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# Does Stress Explain the Effects of Sexual/Gender Minority Status on Children's Behavioral and Emotional Risk?

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**Abstract: Background:** Sexual and gender minority (SGM) youth are at elevated risk for adverse mental health and substance use outcomes. Stressors such as family conflict, discrimination, and trauma have been suggested as possible mediators of these disparities. **Aims:** This study examined whether family conflict, discrimination, and trauma mediate the associations between SGM identity and adverse outcomes, including suicide attempt, major depressive disorder (MDD), nicotine use, and marijuana use. **Methods:** Participants were children from the Adolescent Brain Cognitive Development (ABCD) study. SGM identity was reported at baseline, while outcomes included past MDD and suicide attempts as well as future nicotine and marijuana use. Structural equation modeling (SEM) was used to test both direct and indirect pathways linking SGM identity to mental health and behavioral outcomes. **Results:** No significant mediation was found through family conflict, discrimination, or trauma. Instead, effects of SGM identity were primarily direct: SGM youth had higher odds of past suicide attempts and MDD, as well as future marijuana use, but not future nicotine use. Stressor variables, however, were independently associated with outcomes. Discrimination predicted all outcomes; trauma was positively associated with suicide, nicotine, and marijuana use but not MDD; and family conflict predicted all outcomes except MDD. **Conclusion:** Family conflict, discrimination, and trauma did not mediate SGM disparities in mental health and substance use, but each emerged as an independent predictor of risk. These findings highlight the complexity of mechanisms underlying SGM-related disparities and suggest the need for future research to explore additional pathways and contextual influences.

**Keywords:** Children; Adolescents; Sexual/Gender Minority; Suicide Attempt; Depression; Trauma; Adverse Life Conditions

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## 1. Introduction

Sexual and gender minority (SGM) youth experience a disproportionately high burden of adverse health outcomes compared to their non-SGM peers [1-5]. Previous research has consistently shown elevated rates of suicide attempts [6-8] and major

depressive disorder (MDD) [9-11] among SGM adolescents, reflecting the toll of minority stress and structural inequities on mental health. Beyond mental health, substance use disparities are also evident, with SGM youth demonstrating higher likelihood of engaging in marijuana and nicotine use [12,13]. Together, these outcomes pose critical challenges to adolescent health and well-being, highlighting the importance of unraveling mechanisms that contribute to these disparities.

One possible explanation for these disparities lies in the role of social and environmental stressors [14-16]. Factors such as family conflict, discrimination, and trauma are known to negatively affect youth mental health and increase risk for substance use [17,18]. These stressors are also disproportionately experienced by SGM youth, raising the possibility that they may serve as mediating pathways linking SGM identity to adverse outcomes [19,20]. Mediation by these stressors would suggest that interventions reducing family conflict, preventing discrimination, or addressing trauma exposure could mitigate the elevated risks observed among SGM adolescents.

Very few studies have tested mediators of the link between SGM and poor mental and behavioral outcomes in youth and adults. Hatzenbuehler proposed a conceptual framework that synthesized key insights from prior research. The framework outlined that (a) sexual minority individuals experience elevated stress stemming from stigma; (b) this stigma-related stress increases emotional dysregulation, social and interpersonal difficulties, and maladaptive cognitive processes that heighten susceptibility to mental health problems; and (c) these mechanisms function as pathways connecting stigma-related stress to psychopathology in SGM populations. This proposed model would deepen understanding of how stigma harms mental health of SGM youth and guide the development of both clinical interventions and prevention efforts. Hatzenbuehler reviews considerable evidence supporting his framework, particularly for depression, anxiety, and alcohol use disorders [21].

