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Regular Article

The onset of mental health disparities in sexual minority and majority youth: evidence from the UK Millennium Cohort Study

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Abstract

Decades of research shows that sexual minority youth (SMY) display heightened risk for mental health problems, although the onset of such disparities remains unclear. The Millennium Cohort Study is the largest nationally representative longitudinal study of adolescents in the United Kingdom. In this study, participants ($N = 10{,}047$, 50% female) self-reported their sexual identity at age 17 and had parent-reported mental health data, from the Strengths and Difficulties Questionnaire, reported across five waves at ages 5, 7, 11, 14, and 17. Multilevel linear spline models, stratified by sex, were used to examine mental health trajectories between sexual identity groups (completely heterosexual, mostly heterosexual, SMY). SMY showed heightened peer problems from the baseline assessment at age five, increasing over time, and heightened emotional problems from age 11, increasing over time. Mostly heterosexual youth showed heightened emotional problems at age 11 in males, and at age 17 in females. Findings are discussed in light of the literature on minority stress and gender conformity in youth. The use of parent-reported mental health data means that estimates are likely to be conservative. We conclude that interventions supporting SMY should start early and be available throughout adolescence.

Keywords: Adolescence; mental health; multilevel linear spline models; sexual minority youth

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Introduction

Despite societal improvements in the rights and acceptance of sexual minority groups over recent years, research continues to show that sexual minority youth (SMY) display heightened risk for poor mental health outcomes (Meyer et al., 2021), and health-risk behaviors, including self-harm and illegal substance use (Amos et al., 2020). More research is needed to understand the onset of disparities in mental health outcomes, in order to motivate and inform intervention efforts designed to prevent the development of problems and to promote more inclusive environments.

Over many years, research has shown that SMY are at higher risk of developing mental health problems (Eisenberg & Resnick, 2006). A meta-analysis of 24 studies, published between 1998–2007, found that compared to heterosexual youth, SMY showed higher depressive symptoms (standardized mean difference, $d = .33$), were three times more likely to attempt suicide, and four times more likely to present with severe suicide attempts requiring medical attention (Marshal et al., 2011). Unfortunately, these disparities have been shown to persist into adulthood, as one nationally representative US longitudinal study, which included four waves of data collected between ages 16 and 29 years, found that SMY showed persistently higher rates of depressive symptoms and suicidality into adulthood (Marshal et al., 2013). Regarding potential mechanisms, an extensive review found that peer victimization related to sexual orientation and gender identity was a major factor associated with risk for poor mental health outcomes in SMY (Collier et al., 2013).

The minority stress model is widely regarded as a leading theory explaining why sexual minorities are at increased risk of developing mental health problems (Meyer, 2003). The model posits that sexual minorities experience social stress from stigma, prejudice, and discrimination, which lead to internalized processes, such as expectations of rejection, concealment of identity, and internalized homophobia, resulting in poor mental health. The model also describes ameliorative coping factors, such as supportive interpersonal relationships, which can help to reduce risk (Meyer, 2003). Research in support of this model has found that SMY experience higher rates of both peer and parental abuse (Friedman et al., 2011), and that protective factors include family connectedness, school safety (Eisenberg & Resnick, 2006), and positive peer relationships (Dorrell et al., 2021).

According to the minority stress model, the onset of mental health problems in SMY may coincide with the onset of same-sex attraction, which could be experienced as incongruous within heteronormative society. Previous research using retrospective accounts from sexual minorities found that first awareness of same-sex attraction began at around age ten, while self-identification occurred later, at around age 16 (Graham et al., 2011). More recent research suggests that younger generations show accelerated milestone pacing in sexual identity development compared to older generations, while same-sex attraction may

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occur at a similar age, self-identification and disclosure to friends and family may occur earlier (Bishop et al., 2020), with potentially negative consequences for mental health (Russell & Fish, 2019).

Despite extensive research highlighting disparities in mental health outcomes across sexual identity groups, the onset of such disparities remains unclear. Only a handful of studies have attempted to investigate this using prospective longitudinal designs, which motivated the current study. One study in the Netherlands ($N = 1{,}738$) investigated this question using five waves of data collected between ages 11 to 22, finding that lesbian and bisexual females (self-reported at ages 19 or 22) showed elevated depressive symptoms from the baseline assessment at age 11, with disparities increasing over time (La Roi et al., 2016). In contrast to other research, no differences were observed in males, which may have been due to the small frequency of males reporting a gay or bisexual identity ($n = 58$, 7.4%), resulting in low power to detect effects.

