The European Journal of Psychiatry 37 (2023) 72—83

THE EUROPEAN JOURNAL OF PSYCHIATRY

www.elsevier.es/ejpsy

REVIEW ARTICLE

A systematic review of the factors associated with suicide attempts among sexual-minority youth

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Received 22 April 2022; accepted 22 September 2022
Available online 10 January 2023

KEYWORDS
Sexual minority;
Youth;
Suicide attempt;
Risk and protective factors

Abstract
Background and objectives: Recent literature reported a higher risk of suicide attempts among sexual minority youth. Discovering the risk and protective factors of suicide attempts among this vulnerable population can play a key role in reducing the suicide rate. Our research aims to systematically search for the risk and protective factors for suicide attempts among sexual minority youth.
Methods: We have conducted a systematic review of published studies of associated factors for suicide attempts in sexual minority youth. Four databases up to 2020 were searched to find relevant studies.
Results: Twelve articles were included. For sexual minority youth, the identified risk factors associated with suicide attempts are early coming out, being unacceptable by families, dissatisfaction with sexual minority friendships, too few friends, physical abuse, sexual abuse, and bullying. The identified protective factors for suicide attempts are feeling safe at school, teacher support, anti-bullying policy, and other adult support.
Conclusion: Both risk and protective factors for suicide attempts stem directly from the environments in which youth grew up: family, school, and the internet. Effective preventive measures among sexual minority youth need to be developed and implemented. Societal-level anti-stigma interventions are needed to reduce the risk of victimization and awareness should be raised among family and friends.

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https://doi.org/10.1016/j.ejpsy.2022.09.003

Background and objectives

Suicide is a major public health problem that accounts for 1.4% of all deaths worldwide.[1] The definition of suicide by the CDC is the death caused by injuring oneself with the intent to die.[2] Suicide could occur throughout the lifespan of any individual and was the fourth leading cause of death among 15—29-year-olds globally in 2019.[3] For every suicide, there are many more people who attempt suicide. A suicide attempt (SA) is a behavior when someone harms themselves with any intent to end their life, but they do not die as a result of their actions.[2] It is the single most important risk factor for suicide.[3]

Sexual minorities are associated with a higher risk of suicide and SA. The risk is higher still among the sexual minority youth. Young sexual minorities (born 1990—1997) were found with a higher incidence of psychological distress and suicidal behavior than those in the middle (born 1974—1981) and older ages (born 1956—1963), and with a risk of SA to be 30% which was higher than even the lifetime risk in those older.[4] Another study revealed that among sexual minorities, SA showed two peaks in youth (18-20 years of age for both genders) and mid-life (30-35 years of age for men) and one decreasing trend in lifetime suicide attempt prevalence estimates for both sexual minorities and heterosexuals.[4] During the last decades, there has been a marked improvement in the social and legal environment of sexual minorities.[5] However, sexual minority youth remained 2 to 8 times more likely to attempt suicide compared to their heterosexual peers.[6—10] Some studies in the United States showed that adolescents between 15-19 years of age with homosexual orientation experienced more SA than their heterosexual peers.[10,11] In Europe, a study in Iceland reported that the risk of SA among sexual minority adolescents between 15 and 16 years old was 4 to 6 times higher than in heterosexual adolescents.[12]

How to reduce SA and identifying risk and protective factors for SA among sexual minority youth is crucial. It has been reported the risk factors for SA included mood disorders (depression and anxiety), substance abuse, and a history of prior suicide attempts.[13,14] Social environment including peer victimization and feelings of pressure from being blamed for sexual orientation have also been identified as risk factors for SA.[15,16] Factors related to family adversity, social exclusion, and poor school performance also contribute to the risk of suicide.[13,17] Multiple risk factors make these youth vulnerable to negative influences, while protective factors facilitated a resilience positive response. Therefore both protective and risk factors that may influence SA among sexual minority youth should be considered.[18] Bronfenbrenner's ecological systems theory[19] has divided the protective factors for SA into several systems levels (micro, meso, exo, macro, and chrono). The first layer is the microsystem, which encompasses the socio-demographic characteristics. The meso/exosystem encompasses the interactions and relationships between major settings including family dynamics, parental employment, and the parent-teacher relationship. The macrosystem encompasses all major systems and institutions that govern and shape society. One study in 2009 examined how individual-level factors (sociodemographics, biological/genetic factors), microsystem factors (informal support from family and friends), meso/ exosystem factors (contact with the legal, medical, and mental health systems, and rape crisis centers), macrosystem factors (societal rape myth acceptance), and chronosystem factors (sexual revictimization and history of other victimizations) affect adult sexual assault survivors' mental health outcomes (depression, suicidality, and substance use).[20] In our study, depending on the definition of systems, we use Bronfenbrenner's ecological systems theory to classify the protective factors into personal environment: youth characteristics (micro and chrono), intimate environment: family and friend (meso), and public environment: school and societal (exo and macro). Intervention and prevention efforts could be achieved by identifying and understanding these factors through this classification. In addition, most of the literature reviews we have found[6,13,21] on SA among sexual minorities in recent years have focused on prevalence rather than associated factors. Considering the lack of systematic identification of suicide-associated factors among sexual minority youth, it seems essential to implement this review.