Some empirical studies have tested various mediators of SGM disparities in mental and behavioral health. In one study, [11] data from 4,274 participants in the Avon Longitudinal Study of Parents and Children (ALSPAC) were analyzed to examine links between sexual orientation and later suicidal ideation and self-harm (SISH). Sexual orientation was reported at age 15, while past-year SISH was assessed at age 20. Potential mediators included self-esteem (measured at age 17), depressive symptoms (measured at age 18), and SGM identity (Childhood Gender Nonconformity, assessed at 30–57 months). Two significant mediation pathways were observed: one through self-esteem alone, and another through self-esteem followed by depressive symptoms. Low self-esteem and elevated depressive symptoms partly accounted for the increased risk of SISH observed among SGM youth [11]. A second cross-sectional study explored how psychosocial factors mediate the link between sexual orientation and suicidal ideation among young men in China. The first pathway showed that sexual orientation was indirectly associated with suicidal ideation through family support and depressive symptoms. The second pathway indicated an indirect association through support from friends, self-esteem, and depressive symptoms. Authors concluded that enhancing family and friend support as well as strengthening self-esteem may be promising intervention targets to reduce suicide risk among sexual minority men [22]. The third study applied longitudinal mediation models to examine whether victimization could help explain mental health disparities among sexual minority adolescents. The study measured victimization, depressive symptoms, and suicidality across two waves spaced six months apart. Mediation analyses showed that sexual minority-specific victimization significantly accounted for the association between sexual minority status and both depressive symptoms and suicidality [23]. These findings support Hatzenbuehler's minority stress framework, suggesting that

various types of stressors may contribute to the elevated risk of depression, suicide, and substance use among sexual minority adolescents.

The present study aimed to test whether three types of stress, namely family conflict, discrimination, and trauma, mediate the associations between SGM [24] and adverse outcomes, including suicide attempt, MDD, nicotine use, and marijuana use. Drawing on data from the Adolescent Brain Cognitive Development (ABCD) study [25-37], we examined both direct and indirect pathways using structural equation modeling (SEM) [38-43]. Testing mediation processes at such an early developmental stage is scientifically valuable because minority stress mechanisms are typically studied in adolescence or adulthood. By examining these pathways at ages 9–10, this study addresses a critical gap in the literature and helps clarify when and how disparities first begin to emerge. This approach allowed us to test whether disparities in mental health and substance use outcomes among SGM youth could be explained by these stressor variables, or whether the associations reflect direct effects of SGM identity beyond these mediators.

## 2. Methods

### 2.1. Study Design and Participants

Data for this study came from the Adolescent Brain Cognitive Development (ABCD) Study [25-37], a large, ongoing, prospective cohort of U.S. children recruited from 21 sites nationwide. The ABCD study began in 2016–2018 and enrolled nearly 12,000 children aged 9–10 years at baseline, with annual follow-ups assessing biological, behavioral, and social development. Details of study recruitment and procedures have been described elsewhere.

For the present analysis, we included participants with available baseline data on sexual and gender minority (SGM) identity and mediator variables (family conflict, discrimination, and trauma). Mental health and behavioral outcomes were reported at baseline (past major depressive disorder [MDD] and suicide attempt) and follow-up waves (future nicotine and marijuana use). Participants were included if they had valid data for at least one outcome, using listwise deletion within each model.

### 2.2. Measures

#### 2.2.1. Sexual and Gender Minority (SGM) Identity

At baseline, participants self-reported aspects of sexual orientation and gender identity. Following established approaches in adolescent health research, individuals were classified as SGM if they endorsed non-heterosexual attraction, non-heterosexual identity, or a gender identity differing from their sex assigned at birth. A dichotomous indicator was created (1 = SGM, 0 = non-SGM) [44].

#### 2.2.2. Mental Health and Substance Use Outcomes

We examined four outcomes reflecting both internalizing problems and health-risk behaviors. Suicide attempt: Lifetime history of suicide attempt was assessed using youth self-report at baseline [45,46]. Major depressive disorder (MDD): Past-year MDD diagnosis at baseline [47,48] was derived from the computerized Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS-5) [49-51]. Nicotine use: Self-reported use of tobacco or nicotine products (e.g., e-cigarettes, combustible cigarettes) from baseline to the fourth yearly follow-up was coded as any use versus none [35,52-54]. Marijuana use: Self-reported marijuana use from baseline to the fourth yearly follow-up was similarly coded as any use versus none [35,52-54].

#### 2.2.3. Mediator Variables

We focused on three stressor variables commonly hypothesized as mechanisms in minority stress theory [19-21]. Family conflict: Assessed using items from the Family Environment Scale (FES). Items capture the frequency of quarrels, hostility, and lack of family cohesion. Scores were standardized for analysis [55]. Discrimination: Measured using the Perceived Discrimination Scale adapted for adolescents. Items ask about experiences of unfair treatment due to race/ethnicity, gender, or other social identities [56]. Higher scores reflect greater exposure to discrimination. Trauma exposure: Parent reported exposure to events such as physical assault, witnessing violence, or serious accidents on the KSADS-PTSD module, and a total trauma score was created [57].