A larger study in England ($N = 4{,}828$) observed elevated depressive symptoms in SMY (self-reported at age 16) from the baseline assessment at age ten, with disparities increasing in adolescence and persisting up to age 21, and no interaction observed by sex (Irish et al., 2019). The current study adds to the literature in three ways by: (i) using a more recent and larger nationally representative sample of UK adolescents, (ii) including earlier waves of assessment from age five, and (iii) investigating multiple mental health outcomes, including both internalizing and externalizing symptoms.

A few studies have investigated the onset of peer victimization in SMY (Martin-Storey & Fish, 2019; Mittleman, 2019), which is considered a mediating factor for poor mental health (Birkett et al., 2015). In a US longitudinal study ($N = 952$), participants self-reported sexual attraction at age 15 and experiences of peer victimization at ages 9, 10, 11, 12, and 15 (Martin-Storey & Fish, 2019). Peer victimization was higher among those reporting same-sex attraction compared to those reporting only opposite-sex attraction from the baseline assessment at age nine, persisting throughout adolescence.

Similar results were found in a larger US study ($N = 3{,}022$), where participants self-reported sexual attraction at age 15, with various other self- and parent-reported outcomes at ages 5, 9, and 15 (Mittleman, 2019). Participants who reported same-sex attraction at age 15, showed elevated peer victimization at age 9, and elevated internalizing symptoms at age 15. It was concluded that disparities in peer victimization emerged somewhere between ages 5 and 9, while internalizing symptoms emerged somewhere between ages 9 and 15, although the specific onset was unclear, due to the wide time-lapse between assessments.

Sexual identity has been assessed in various different ways, which can make comparisons across studies difficult. In the current study, sexual identity was assessed by self-report using a five-point scale ranging from "completely straight" to "completely gay or lesbian," with "bisexual" reflecting the middle point, and "mostly straight" or "mostly gay or lesbian" in between. Other researchers have supported this method, as sexual orientation is thought to exist along a continuum (Kinsey et al., 2003; Savin-Williams & Vrangalova, 2013). However, research tends to compare effects between heterosexuals versus any other group, which are considered to reflect "sexual minority" status, perhaps due to small sample sizes (Savin-Williams & Vrangalova, 2013).

However, research suggests that a "mostly heterosexual" identity reflects a qualitatively meaningful group, distinct from completely heterosexual and bisexual, in that individuals feel mostly attracted to people of the opposite sex, while experiencing some degree of same-sex attraction (Savin-Williams & Vrangalova, 2013). A larger proportion of the population have been found to report a mostly heterosexual identity compared to both bisexual and homosexual (Savin-Williams & Vrangalova, 2013), and this group shows higher risk for poor mental and other health outcomes compared to completely heterosexuals, although lower than bisexuals (Vrangalova & Savin-Williams, 2014), which supported our intention to analyze this group distinctively.

The current study

The Millennium Cohort Study (MCS) is an ongoing, nationally representative UK birth cohort, which has completed seven waves of data collection at ages 9 months (MCS1), and 3 (MCS2), 5 (MCS3), 7 (MCS4), 11 (MCS5), 14 (MCS6), and 17 (MCS7) years (Fitzsimons et al., 2020) – although ages vary slightly at each wave, thus reflecting an average. In this study, we investigated mental health trajectories, with data collected at five consecutive waves from MCS3 – MCS7, using the parent-reported Strengths and Difficulties Questionnaire (SDQ: Goodman, 1997), which covers various internalizing and externalizing outcomes. Parent-report was used because self-reported mental health outcomes were collected using different measures at different ages in MCS, starting from age 11, which was not useful for investigating early-onset mental health disparities. Between-group differences were explored for three sexual identity groups (completely heterosexual, mostly heterosexual, SMY), which was self-reported at age 17. The WHO definition of adolescence was used, reflecting the ages between 10 and 19 (WHO, 2023).

Hypotheses

1. Compared to completely heterosexual youth, SMY will show heightened peer problems during childhood, which are likely to persist and increase during adolescence, although specific timings are unclear.
2. Compared to completely heterosexual youth, SMY will show heightened emotional problems during early adolescence which will increase over time, although specific timings are unclear.
3. Compared to completely heterosexual youth, *mostly* heterosexual youth will show elevated mental health problems, although levels will be lower than SMY and may occur later.