We aim to systematically review the literature on the risk and protective factors of SA among sexual minority youth.

Methods

Eligibility criteria

Inclusion criteria

a) The target population is youth (13-20 years old);
b) Those with clearly defined sexual orientation (gay, lesbian, homosexual, bisexual) and/or those reporting levels of same-sex attraction or behavior;
c) Those with clearly identified SA as an independent outcome in multiple statistical analyses (logistic regression);
d) Those with risk or protective factors for SA;
e) All types of studies including but not limited to cross-sectional studies, cohort studies, and case-control studies;
f) No language limits.

Information sources and search

Two authors (X.W and Q.G) searched four databases (PubMed, Web of Science, Cochrane library, and PsycInfo) for articles published until 31 December 2020 using the search strategy "suicide" AND "adolescent" or "youth" or "young people" or "teenager" AND "LGB" or "gay" or "lesbian" or "homosexual" or "sexual minority" or "sexual orientation". Disagreement was resolved by discussion.

Study selection

In total, 422 articles were identified, of which 60 duplicates were removed. After screening the titles and abstracts, 281 articles were excluded for the following reasons: 125 did not concern suicide attempts; 86 did not describe any risk or protective factor of SA; 47 did not include the participants aged 13-20 years old; 17 were based on a population not including sexual minorities; 6 only concerned transgender population. After reviewing the full text of 81 articles, 69 were excluded for the following reasons: 50 did not describe

any risk or protective factor of suicide attempts; 10 were based on the second analysis of published articles; 6 did not include youth participants; 2 did not concern suicide attempts; 1 only concerned transgender population. Finally, 12 articles met the inclusion criteria (Fig. 1. Flowchart).

Data collection process

After study inclusion, one author (X.W) extracted the data and entered it into the forms. Two authors (C.P and Q.G.) examined and verified the information was properly entered.

The following information was extracted in Table 1: Author, publication year, country, target population, age range, study design, total sample size, sexual minority sample size, the proportion of SA, and quality assessment of the study.

Data synthesis

We extracted OR (odds ratio) or PR (the prevalence ratio) and 95% confidence intervals of risk and protective factors from the statistical results of logistic regressions. Identified factors were assigned into three categories according to the environmental contexts: personal environment (demographic, psychiatric disorder and traumatic state, consumption of substances, and personal life), intimate environment (family/adult support, friends support), and public environment (school, the internet, and social support).

The following information was extracted in Table 2: Year of study, name of investigation, confirmed risk or protective factors with odds ratio and 95% confidence intervals, non-confirmed risk or protective factors with odds ratio and 95% confidence intervals, adjustment variables, and conclusion.

Quality assessment of the studies

The Newcastle-Ottawa scale[22] was used to evaluate the quality of included studies. This scale is widely used as an evaluation tool for observational studies and longitudinal studies.[23] It has three categories including eight entries with a full score of 10. We classified 8-10 points as high quality, 5-7 points as medium quality, and less than 5 points as low quality (Appendices).