#### 2.2.4. Covariates

Models adjusted for demographic and socioeconomic covariates, including age, sex at birth, parental education, and household income, to account for confounding in the associations of SGM identity with outcomes.

### 2.3. Statistical Analysis

Analyses were conducted using structural equation modeling (SEM) [38,40,42,58-60] in Stata version 18.0. We specified a path model in which SGM identity predicted each outcome directly, as well as indirectly through family conflict, discrimination, and trauma. Each mediator was modeled simultaneously to estimate unique indirect effects. Significance of indirect effects was evaluated using bias-corrected bootstrapped confidence intervals (10,000 resamples). All models accounted for clustering within study sites and used robust standard errors to address non-normality. Model fit was evaluated with multiple indices, including the root mean square error of approximation (RMSEA < 0.08 indicating acceptable fit), comparative fit index (CFI > 0.90), and standardized root mean square residual (SRMR < 0.08).

### 2.4. Ethical Considerations

The ABCD study received approval from the Institutional Review Board (IRB) at the University of California, San Diego, and all participating sites obtained local IRB approvals. Parents or guardians provided written informed consent, and children provided assent prior to data collection. The present study was conducted under the ABCD Data Use Agreement, and the analyses were exempt from additional IRB review at our institution because they used fully de-identified, publicly available data.

## 3. Results

### 3.1. Descriptive Data

Table 1 summarizes the descriptive statistics for the continuous variables in the study. The average age of participants was 9.48 months (SE = 0.00, 95% CI [9.47, 9.49]). Parents reported a relatively high level of educational attainment, with the mean parental education corresponding to 16.71 years (SE = 0.03, 95% CI [16.66, 16.76]). With respect to psychosocial indicators, participants reported an average trauma score of 0.52 (SE = 0.01, 95% CI [0.50, 0.54]) and a mean discrimination score of 1.20 (SE = 0.00, 95% CI [1.19, 1.21]). Family conflict was reported at a mean of 0.72 (SE = 0.01, 95% CI [0.70, 0.74]).

**Table 1. Descriptive Data, Continuous Variables**

	Mean	Std. Err.	95% CI	
Age (Years)	9.48	0.00	9.47	9.49
Parental Education (Years)	16.71	0.03	16.66	16.76
Trauma (n)	0.52	0.01	0.50	0.54
Perceived Discrimination	1.20	0.00	1.19	1.21
Family Conflict	0.72	0.01	0.70	0.74

**Table 2** summarizes the categorical characteristics of the study sample. Only a small proportion of participants identified as SGM (1.50%). Slightly more participants were male (52.14%) than female (47.86%). Most participants lived in married households (67.30%). Participants showed low rates of lifetime suicide attempt (2.59%) and past year diagnosis of major depressive disorder (MDD, 2.15%). About 5.28% of participants had reported nicotine use and 3.41% reported marijuana use by the fourth yearly follow up.

**Table 2. Descriptive Data, Categorical Variables**

	Freq.	Percent
Gender/Sex Minority		
No	11,671	98.50
Yes	178	1.50
Sex/Gender		
Female	5,673	47.86
Male	6,181	52.14
Married Family		
Unmarried	3,877	32.70
Married	7,980	67.30
Suicide Attempt History (Lifetime)		
No	4,583	97.41
Yes	122	2.59
MDD (Past-year diagnosis)		
No	9,146	97.85
Yes	201	2.15
Future Nicotine Use		
No	11,097	94.72
Yes	618	5.28
Future Marijuana Use		
No	11,315	96.59
Yes	400	3.41

**Note:** Major Depressive Disorder (MDD)

### 3.2. SEM Results

As shown in Table 3, SEM results indicated that SGM youth had higher risk of suicide attempt, MDD, and marijuana use, but not nicotine use. Stressors such as family conflict, discrimination, and trauma independently predicted outcomes but did not serve as mediators of SGM disparities.