Method

Participants

At MCS1 (2001–02), 18,818 infants were recruited through near universal Child Benefit records, forming a representative sample of babies born in the UK at the turn of the century. A stratified, clustered, random sample design was used, which oversampled from disadvantaged areas and those with a high density of ethnic minority populations (Fitzsimons et al., 2020). The baseline representative sample were 49% female and 83% ethnically White. A small household boost was conducted at MCS2 (2003-04), to recruit families who were previously missed, making the total sample of cohort members 19,519.

The current study analyzed data from 10,047 cohort members who completed data collection at MCS7 (2018–19) and who had no missing data on sex at baseline, or self-reported sexual identity at MCS7. We applied analytic sample design and attrition weights to restore sample representativeness (Fitzsimons et al., 2020). For example, in the current study, there were slightly more female

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than male participants, but this estimate was restored to 50% after weights were applied. The weighted analysis sample also had a similar proportion of White (84%) and ethnic minority (16%) participants compared to the baseline representative sample.

Measures

Sexual identity was assessed by self-report at MCS7, by asking: "Which of the following best describes how you currently think of yourself?": (1) "Completely straight" ($n = 7{,}885$; 79%); (2) "Mostly straight" ($n = 1{,}099$; 11%); (3) "Bisexual" ($n = 656$; 7%); (4) "Mostly gay or lesbian" ($n = 90$; 1%); (5) "Completely gay or lesbian" ($n = 160$; 2%); (6) "Other" ($n = 157$; 2%). Participants who selected 3, 4, 5, or 6 were grouped together to reflect the SMY group ($n = 1{,}063$; 11%), due to the small frequencies within certain categories and in order to be comparable with other studies. We use the term "heterosexual" rather than "straight" herein, to better reflect the literature.

Depressive symptoms were assessed by self-report at MCS7 using the Kessler-6 (Kessler et al., 2010), which is a 6-item measure, designed to screen for probable mental illness. Participants were asked to rate how often, in the past 30 days, they had felt each symptom (e.g., "nervous," "hopeless," "restless or fidgety," "so depressed that nothing could cheer you up," "that everything was an effort," "worthless"), using a 5-point Likert scale. Across the sample, 16% met criteria for severe psychological distress, defined as scores of 13 or above (Kessler et al., 2003).

Self-harm was assessed by self-report at MCS7. Participants were asked whether, during the last year, they had hurt themselves on purpose in any of the following ways (1 = "cut or stabbed yourself," 2 = "burned yourself," 3 = "bruised or pinched yourself," 4 = "taken an overdose of tablets," 5 = "pulled out your hair," 6 = "hurt yourself in some other way"). Across the sample, 2,289 participants (24%) reported at least one self-harm behavior.

Suicide attempt was assessed by self-report at MCS7. Participants were asked whether they had ever hurt themselves on purpose in an attempt to end their life. Answer categories were "Yes," "No," "Do not know," and "Prefer not to say." Lifetime suicide attempt reflected any participant who answered yes to this question, which was 725 participants in total (7% of the sample).

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) was used to assess mental health across childhood and adolescence. It was reported by the main parent (98% mothers) at each wave from ages 5 to 17. The SDQ is widely used and shows good reliability and stability over time (Becker et al., 2015), making it useful for longitudinal research. The SDQ also shows strong validity, as scores on each subscale collected during preschool have been shown to predict the development of mental health disorders during adolescence with good specificity (Nielsen et al., 2019). In the current study, four negative outcomes were assessed, reflecting an average of five items, each reported on a 4-point Likert scale; (i) Emotional problems (e.g., "Often unhappy, downhearted"), (ii) Peer problems (e.g., "Picked on or bullied by other children"), (iii) Conduct problems (e.g., "Often lies or cheats"), and (iv) Hyperactivity-inattention (e.g., "Easily distracted, concentration wanders"). The first two outcomes are more consistent with internalizing symptoms, while the latter two reflect more externalizing symptoms. A score for "total difficulties" was also assessed, as an average of all 20 items.