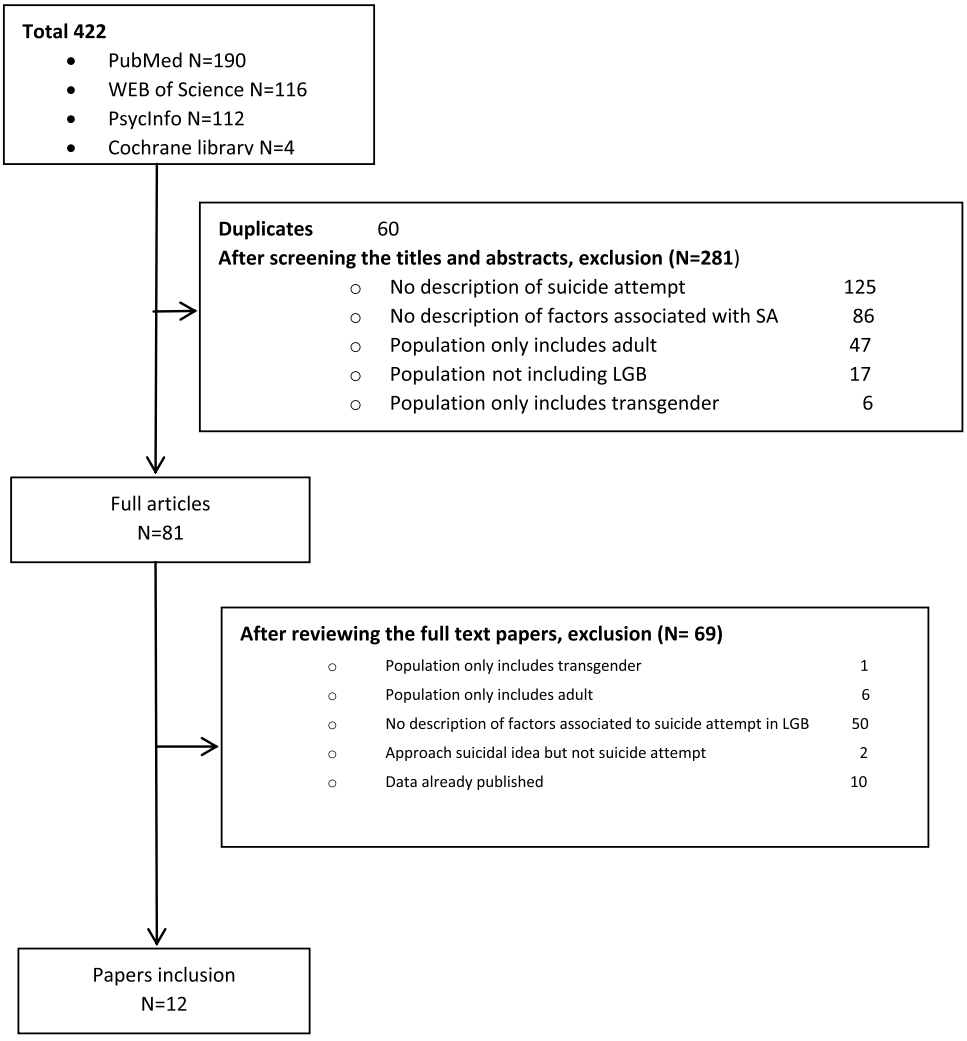

Fig. 1 Flowchart.

Table 1 Characteristics of included articles.

Author	Country	Population	Age	Study design	Suicide attempt	Total sample size	LGB size (% girls)	Proportion of suicide attempts LGB	Quality of study
Humphries et al. 2020	US	A nationally representative sample of students in grades 9th to 12th enrolled in ether public or private schools	14-18	cross-sectional	last 12 months	27706	2740	25.8%	9
Busby et al. 2020	US	868 students from four universities who completed an online screening survey	18-30	cross-sectional	lifetime	868	868 (63.6%)	23%	8
Turpin et al. 2020	US	all regular public and private schools with students in at least one of 9th to 12th grades in the 50 states and the District of Columbia	12-18	cross-sectional	last 12 months	876	876	29.5%	9
Toomey et al. 2019	US	a large sample of in-school US adolescents	11-19	cross-sectional	lifetime	116925	5598	37.7%	6
Rimes et al. 2019	UK	LGB young adults	16-25	cross-sectional	lifetime	3275	3275 (49.3%)	13.6%	9
McDermott et al. 2017	UK	community-based via LGBT organizations and social media (twitter. FB. Tumblr)	13-25	mixed study	lifetime	789	789 (42.6%)	17.6%	4
Taliaferro et al. 2017	US	population-based survey administered every 3 years to students in grades 5. 8. 9. and 11	14-17	cross-sectional	last 12 months	77758	2878	12.5% (Gay or les), 19.5% (Bisexual)	9
Duong et al. 2014	US	the 11.877 students enrolled in grades 9 through 12 from 105 NYC public high schools	14-18	cross-sectional	last 12 months	11877	951 (69.5%)	27.3%	9
Hatzenbuehler et al. 2013	US	random sampled from 11th grade school students	13-17	cross-sectional	last 12 months	31852	1413 (67.4%)	21%LG. 23%B	8
Mustanski et al. 2013	US	venue sampling (flyers in neighborhoods by LGBT youth 38%) and snowball sampling (incentivized recruitment of peers by existing participants 62%)	16-20	cross-sectional	whole life. last year	237	237 (52.3%)	31.6% (lifetime) 7.2% (last year)	10
Goodenow et al. 2006	US	a population-based survey of adolescents from 64 public high schools	14-18	cross-sectional	last 12 months	3607	202 (49%)	28.5%	10
Heerngen et al. 2000	Belgium	a general population sample of homosexual or bisexual young people and a control sample consisting of secondary and high school students	15-27	cross-sectional	lifetime	404	219 (37.4%)	17.2%	9

Legend: LGB=lesbian, gay and bisexual; NYC=New York City; UK=United Kingdom; US=United States.