#### 3.2.1. Suicide Attempts (Lifetime)

Higher family conflict was significantly associated with greater odds of reporting a past suicide attempt ( $b = 0.009$ , 95% CI [0.005, 0.014],  $p < .001$ ). Discrimination was also a robust predictor of suicide attempt ( $b = 0.032$ , 95% CI [0.021, 0.043],  $p < .001$ ). Trauma exposure showed a marginal association ( $b = 0.004$ , 95% CI [0.000, 0.007],  $p = .067$ ). Being an SGM youth was positively associated with suicide attempt ( $b = 0.040$ , 95% CI [0.005, 0.074],  $p = .024$ ). Living in a married household was negatively associated with suicide attempt ( $b = -0.024$ , 95% CI [-0.034, -0.013],  $p < .001$ ).

#### 3.2.2. Major Depressive Disorder (Past-year diagnosis)

Discrimination was positively associated with past-year MDD ( $b = 0.029$ , 95% CI [0.022, 0.036],  $p < .001$ ). Family conflict and trauma exposure were not significantly related to MDD (both  $p > .10$ ). SGM youth showed higher odds of MDD ( $b = 0.035$ , 95% CI [0.010, 0.060],  $p = .007$ ). Older age was also positively related to MDD ( $b = 0.006$ , 95% CI [0.000, 0.012],  $p = .050$ ).

#### 3.2.3. Nicotine Use (Future)

Family conflict predicted greater odds of future nicotine use ( $b = 0.006$ , 95% CI [0.002, 0.010],  $p = .005$ ), as did discrimination ( $b = 0.020$ , 95% CI [0.011, 0.030],  $p < .001$ ) and trauma exposure ( $b = 0.007$ , 95% CI [0.003, 0.011],  $p = .001$ ). SGM status was not significantly related to future nicotine use ( $b = 0.023$ , 95% CI [-0.010, 0.056],  $p = .172$ ). Older age was strongly associated with nicotine use ( $b = 0.033$ , 95% CI [0.025, 0.041],  $p < .001$ ). Males showed marginally lower nicotine use compared with females ( $b = -0.008$ , 95% CI [-0.016, 0.000],  $p = .058$ ).

#### 3.2.4. Marijuana Use (Future)

Family conflict predicted greater odds of future marijuana use ( $b = 0.003$ , 95% CI [0.000, 0.007],  $p = .036$ ). Discrimination was also a significant predictor ( $b = 0.014$ , 95% CI [0.006, 0.022],  $p < .001$ ), as was trauma exposure ( $b = 0.004$ , 95% CI [0.001, 0.007],  $p = .015$ ). SGM youth had elevated odds of marijuana use ( $b = 0.042$ , 95% CI [0.015, 0.069],  $p = .002$ ). Older age was associated with increased odds of marijuana use ( $b = 0.028$ , 95% CI [0.022, 0.034],  $p < .001$ ).

#### 3.2.5. Association with Mediators

In models describing covariate and SGM relationships to the mediators, SGM identity was not significantly related to family conflict ( $b = -0.085$ , 95% CI [-0.235, 0.064],  $p = .263$ ), discrimination ( $b = 0.002$ , 95% CI [-0.064, 0.068],  $p = .950$ ), or trauma exposure ( $b = 0.099$ , 95% CI [-0.060, 0.259],  $p = .221$ ). However, several covariates were associated with mediator levels. Male sex was positively related to family conflict ( $b = 0.082$ , 95% CI [0.046, 0.119],  $p < .001$ ) and discrimination ( $b = 0.067$ , 95% CI [0.051, 0.083],  $p < .001$ ). Higher parental education was negatively associated with family conflict ( $b = -0.012$ , 95% CI [-0.019, -0.004],  $p = .001$ ) and discrimination ( $b = -0.022$ , 95% CI [-0.025, -0.019],  $p < .001$ ). Living in a married household was inversely associated with family conflict ( $b = -0.167$ ,

95% CI [-0.208, -0.125],  $p < .001$ ), discrimination ( $b = -0.079$ , 95% CI [-0.098, -0.061],  $p < .001$ ), and trauma exposure ( $b = -0.275$ , 95% CI [-0.319, -0.231],  $p < .001$ ).