Parent depressive symptoms were assessed using the Kessler-6 (Kessler et al., 2010), reported by the main parent at each wave from ages 5 to 17. The continuous score was used and added to longitudinal models as a time variant predictor, as previous research has shown that parent reports of children's mental health can be affected by parent's own mental health (Conrad & Hammen, 1989).

Baseline covariates

The following baseline covariates, previously shown to predict adolescent mental health (Patalay & Fitzsimons, 2016), which capture demographic characteristics and early childhood environmental factors, were included: (i) ethnicity (0 = White, 1 = other non-White ethnic minority (16%)), (ii) household poverty (0 = "80% highest income," 1 = "20% lowest income"), (iii) single-parent household (0 = "two parents," 1 = "single parent" (18%)), and (iv) parental education (0 = "university degree or above," 1 = "less than university degree" (65%)). Variables from MCS2 (age 3) were used, as this was the baseline assessment for those recruited as part of the MCS2 household boost, although data were updated from MCS1 (9 months) if missing.

Data analysis

MCS data are freely available and were downloaded from the UK Data Service website (https://ukdataservice.ac.uk/). All analyses were conducted in Stata version 18. Analyses were not preregistered, but the analytic code is available on the Open Science Framework (https://osf.io/3wpv9/). Ethical approval for the study was obtained from the National Research Ethics Service, North East – York (REC ref: 17/NE/0341).

Cross-sectional, between-group differences in (i) baseline covariates, (ii) parent-reported mental health outcomes (age five), and (iii) self-reported mental health problems (age 17), were estimated using multinomial logistic regression, with completely heterosexual as the reference group. The mental health outcome models also controlled for confounding by including the baseline covariates.

Following this, multilevel linear spline models, which account for possible nonlinear growth in outcomes over time (Howe et al., 2016), were used to estimate parent-reported mental health trajectories across four "knot points," corresponding to each of the relevant gaps in data collection (1 = "from age five to seven," 2 = "from age seven to eleven," 3 = "from age eleven to fourteen," 4 = "from age fourteen to seventeen"). This method is more accurate for identifying specific periods of acceleration or deceleration in outcomes over time, compared to traditional multilevel modeling, which averages across time (Howe et al., 2016).

Analyses were stratified by sex at baseline (male, female), in order to examine the interplay between sex and sexual identity, which has been called for in the literature (Wittgens et al., 2022), and to consider previously observed sex differences in mental health trajectories, including the greater prevalence and earlier onset of internalizing symptoms in females (Scott et al., 2018), and greater externalizing symptoms in males (Becker et al., 2015).

Ten multilevel linear spline models were estimated, for each of the five outcomes (total difficulties, emotional problems, peer problems, conduct problems, hyperactivity-inattention), stratified by sex (male, female), with maximum likelihood estimation and robust standard errors, allowing intercepts and slopes to vary across individuals. An adjusted significance level ($p < .01$) was used to account for the large number of models tested. Time variant

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predictors included parental depressive symptoms and single-parent household. Time invariant predictors were ethnicity, childhood poverty, parental education, and sexual identity group (completely heterosexual, mostly heterosexual, SMY), due to data availability. Predicted marginal means (averages at each knot point) were plotted to depict mental health trajectories across groups, with covariates set at their reference category.

Missing data

The extent of item-level missing data was minimal and was dealt with using full information maximum likelihood in the multilevel models, where at least one data point for each time variant predictor or outcome was observed. The largest degree of missing data was for parent-reported total difficulties, which ranged from 4%–15% across waves, although 87% of the sample had at least four data points observed, which was high. Data were treated as missing at random (Rubin, 1976), supported by the fact that our near fully observed baseline covariates (e.g., sex, ethnicity, household poverty, parent education) were able to predict missingness on these variables.

Sensitivity analyses

Research suggests that gender minority youth, reflecting individuals whose gender identity or expression is different from their sex assigned at birth, are at even greater risk of poor mental health outcomes compared to SMY (Jadva et al., 2023). Therefore, although not the focus of the current study, we conducted sensitivity analyses by re-running models removing gender minority youth ($n = 115$; 1% of the total sample), in order to examine whether results remained unchanged.

Gender identity was assessed by self-report at age 17, by asking: "Which of the following best describes how you think of yourself?" (1 = "Male"; 2 = "Female"; 3 = "Other"; 4 = "Androgynous"; 5 = "Gender fluid"; 6 = "Non-binary"). Gender minority youth was operationalized as those who answered differently from their sex reported at baseline (male, female). Most of these were in the SMY group (83%), but some were in the completely heterosexual (10%), or mostly heterosexual group (7%).