Table 2 Information of risk and protective factors in LGB adolescents.

Author	Year of study	Name of study	Confirmed risk or protective factors	Non-significant risk or protective factors	Adjustment	Conclusion
Humphries et al. 2020	2015-2017	YRBS	Traditional bullying only PR 1.49 (1.08-2.04) Traditional and electronic bullying PR 1.74 (1.35-2.24)	Electronic bullying only PR 1.43 (0.90-2.27)	gender, race, class grade, school grade, student feeling hopeless over the past 12 months, sleeping 8 or more hours on average per school night, being physically active 5 or more days on average per week, ever smoked cigarettes in their lifetime, ever drank alcohol in their lifetime, ever used marijuana in their lifetime ever tried hard drugs (cocaine, heroin, etc.), ever had sexual intercourse in their lifetime, and ever experienced forced sexual intercourse in their lifetime	Traditional and electronic bullying are not synergistic in the risk of attempting suicide, although each form increases that risk.
Busby et al. 2020	2017-2018	eBridge	Victimization OR 1.11 (1.05-0.18) Connectedness OR 0.87 (0.79-0.96)	Discrimination OR 1.01 (0.97-1.06) LGBTQ identity affirmation OR 1.05 (1.00-1.10)	age, gender, race, study-site, sexual orientation	Results suggest efforts to decrease victimization and discrimination and increase connectedness may decrease depressive morbidity and risks for self-harm among SGM college students
Turpin et al. 2020	2015.2017	YRBS	Any substance use PR 1.99 (1.37-2.89) No of substance use PR 3.35 (2.41-4.66)		race and depression	Substance use is an especially important focal point for targeted interventions reducing suicidality among Adolescent sexual minority males
Toomey et al. 2019	2012-2015	PSL-AB	Gender: female OR 1.56 (1.27-1.92) Race: Hispanic OR 1.35 (1.02-1.09) Feeling unsafe OR 1.11 (1.03-1.20) Hope OR 0.60 (0.53-0.69)	Age OR 1.00(0.95,1.05), parental education OR 1.00 (0.94,1.05) urban city vs rural small cities OR 0.93(0.74,1.16), Asian OR 0.85 (0.61,1.19) Black/ African American OR 1.07 (0.79,1.43)		Disparities in suicidal behavior by sexual orientation were largely unexplained by differential associations between developmental assets and suicidal behavior.
Rimes et al. 2019	2012-2013	YCS	Gender: female OR 1.51 (1.14-1.90) Fewer than 5 friends to count on OR 1.33 (1.02-1.72) Help-seeking for depression/anxiety OR 3.89 (2.97-5.07) Abuse or violence from someone close OR 1.72 (1.33-2.24) sexual abuse before 16 years OR 2.25 (1.63-3.09) weekly drug use OR 1.58 (1.07-2.33) Orientation Bisexual OR 1.50 (1.14-1.99) Not feeling accepted where living OR 1.93 (1.44-	Thought LGB before 10 OR 1.24 (0.88—1.73) Bad reaction: friend OR 1.34 (0.93—1.93) 50%+ friends LGBT OR 1.20 (0.93—1.55) Staff not speaking up OR 1.32 (0.80—2.18) Lessons negative OR 1.16 (0.77—1.75) LGB Harassment OR 1.17 (0.74—1.85) Academic engagement OR 1.19 (1,1.4) Social emotional skills OR 1.26 (1.05,1.51) Planning, decision making skills OR 0.76 (0.63,0.91) Caring OR 0.87 (0.66,1.15) Social Justice OR 1.13 (0.84,1.53)		The findings are consistent with the suggestion that LGB stigma and discrimination contribute to LGB youth suicidality. LGB participants also shared risk factors with previous general population samples (e.g.. previous depression/ anxiety. childhood sexual abuse).