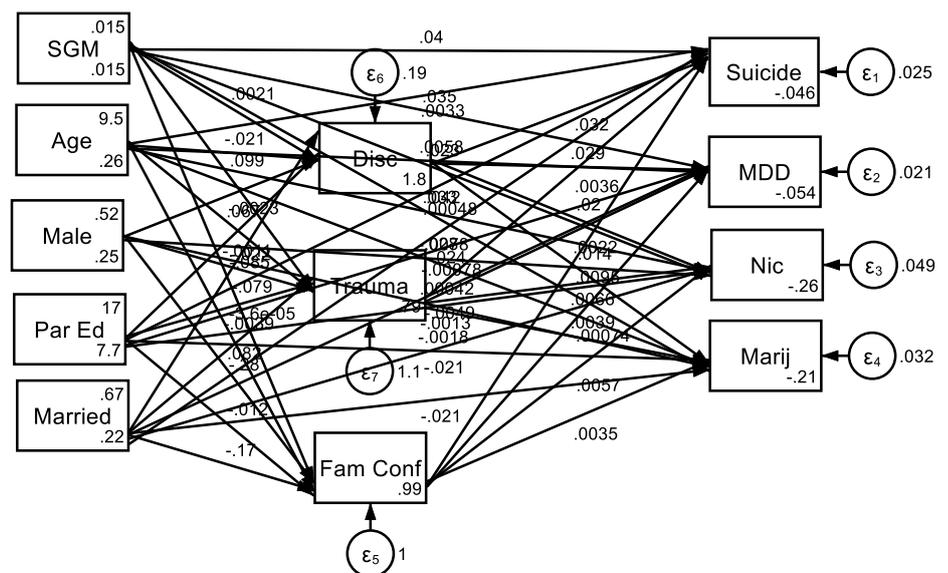
**Table 3. Summary of the Structural Equation Model Findings**

	Coefficient	Std. Err.	95% CI	p
<b>Suicide Attempt History (Lifetime)</b>				
Family Conflict	0.009	0.002	0.005 0.014	< 0.001
Discrimination	0.032	0.006	0.021 0.043	< 0.001
Trauma	0.004	0.002	0.000 0.007	0.067
Sexual/Gender Minority	0.040	0.018	0.005 0.074	0.024
Age	0.003	0.005	-0.006 0.012	0.468
Parental Education (years)	0.000	0.001	-0.001 0.002	0.599
Married household	-0.024	0.005	-0.034 -0.013	< 0.001
<b>MDD (Past-year diagnosis)</b>				
Family Conflict	0.001	0.001	-0.002 0.004	0.616
Discrimination	0.029	0.003	0.022 0.036	< 0.001
Trauma	0.002	0.001	-0.001 0.005	0.144
Sexual/Gender Minority	0.035	0.013	0.010 0.060	0.007
Age	0.006	0.003	0.000 0.012	0.050
Parental Education (years)	-0.001	0.001	-0.002 0.000	0.175
Married household	-0.005	0.003	-0.012 0.002	0.153
<b>Future Nicotine Use</b>				
Family Conflict	0.006	0.002	0.002 0.010	0.005
Discrimination	0.020	0.005	0.011 0.030	< 0.001
Trauma	0.007	0.002	0.003 0.011	0.001
Sexual/Gender Minority	0.023	0.017	-0.010 0.056	0.172
Age	0.033	0.004	0.025 0.041	< 0.001
Male	-0.008	0.004	-0.016 0.000	0.058
Parental Education (years)	-0.001	0.001	-0.003 0.000	0.094
Married household	-0.021	0.005	-0.030 -0.012	< 0.001
<b>Future Marijuana Use</b>				
Family Conflict	0.003	0.002	0.000 0.007	0.036
Discrimination	0.014	0.004	0.006 0.022	< 0.001
Trauma	0.004	0.002	0.001 0.007	0.015
Sexual/Gender Minority	0.042	0.014	0.015 0.069	0.002
Age	0.028	0.003	0.022 0.034	0.000
Male	0.000	0.003	-0.006 0.007	0.901
Parental Education (years)	-0.002	0.001	-0.003 -0.001	0.006
Married household	-0.021	0.004	-0.028 -0.013	< 0.001
<b>Family Conflict</b>				
Sexual/Gender Minority	-0.085	0.076	-0.235 0.064	0.263

