risk. Unlike interaction terms in regression models, CITs do not impose parametric assumptions, allowing for emergent, data-driven interactions that reflect more realistic, heterogeneous relationships and catching more of the structural and contextual nuance that is central to the intersectionality framework.⁴ Because the conditional inference tree models outperformed base rate predictions for sensitivity and specificity with respect to specific STBs, these models will be particularly useful in identifying individuals at risk of suicide intent and planning. By moving beyond independent effects and embracing non-linear relationships, our approach operationalizes intersectionality theory in suicide research, improving both predictive accuracy and practical relevance for intervention strategies.

Limitations of the current study point to important future directions. First, the current study used a conditional inference tree approach without pre-specified hypotheses. This is in large part a function of this being one of the first studies of this nature in this area, however, and our data-driven method effectively identifies complex intersections between demographic, psychosocial, and mental health factors. Future research should nonetheless aim to replicate these findings within a hypothesis-driven framework to better understand their relevance to minority stress and suicidal behaviors. Second, while conditional inference trees are well-suited to explore complex data patterns, their reliance on sample characteristics necessitates caution when generalizing findings to broader populations. Variability in demographic composition, especially related to sexual orientation and race/ethnicity, should be further explored to assess the robustness of these results across diverse subgroups. Third, although this study includes general measures of psychological distress and discrimination, these broad assessments may not fully capture the nuances of minority stress, including specific forms of identity-based stigma and intersectional stressors faced by subgroups within the SM community. Fourth, we recognize that our sample may be biased toward individuals who openly disclose their sexual minority identity, potentially underrepresenting those who conceal their identities. This limitation may restrict the generalizability of the findings to more vulnerable and less visible subgroups within the broader SM population. Fifth, while demographic factors were included in the analysis, we did not include other important social identities and positions, such as disability status or educational attainment. Not considering these factors in our analysis may limit our understanding of how these identities intersect with sexual minority status in meaningful ways and contribute to risk for suicidal thoughts and behaviors.

Notably, we intentionally excluded psychological distress from the second set of models to better isolate upstream, potentially modifiable contributors (e.g., discrimination, healthcare stigma) that may lead to elevated distress and, subsequently, to STBs. Including distress too early in the modeling process could obscure these more distal associations by absorbing a large share of variance. However, we acknowledge that omitting distress limits interpretability by preventing examination of potential indirect pathways. Future work may benefit from integrating

complementary analytic methods (e.g., path analysis or structural equation modeling) to formally test mediation hypotheses alongside the identification of high-risk subgroups.

Despite these limitations, applying CITs led to the identification of key factors that may predict STBs in SM adults, including everyday discrimination, psychological distress, the intersection of distress and everyday discrimination, and the intersection of everyday discrimination, healthcare stereotype threat, and income. While our use of CITs was informed by the intersectionality framework, this analytic approach identifies emergent, stratified subgroups rather than directly testing interaction effects. Nonetheless, it complements interaction-based modeling approaches (Mahendran et al., 2022) by revealing complex patterns of co-occurring risks that might otherwise be obscured. Though psychological distress remains a central differentiating factor that predicts future STBs, identifying and addressing additional, co-occurring contextual stressors, especially discrimination, can inform the optimization of suicide risk reduction interventions for subgroups of SM adults who are at greatest risk. Existing interventions, including LGBT affirmative cognitive behavioral therapies (Burger and Pachankis, 2024; Pachankis et al., 2022, 2023), already include modules on minority stress processes (e.g., social support enhancement, identity affirmation) and coping with discrimination and stigma. These approaches may be further strengthened with enhanced content on health care-specific discrimination and could also be tailored as stand-alone modules to subgroups of SM adults with elevated risk for STBs.

CRedit authorship contribution statement

Qimin Liu: Writing – original draft, Supervision, Software, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Lauren A. Trichtinger:** Writing – original draft, Visualization, Supervision, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation. **Simon M. Li:** Writing – review & editing, Writing – original draft, Software, Formal analysis. **Kiyan Irani:** Writing – review & editing, Writing – original draft, Software, Formal analysis. **Hyo Jin Shin:** Writing – review & editing. **Zoe Habel:** Visualization, Software, Formal analysis, Data curation. **Richard T. Liu:** Writing – review & editing. **Kirsty A. Clark:** Writing – review & editing. **Amelia M. Stanton:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmmh.2025.100542>.

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⁴ It is important to note that comparisons between CTREE and regression approaches should be interpreted with caution, as the methods are designed for different purposes. Whereas multivariate logistic regression evaluates pre-specified predictors, CTREE identifies subgroups through data-driven splits that capture complex interactions. Accordingly, we view these approaches as complementary: regression models benchmark the predictive utility of theorized variables, while CTREE highlights subgroup heterogeneity that may generate new hypotheses.

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