Table 2 (*Continued*)

Author	Year of study	Name of study	Confirmed risk or protective factors	Non-significant risk or protective factors	Adjustment	Conclusion
			2.60) Came out before 16 years OR 1.53 (1.18-1.97) LGB victimization Crime OR 1.79 (1.36-2.37)	Integrity OR 1.03 (0.88,1.21) Responsibility OR 1.02 (0.84,1.24) Boundaries Family OR 1.17 (0.15,9.19) School OR 0.88 (0.01,68.79) Neighborhood OR 0.94 (0.37,2.41) Family Support OR 0.69 (0,1.65) Open Family Communication OR 1.50 (0,1.66) Parent Involvement in School OR 0.93 (0.7,1.24) Other Adult Relationships OR 1.04 (0.5,2.18) Caring School Climate OR 1.30 (0.02,80.78) Community Values Youth OR 1.02 (0.03,36.85) Extracurricular Activity Participation Non-Sports OR 0.92 (0.31,2.72) Sports OR 1.01 (0.91,1.12)		
McDermott et al. 2017	2014-2016	-	Self-harm OR 7.45 (3.95-14.04) Gender identity OR 1.50 (1.06-2.12) Disability OR 2.23 (1.47-3.36) sexual abuse OR 2.14 (1.15-3.21) not talking about feeling and emotions OR 2.43 (1.03-5.75)	Experience of abuse related to sexual orientation OR 0.81 (0.52-1.23) Effect of keeping sexual orientation/gender identity secret OR 0.81 (0.48-1.35) Effect of hiding sexual orientation/gender identity OR 0.86 (0.50-1.77)		Public health universal interventions that tackle bullying and discrimination in schools. and selected interventions that provide specific LGBT youth mental health support could reduce LGBT mental health inequalities in youth suicidality.
Taliaferro et al. 2017	2013	MSS	Depressive symptoms OR 4.17 (1.72-10.07) Anxiety symptoms OR 2.28 (1.06-4.91) school safety OR 0.65 (0.47-0.91)	Bully victim OR 1.60 (0.79—3.23) Violence victim at school OR 1.37 (0.72—2.63) Friend caring OR 0.83 (0.68—1.02)	gender. race and grade	In addition to facilitating connections between youth and parents. clinicians might consider encouraging sexual minority youth to remain connected to trusted non parental adults who could offer support and care.
Duong et al. 2014	2009	YRBS	Cyber bullied only OR 3.07 (1.39-6.79) School bullied only OR 3.01 (1.09-8.33) Both OR 5.10 (1.90-13.71)	School connection OR 1.10 (0.54-2.27)	gender, race, grade, language and weight status	Helping victimized LGB youth develop meaningful connections with adults at school can minimize the negative impacts of cyber and school bullying
Hatzenbuehler et al. 2013	2006-2008	OHT	Anti-bullying policy OR 0.18 (0.03-0.92) Sex female OR 1.95 (1.01-3.79) Race non-white OR 2.55			Inclusive anti-bullying policies may exert protective effects for the mental health of lesbian and gay youths. including reducing their risk for suicide attempts.

Table 2 (*Continued*)

Author	Year of study	Name of study	Confirmed risk or protective factors	Non-significant risk or protective factors	Adjustment	Conclusion
			(1.21-5.38) Peer harassment OR 7.72 (3.12-19.13)			
Mustanski et al. 2013	2001	-	MDD (major depressive disorder) symptoms OR 1.17 (1.07-1.28) Hopelessness OR 2.69 (1.51-4.77)	Impulsivity OR 1.00 (0.97−1.04) Family support OR 1.09 (0.89−1.34) Conduct disorder symptoms OR 0.99 (0.92−1.07) LGBT victimization OR 1.53 (0.95−2.48) Age of same sex-attraction OR 0.94 (0.86−1.03)		These results highlight the importance of addressing depression and hopelessness as proximal determinants and family support and victimization.
Goodenow et al. 2006	1999	YRBS	school victimization OR 4.35 (2.04-9.27) teacher support OR 0.19 (0.06-0.60) anti-bullying policy OR 0.37 (0.16-0.86) community-service learning OR 3.11 (1.00−9.65)	Personal victimization OR 1.45 (0.69−3.03) Peer-tutoring program OR 0.60 (0.29−1.24)	demographics, depression and school characteristics	sexual minority adolescents in schools with LGB support groups reported lower rates of victimization and suicide attempts than those in other schools. Victimization and perceived staff support predicted suicidality
Heeringen et al. 2000	NF	-	hopelessness OR 1.27 (1.10-1.50) suicide attempt in someone close OR 4.14 (1.60-10.6) unsatisfactory homosexual friendship OR 2.22 (1.20-4.0)			The identified suicide among homosexual or bisexual young people is associated with depression especially among those with unsatisfying friendships

Legend: LGB=lesbian, gay and bisexual; MSS=Minnesota Student Survey; OHT=Oregon Healthy Teens; OR=odds ratio; PR=prevalence risk; PSL-AB=profiles of student life: attitudes and behaviors; YRBS=Youth Risk Behavior Survey; YCS=the Youth Chances Study

Results

Study characteristics

Of the 12 articles included, 10 studies were of high quality, 1 of moderate quality and only 1 of low quality. All were cross-sectional studies, except one was a mixed study. Most were based in the US (n = 9), with 2 in the United Kingdom and 1 in Belgium.