Results

Descriptive statistics

Table 1 shows descriptive statistics (proportions and means) and group differences (risk ratios) for the baseline covariates, parent-reported mental health outcomes at age five, and self-reported mental health problems at age 17. There were minimal significant group differences at baseline or age five. Compared to completely heterosexual, the mostly heterosexual (male only) group were less likely to have a parent with no university degree (i.e., they had a higher level of education), and incidence of parental depression was slightly higher in the SMY (female only) group. Regarding the parent-reported mental health outcomes, SMY (both males and females) showed higher peer problems at age five.

However, large group differences were observed for the self-reported mental health outcomes at age 17. In males, compared to completely heterosexual, the mostly heterosexual group showed higher incidence of self-harm (RR = 2.87), attempted suicide (RR = 6.34), and depression (RR = 3.01). The male SMY group also showed higher incidence of self-harm (RR = 4.82), attempted suicide (RR = 5.77), and depression (RR = 4.88). In females, compared to completely heterosexual, the mostly heterosexual group showed higher incidence of self-harm (RR = 2.45), and depression (RR = 2.18), but not attempted suicide. While the female SMY group showed higher incidence of self-harm (RR = 6.58), depression (RR = 4.41), and attempted suicide (RR = 3.62). Results did not change meaningfully in sensitivity analyses after removing gender minority youth (Supplementary Table 1).

Mental health trajectories

Parameter estimates for the 10 multilevel linear spline models are displayed in Table 2 (for males) and Table 3 (for females). Results are discussed for each outcome in turn, with trajectories across groups depicted by marginal predicted means across time (Figures 1–5). Results were largely the same in our sensitivity analyses that removed gender minority youth (Supplementary Tables 2 and 3) – any notable differences are reported here in the main text.

Total difficulties

Total difficulties increased in males overall at age seven ($B = 0.13$) and decreased at age 17 ($B = -0.29$). Group differences were observed at age 11, with increasing total difficulties in both mostly heterosexual ($B = 0.15$) and SMY males ($B = 0.16$). However, both of these estimates reduced to the null in sensitivity analyses. Total difficulties increased in females overall at age 14 ($B = 0.13$) and decreased at age 17 ($B = -0.11$). Group differences were observed with increasing total difficulties in SMY females at age seven ($B = 0.32$) and age 11 ($B = 0.13$), with the latter reducing to the null in sensitivity analyses. Trajectories for total difficulties are depicted in Figure 1.

Emotional problems

Emotional problems increased in males overall at age seven ($B = 0.06$), and age 11 ($B = 0.04$), and then decreased at age 14 ($B = -0.03$), and age 17 ($B = -0.05$). Group differences were observed with emotional problems increasing further at age 11 in mostly heterosexual ($B = 0.11$) and SMY males ($B = 0.08$), and then decreasing at age 14 in mostly heterosexual males ($B = -0.10$) but increasing in SMY males at age 17 ($B = 0.14$). In females, emotional problems increased overall at age 7 ($B = 0.07$), age 11 ($B = 0.07$), and age 14 ($B = 0.08$). Group differences were observed with emotional problems increasing further in SMY females at age 11 ($B = 0.06$), age 14 ($B = 0.13$), and age 17 ($B = 0.12$), with the first result reducing to the null in sensitivity analyses. Emotional problems increased in mostly heterosexual females at age 17 only ($B = 0.08$). Trajectories for emotional problems are depicted in Figure 2.

Peer problems

Peer problems increased in males overall at age 7 ($B = 0.04$), age 11 ($B = 0.02$), and age 14 ($B = 0.12$). Group differences were observed with SMY males showing a further increase at age 11 ($B = 0.12$). In females, peer problems increased overall at age 11 ($B = 0.02$), age 14 ($B = 0.09$), and age 17 ($B = 0.04$). Group differences were observed with SMY females showing a further increase at age 7 ($B = 0.11$), age 11 ($B = 0.05$), and age 14 ($B = 0.07$), with the latter two estimates reducing to the null in sensitivity analyses. No significant differences in peer problem trajectories were observed for mostly heterosexual males or females. Trajectories for peer problems are depicted in Figure 3.