Age	0.000	0.018	-0.036	0.036	0.998
Male	0.082	0.019	0.046	0.119	< 0.001
Parental Education (years)	-0.012	0.004	-0.019	-0.004	0.001
Married household	-0.167	0.021	-0.208	-0.125	< 0.001
Discrimination					
Sexual/Gender Minority	0.002	0.034	-0.064	0.068	0.950
Age	-0.021	0.008	-0.037	-0.005	0.010
Male	0.067	0.008	0.051	0.083	< 0.001
Parental Education (years)	-0.022	0.002	-0.025	-0.019	< 0.001
Married household	-0.079	0.009	-0.098	-0.061	< 0.001
Trauma					
Sexual/Gender Minority	0.099	0.081	-0.060	0.259	0.221
Age	-0.002	0.019	-0.040	0.036	0.907
Male	-0.001	0.020	-0.040	0.038	0.957
Parental Education (years)	-0.004	0.004	-0.011	0.004	0.307
Married household	-0.275	0.022	-0.319	-0.231	< 0.001

*Note:* Major Depressive Disorder (MDD)

Figure 1 presents the structural equation model illustrating that the associations between the independent and dependent variables are not explained by the proposed mediator. The path analysis indicates that the mediator does not carry or reduce the effect; instead, the relationship remains direct and significant. This suggests that the predictor influences the outcome without being channeled through the intermediary variable, highlighting the absence of mediation in the model.



**Figure 1. Structural Equation Model** (*Note:* Par Ed= Parental Education; SGM = Sexual and Gender Minority; Marij = Marijuana Use; Nic= Nicotine Use; MDD= Major Depressive Disorder; Suicide= Suicide Attempt; Disc= Discrimination; Trauma = Number of Traumatic Events; Fam Conf= Family Conflict)

#### 4. Discussion

Using structural equation modeling (SEM) with baseline ABCD Study data, we examined how sexual and gender minority (SGM) identity, family stressors, and adverse social experiences shaped risk for suicide attempt, major depressive disorder (MDD), and future nicotine and marijuana use in early adolescence. Our results extend prior work by showing that SGM youth already exhibit significant disparities in mental health at ages 9–10, a developmental stage often considered early for the emergence of such risks. Specifically, SGM youth demonstrated significantly higher odds of suicide attempt, MDD, and future marijuana use compared with their non-SGM peers, though no such disparity was observed for future nicotine use.

Beyond SGM identity, stressors such as family conflict, discrimination, and trauma exposure emerged as robust independent predictors of adverse outcomes. Each was significantly associated with suicide attempts and future substance use, and discrimination in particular was strongly related to both suicide attempts and MDD. However, these stressors did not act as mediators of the disparities between SGM and non-SGM youth. This suggests that while adversity worsens outcomes across the entire sample, the elevated risks faced by SGM youth cannot be explained by greater exposure to family conflict, discrimination, or trauma alone. Rather, the risks appear to operate independently, consistent with processes unique to minority stress.

Our findings that SGM youth were more likely to report a past suicide attempt and past-year MDD align with a growing body of evidence on disparities in psychiatric outcomes among SGM populations. Minority stress theory provides a compelling framework for understanding these results, highlighting how stigma, exclusion, and structural disadvantage produce chronic stressors that accumulate over time to harm mental health. The fact that SGM disparities remained even after adjusting for family conflict, discrimination, and trauma suggests that other unmeasured factors may be contributing to this vulnerability. These could include internalized stigma, concealment of one's identity, or victimization specifically tied to sexual and gender identity. Moreover, given the young age of the ABCD sample, these disparities may represent early manifestations of vulnerabilities that widen across adolescence and into adulthood if left unaddressed.

One of the most notable distinctions in our findings was that SGM identity predicted marijuana use but not nicotine use. This difference may reflect shifts in substance use patterns among contemporary adolescents. While tobacco prevention campaigns and policy restrictions have led to historically low rates of combustible cigarette use in youth, marijuana remains widely available and increasingly normalized in the context of legalization in many U.S. states. For SGM youth, marijuana may serve as a coping strategy for stress and stigma, consistent with self-medication frameworks [61]. Prior research has shown higher marijuana use among SGM populations in adolescence and adulthood, often linked to efforts to manage minority stress [62]. The absence of an SGM disparity in nicotine use could indicate both the success of tobacco control measures and the fact that SGM youth may be drawn to substances that are perceived as more socially acceptable among peers.