Population

Included studies covered different age groups, with 6 studies focusing on ages between 12 and 18 years old, 2 until 20 years, 2 until 25 years, and further 2 until 30 years. All studies included at least two genders. Regarding sexuality, 8 studies used one question to define sexual orientation, of which 4 studies originated from the same project YRBS (Youth Risk Behavior Survey) in the U.S., but focused on different regions or years. 2 studies used sex behavior directly. And 2 studies did not mention the definition of sexual orientation.

Definition of suicide attempts

Six studies collected information on SA by the question "During the past 12 months, how many times did you actually attempt suicide?" In 5 studies, participants described whether they ever had attempted suicide in their life. 1 study collected data on SA over a whole life and during the last year.

Associated factors

Personal environment

Demographic. We listed 5 elements (gender, ethnicity, age, rurality, and parental education) in the demographic category. Gender and ethnicity were considered confirmed risk factors in sexual minority youth, whereas age, rurality, and parental education were not found to have any statistical association.[24] For gender, 4 studies reported that girls were more likely to commit suicide than boys.[24—27] For ethnicity, one study revealed that non-white participants had a higher risk of SA than white participants.[25] The study of Toomey implied that Hispanic youth had a higher risk of SA than other ethnicities.[24]

Psychiatric disorder and traumatic state. Depression or anxiety was evaluated in three studies that were reported as a high SA risk factor.[27—29] Hopelessness was studied and identified as a risk factor in three studies.[24,29,30] Moreover, "not talking about feelings and emotions"[26] and "feeling unsafe"[24] were also reported as risk factors. Furthermore, "a history of SA in someone close" was found to be a risk factor.[30] Physical abuse and sexual abuse were also identified as risk factors.[26,27] And "childhood abuse or violence experience from someone close (friend or family)" was associated with SA.[27]

Substances consumption. Substance consumption was identified as a risk factor in the study of Turpin who reported the number of substances used (0-7) revealed the strongest association with SA.[31] The study of Rimes revealed the same result that weekly drug use compared with no drug use increased the risk of SA in sexual minority youth.[27]

Personal life. Only a few studies were interested in personal sexual life including the early age of coming out and related experiences. The youth coming out before 16 years of age were more likely to commit suicide than others[27] while another study revealed no association between sexual identity affirmation and suicide behavior.[32] Whereas self-identified as a sexual minority before the age of 10 was reported no association with SA,[27] and the age of being attracted to the same sex was not associated with suicide behavior.[29]

Intimate environment

Family/adult support. Goodenow found that adult (teacher) support was associated with a protective effect against SA.[33] However, Duong and Mustanski did not report any such association.[29,34] Rimes focused on 4 elements of support (family support, open family communication, parent involvement in school, and other adult relationships), none of these showed significance in multiple regression models.[27] however, this study found that "not feeling accepted where one lives" doubled the risk of SA.[27]

Friend's support. Van Heeringen found that if the relationships of sexual minority peers around them are not satisfactory, the SA of homosexual adolescents will be greatly increased.[30] Too few friends (less than 5 friends) can also increase the risk of SA.[27] Social connectedness (A 3-item UCLA Loneliness Scale questionnaire was used to assess students' friendship connectedness) was a protective factor in the prevention of SA.[32] The protective policy of peer-tutoring programs did not show any significance in Goodenow's study.[33]

Public environment

School. Two studies reported the importance of school safety: In Taliaferro's study, "perceived safety at school" was considered a protective factor protected against SA of gay/lesbian youth,[28] and "feeling unsafe at school" in Toomey's study showed a risk of SA.[24] Whereas the study of Rimes did not find any association between "a caring school climate" and SA (whether staff and students speak up consistently against LGB prejudice).[27] Concerning school victimization (being verbally or sexually harassed, physical assault in school), Goodenow reported an association of SA with school victimization.[33] However, Taliaferro reported no association with victims of violence at school (being pushed, shoved, slapped, hit, or kicked by other students at school).[28]

The internet. Cyberbullying is also considered a strong risk factor for SA in sexual minority youth. The study of Duong and Bradshaw divided bullying into school bullying and cyberbullying while suffering from both types of bullying at the same time has the highest risks.[34] However, another study did not find an association between electronic bullying and SA, it only reported the significance of traditional bullying or both traditional and electronic bullying (cyberbullying).[35]

Society support. Among all of the risk factors identified, bullying is considered to be the most prominent risk factor, one study found that the homosexual population had higher risks of being bullied than the bisexual population.[25] Rimes also reported that sexual minority victimization was a risk

factor for SA.[27] However, the experience of abuse related to sexual orientation was not significant in another study.[26] Therefore, the anti-bullying policy was considered an important protective factor. One study[25] found that "the anti-bullying policy was associated with reduced risk for SA among lesbian and gay youths", another study[33] revealed that "anti-bullying policy significantly predicted a lower probability of single or multiple SA" in sexual minority adolescents.