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Table 1. Descriptive statistics (proportions and means), and group differences (risk ratios) for baseline covariates, parent-reported mental health at age five, and self-reported mental health at age 17 ($N = 10,047$)

	Males ($N = 4,896$)			Females ($N = 5,151$)		
	Completely heterosexual	Mostly heterosexual	SMY	Completely heterosexual	Mostly heterosexual	SMY
Baseline covariates						
Ethnic minority	15.8%	15.9% 1.00	10.1% 0.59	16.8%	17.4% 1.04	13.6% 0.78
Child poverty	20.0%	16.6% 0.79	26.3% 1.43	19.8%	23.4% 1.24	20.7% 1.05
Single parent	18.4%	15.8% 0.83	13.7% 0.70	16.9%	25.2% 1.66	20.1% 1.24
Parent no degree	65.6%	53.6% 0.61**	71.4% 1.31	67.7%	58.5% 0.67	62.5% 0.80
Parent depression	2.2%	2.4% 1.08	2.1% 0.95	2.3%	2.5% 1.08	5.7% 2.50**
Parent-report mental health (age five)						
Total difficulties	7.26	7.29 1.01	8.54 1.03	6.40	5.69 0.98	6.69 1.02
Emotional problems	1.29	1.24 0.95	1.39 0.98	1.43	1.20 0.91	1.31 0.99
Peer problems	1.11	1.21 1.05	1.79 1.20***	0.93	0.92 1.03	1.15 1.16***
Conduct problems	1.50	1.48 1.02	1.76 1.03	1.25	1.12 0.97	1.40 1.07
Hyperactivity	3.41	3.36 1.02	3.73 1.05	2.80	2.48 0.97	2.89 1.01
Self-report mental health (age 17)						
Self-harm	16.5%	34.5% 2.87***	46.6% 4.82***	20.6%	32.9% 2.45***	59.8% 6.58***
Attempted suicide	2.5%	15.9% 6.34***	12.7% 5.77***	7.7%	10.3% 1.21	26.5% 3.62***
Depression	7.9%	18.1% 3.01***	26.5% 4.88***	15.4%	33.0% 2.18***	46.1% 4.41***
N (%)	4168 (85.1)	405 (8.3)	323 (6.6)	3717 (72.2)	694 (13.5)	740 (14.4)

Note. Completely heterosexual was the reference group. Sample design and attrition weights were applied. Risk ratios from multinomial regression models are presented in italics. Baseline covariates were included in the mental health models at age 5 and 17. SMY = Sexual minority youth. **p < .01. ***p < .001.

Conduct problems

Conduct problems decreased in males overall at age 7 ($B = -0.06$), age 11 ($B = -0.02$), and age 17 ($B = -0.07$). Group differences were observed at age 14 only, with mostly heterosexual males showing decreasing conduct problems ($B = -0.07$). In females, conduct problems decreased overall at age seven ($B = -0.05$), increased slightly at age 14 ($B = 0.02$), and then decreased at age 17 ($B = -0.07$). No significant group differences were observed in females. Trajectories for conduct problems are depicted in Figure 4.

Hyperactivity-inattention

Hyperactivity-inattention increased in males overall at age seven ($B = 0.09$), and then decreased at age 11 ($B = -0.08$), age 14 ($B = -0.05$), and age 17 ($B = -0.17$). SMY males showed a further decrease at age 14 ($B = -0.10$). In females, hyperactivity-inattention decreased overall at age 11 ($B = -0.09$), age 14 ($B = -0.05$), and age 17 ($B = -0.12$). No significant group differences were observed in females. Trajectories for hyperactivity-inattention are depicted in Figure 5.

Discussion

The onset of disparities in mental health outcomes between sexual minority and majority youth was investigated in MCS, which is the largest nationally representative longitudinal study of adolescents in the UK. It was found that SMY showed heightened risk for parent-reported peer problems from the baseline assessment at age five in both males and females, which increased further above the reference group at ages 7, 11, and 14 in females, and at age 11 in males. Heightened risk for parent-reported emotional problems was also observed in SMY, with onset from age 11 in both males and females, and a further increase at ages 14 and 17 in females, and at age 17 in males. Few group differences were observed for externalizing outcomes, except for a slight decrease in conduct problems in mostly heterosexual males at age 14, and a slight decrease in hyperactivity-inattention in SMY males at age 14.