Our results further highlight the independent role of adversity in shaping mental health and substance use outcomes. Family conflict was consistently associated with suicide attempt, nicotine use, and marijuana use, while discrimination was strongly associated with suicide attempt and MDD. Trauma exposure also increased risk for substance use. These findings are consistent with decades of research documenting the harmful impact of family dysfunction and social marginalization on youth development. However, the absence of mediation indicates that such stressors do not fully explain

disparities for SGM youth. In other words, while reducing family conflict, discrimination, and trauma would likely improve outcomes for all youth, these strategies alone may not eliminate the disproportionate risks faced by SGM populations. This underscores the importance of interventions that address minority-specific processes, such as identity-related stress and peer victimization.

Our analyses also identified protective factors. Living in a married household was associated with lower odds of suicide attempt and lower reported levels of family conflict, discrimination, and trauma. Similarly, higher parental education was associated with reduced family conflict and discrimination. These findings emphasize the role of stable family structures and socioeconomic resources as buffers against psychosocial stress and adverse outcomes. While these factors did not eliminate SGM disparities, they highlight potential points of intervention. Supporting families through education, strengthening economic resources, and promoting family cohesion may foster resilience, even among youth facing identity-related risks.

#### ***4.1. Implications for Prevention and Policy***

The findings carry important implications for prevention and policy. First, suicide prevention strategies for adolescents should explicitly recognize the heightened vulnerability of SGM youth. Programs designed for general populations may not adequately address minority stress processes; tailored approaches are needed to reduce suicide risk and promote mental health in these groups. Second, interventions that target family functioning and reduce exposure to discrimination could yield broad benefits, particularly when combined with programs aimed at fostering affirming environments for SGM youth. Finally, substance use prevention efforts should adapt to shifting patterns of risk, with increased attention to marijuana use as a salient concern for SGM adolescents.

#### ***4.2. Limitations***

Several limitations should be acknowledged. The analyses were cross-sectional, limiting the ability to infer causal pathways and the potential for mediators to influence outcomes. Longitudinal follow-up of the ABCD cohort will be critical to examine how disparities evolve across adolescence and into young adulthood. In addition, measures of family conflict, discrimination, and trauma were based on self- and parent-report, which may be subject to reporting bias. The relatively small proportion of SGM youth, while consistent with population prevalence at this age, limited statistical power and may have produced conservative estimates of disparities. Lack of inclusion of race/ethnicity as a covariate is important. Race/ethnicity likely impacts measures of discrimination, substance use, and mental health. Also, race/ethnic minority youth may have added cultural stigma on belonging to SGM [63,64]. It is important to note that our findings may actually underestimate the true extent of SGM disparities. Sexual orientation and gender identity often consolidate later in adolescence, and prior work suggests that disparities in mental health and substance use widen with age. Thus, the current results likely represent conservative estimates of these differences. Finally, the measures of future nicotine and marijuana use were based on self-reports of low-level use, which may not fully capture actual trajectories of substance use as participants age or separate normative experimental behaviors from problematic use.

#### ***4.3. Future Directions***

Future research should build on these findings in several important ways. Longitudinal analyses of the ABCD cohort will allow researchers to test developmental trajectories, clarifying whether early disparities among SGM youth widen, narrow, or shift as adolescents mature. Such work could examine whether early marijuana use predicts

later mental health challenges or interacts with minority stress processes to shape long-term outcomes. Additionally, integrating peer relationships and school climate into future models could help identify how affirming or hostile social environments impact risk. Neuroimaging data available in ABCD also provides an opportunity to examine biological stress pathways and neural mechanisms of risk and resilience among SGM youth, which may offer further insight into the unique vulnerabilities identified here. Finally, intervention research is needed to test programs that directly address minority stress—such as school-based affirming policies, peer support groups, or family-based acceptance interventions—and to evaluate whether these approaches reduce disparities in suicide attempts, depression, and substance use.

## 5. Conclusion

In conclusion, this study demonstrates that SGM youth face disproportionately high risks of suicide attempt, MDD, and marijuana use in early adolescence, risks that cannot be fully explained by exposure to family conflict, discrimination, or trauma. Although these contextual stressors were strong predictors of mental health and substance use for all youth, they did not mediate SGM disparities. These findings suggest that minority stress processes operate through unique pathways. Prevention strategies should combine efforts to reduce contextual stressors with targeted approaches that affirm SGM identities, reduce stigma, and provide culturally responsive support. Broad structural efforts to reduce discrimination and strengthen family and socioeconomic support systems are crucial for reducing disparities and fostering resilience within this vulnerable population.

### Conflicts of Interest:

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