Discussion

The majority of studies and systematic reviews have focused on the prevalence of SA rather than investigating risk and protective factors for SA.[21,36] Another precedent review has focused on investigating risk factors in the sexual minority population rather than youth.[37] The current systematic review analyzed the associated factors for SA among sexual minority youth in detail and gave specific classifications.

Personal environment

In this review, ethnic minorities showed a higher risk of suicide attempts than Caucasian ethnicities,[24,25] which implies that ethnic minorities living in Western countries were in a more vulnerable situation in terms of their sexual orientation. Many factors associated with sexuality have also been studied: Coming out during adolescence at an early age (before 16 years old) is considered to be a risk factor,[27] which may generate more family rejection and school bullying.[9,35,38,39] This result would lead to further sexual-related victimization in school and emotional or physical blame from family members. This suggests that coming out before maturity may increase the risk of SA, especially in the dual hostile environment of homophobic attitudes and a lack of family support. This was consistent with another study reporting that sexual orientation identity affirmation is no longer a risk factor for SA for college students over 18 years old. It revealed that with the completion of puberty, sexual minority youth can face their identities and orientations with more confidence.[32]

Interpersonal environment

Relevant literature still showed that relationship discrimination and low-quality intimate relationships, either family relationships, or friendships, are major risk factors for SA in sexual minority communities.[37] The sexual minority youth who reported higher levels of family rejection were 8.4 times more likely to report having attempted suicide.[39] Family support is considered to be one of the most important environments for the growth of adolescents. Some studies have shown that parental support is more important than peer support.[27,29]

Concerning victimization, the most important factor is bullying, whether it is school bullying, internet bullying, or sexually-oriented bullying.[35] Humphries's research indicated that students who experienced both traditional bullying and electronic bullying had a higher prevalence of SA than those who experienced only one form, but the interactions for both forms showed no association, suggesting that these two forms of bullying were not synergistic in the risk of suicidality.[35] However, another study by Duong showed that both school bullying and cyberbullying were significant respectively, and suffering both further increases the probability of suicide among sexual minority teenagers. They also found that with the support of teachers, the association between bullying and suicide disappeared. Goodenow also reported the same conclusion, that teacher support is a protective factor to prevent suicide behavior.[33]

A safe environment in school has appeared in many studies as a strong protective factor.[27,28,34] School as the first environment in which students live outside of the family is very critical. If a student cannot perceive a sense of security, sympathy, empathy, and approachability in school, they will be reluctant to speak out even if they are seriously bullied.[26] If they have been in such a harsh environment for a long time, they will want to resort to; substance use, dropping out, or even suicide attempt, to escape.[33] These conclusions all verify the stress-buffering theory[40] and point to the importance of school and teacher support in suicide prevention.

The anti-bullying policy has been verified by multiple studies to be an effective preventive measure against SA.[25,33] Hatzenbuehler and Keyes's research showed that the prevalence of SA among sexual minority students in schools with anti-bullying policies has dropped to 17%. Schools without the policy have a SA rate of 31%. In addition, the research also revealed that the suicide rate of heterosexual teenagers will also be alleviated by implementing this policy. However, the policy has no significant effect on bisexual youth, indicating that the protective factors of homosexuality may be distinguished from those of bisexuality. The same policy may not be appropriate for all sexual minorities.

In summary, we found that both risk and protective factors for SA stem directly from the environments in which students grew up: family, school, and the internet.[33,35,39] The same environmental factors can be either positive or negative factors. Therefore, our forecasting strategies should focus on these environmental factors to maximize the conversion of negative factors into favorable ones. The original actions of Primary Prevention among peers (school and internet), parents (family), and professionals (education, health, leisure supervision, etc.) should be developed. Awareness should be raised in a targeted and documented manner, to understand the greater complexity of the youth process and the nature of psychological suffering by LGB youth. Secondary preventive actions should also be built in to prevent these young people from attempting suicide, where the risks to which they are exposed are greater than that of their heterosexual peers. The connection between schools and families should be promoted to raise awareness among young people about the facts of sexual minority stigmatization and the consequences in terms of psychological suffering endured by many LGB youth.

Strength

Our understanding is that this review is the first to focus on the risk and protective factors of SA in sexual minority youth. The main strength of this study is to summarize all associated factors for SA among sexual minority youth and

contextualized 3 different categories, finally classified as risk factors and protective factors. In addition, this literature review summarizes the risk and protective factors of SA in different countries or regions through different perspectives in epidemiology, sociology, cultural, and political beliefs across multiple disciplines. These findings can provide a strong theoretical basis for subsequent policy formulation and implementation. Risk factors associated with SA in the sexual minority were summarized in gender, ethnic minorities, childhood trauma, psychiatric symptoms, and addictive behaviors. Considering the higher prevalence of SA in girls, special attention and different prevention strategies should be developed for gays and lesbians.

Limitation

However, this review also has several limitations. The first is that the number of studies included is small. Although many studies have reported on the suicide of sexual minority youth, most of them have focused on the prevalence of suicidality rather than related factors. Moreover, most studies were concentrated in North America. Only a few have focused on Europe, no relevant research could be found in Asia or Africa. Most of the included studies were cross-sectional studies, with a lack of longitudinal studies. Furthermore, some studies researched the associated factors but did not perform multiple logistic regressions. This resulted in it being impossible to obtain important evidence in support of risk or protective factors of SA in Africa and Asia. Finally, different studies have different definitions of associated factors, and standards cannot be unified. In our review, we collected the identified risk or protective factors of SA from studies that only focused on sexual minorities. A large part of the published studies do not compare risk factors among sexual minorities and heterosexual participants but considered sexuality as a specific risk factor.

Conclusions

Whereas risk factors associated with SA have been found (female, ethnic minorities, trauma, psychiatric, and addiction dimension), more specific risk factors related to sexuality have been searched according to intimate and public environments. Risk factors for sexual minority youth are: early coming out, being unacceptable by families, being dissatisfied with sexual minority friendships, too few friends, physical abuse, sexual abuse, and bullying. The protective factors of SA are feeling safe at school, teacher support, anti-bullying policy, and other adult support. In both LGB and heterosexual youth, it is essential to build recommendations to develop relevant tools including peers, parents, and professionals, whose support plays a crucial role. Effective preventive measures among sexual minority youth need to be developed and implemented. Societal-level anti-stigma interventions are needed to reduce the risk of victimization and awareness should be raised among family and friends.

Conflict of Interest

The authors declare that they have no conflict of interest.

Acknowledgments

We sincerely thank Helene RAFFIN, Aminata ALI, and Camille PREVOST for their helpful input on this article. And we also thank David Gregory BARNS to provide proofreading for this manuscript.

Author disclosure statement

The authors have no financial or proprietary interests in any material discussed in this article.

Sources of funding

This research did not receive any specific funding.

Ethical considerations

1. The corresponding author has the consent of all the authors for the submission and publication of the article that was submitted for review.
2. All the authors have substantially contributed to the article, without omitting any person, and the contribution of each author is specified.
3. The article is an original document that has not been previously published and has not been simultaneously submitted for review to another journal.
4. The article does not contain any unpublished material copied from other authors without their consent.
5. All data included in the article that come from previous studies have been referenced, regardless of whether or not they are from the same authors. If an article submitted for review is a sub-analysis of previously published project results, the publication must always be cited.

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Table A1 Quality assessment of the studies.

Author	Selection				Comparability		Outcome		Total
	Representativeness of the sample	Sample size	Non respondents	Ascertainment of the exposure	Controls for the most important factor	Control for any additional factor	Assessment of the outcome	Statistical test	
Huphries et al. 2020	1	1	1	2	1	1	1	1	9
Busby et al. 2020	1	0	1	2	1	1	1	1	8
Turpin et al, 2020	1	1	1	2	1	1	1	1	9
Rimes et al, 2019	1	1	0	2	0	0	1	1	6
Toomey et al, 2019	1	1	0	2	1	1	2	1	9
McDermott et al, 2017	1	1	0	2	0	0	0	1	4
Taliaferro et al, 2017	1	1	1	2	1	1	1	1	9
Duong et al, 2014	1	1	1	2	1	1	1	1	9
Hatzenbuehler et al, 2013	1	1	1	1	1	0	2	1	8
Mustanski et al, 2013	1	1	1	2	1	1	2	1	10
Goodenow et al, 2006	1	1	1	2	1	1	2	1	10
Heerngen et al, 2000	1	1	0	2	1	1	2	1	9