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Table 2. Results from multilevel linear spline models for parent-reported mental health trajectories in males

	Total difficulties		Emotional problems		Peer problems		Conduct problems		Hyperactivity-inattention	
	B	s.e.	*B*	s.e.	*B*	s.e.	*B*	s.e.	*B*	s.e.
Intercept	4.47***	0.26	0.46***	0.10	0.38***	0.10	1.31***	0.09	2.26***	0.13
Group										
Mostly heterosexual	0.30	0.82	0.05	0.32	0.38	0.32	−0.10	0.31	−0.08	0.41
SMY	0.52	0.81	0.01	0.35	0.34	0.33	0.09	0.30	0.03	0.44
Age splines										
Age 5–7	0.13***	0.04	0.06***	0.02	0.04***	0.02	−0.06***	0.01	0.09***	0.02
Age 7–11	−0.03	0.02	0.04***	0.01	0.02**	0.01	−0.02***	0.01	−0.08***	0.01
Age 11–14	0.03	0.03	−0.03***	0.01	0.12***	0.01	−0.01	0.01	−0.05***	0.01
Age 14–17	−0.29***	0.03	−0.05***	0.01	0.00	0.01	−0.07***	0.01	−0.17***	0.01
Group-by-age										
Mostly*Age 5–7	−0.01	0.13	−0.01	0.05	−0.03	0.05	0.02	0.05	0.02	0.07
SMY*Age 5–7	0.13	0.13	0.02	0.06	0.03	0.06	0.01	0.05	0.07	0.07
Mostly*Age 7–11	0.15**	0.07	0.11***	0.03	0.05	0.03	0.00	0.02	0.00	0.04
SMY*Age 7–11	0.16**	0.08	0.08**	0.03	0.11***	0.04	0.00	0.03	−0.01	0.03
Mostly*Age 11–14	−0.17	0.10	−0.10**	0.04	0.01	0.04	−0.07**	0.03	−0.02	0.05
SMY*Age 11–14	0.02	0.13	0.04	0.05	0.02	0.05	0.03	0.04	−0.10**	0.05
Mostly*Age 14–17	0.01	0.09	0.03	0.05	−0.01	0.04	0.00	0.03	−0.01	0.04
SMY*Age 14–17	0.13	0.12	0.14***	0.05	0.03	0.05	−0.07	0.05	0.02	0.05
Covariates										
Ethnic minority	0.50***	0.17	0.14***	0.05	0.34***	0.05	−0.04	0.05	−0.03	0.08
Child poverty	1.70***	0.20	0.30***	0.06	0.38***	0.06	0.46***	0.06	0.59***	0.09
Parent no degree	1.58***	0.13	0.21***	0.04	0.30***	0.04	0.36***	0.04	0.69***	0.06
Parent depression	0.28***	0.01	0.10***	0.00	0.06***	0.00	0.07***	0.00	0.07***	0.01
Single parent	0.23	0.12	0.06	0.04	0.13***	0.04	0.04	0.04	0.04	0.05
Observations	19,936		20,002		20,004		20,016		19,972	
Number of groups	4,782		4,787		4,790		4,788		4,784	

Note. Completely heterosexual was the reference group. Sample and attrition weights were applied to models at the observational level. SMY = sexual minority youth; Mostly = mostly heterosexual. **$p < .01$. ***$p < .001$.

Results supported a previous study, which found elevated self-reported depressive symptoms in SMY females at age 11, increasing throughout adolescence (La Ro et al., 2016). However, in the current study, SMY males also showed elevated emotional problems at ages 11 and 17, which could have been due to greater power in the current study. Although it is unclear exactly when disparities in emotional problems emerged, it appeared somewhere between the ages of 7 and 11. According to the minority stress model, feelings of same-sex attraction can trigger emotional difficulties, due to internalized processes, such as fear of rejection and internalized homophobia (Meyer, 2003). Previous research has found that first sexual attraction often occurs around the age of 10 (Graham et al., 2011), which could explain the observed increase in emotional problems at age 11. Other research suggests that reasons for persistent emotional problems in SMY could be related to difficulties processing, accepting, and understanding one's sexual identity (Williams et al., 2023).

Findings for peer problems were similar to previous research, as onset was earlier than emotional problems, occurring during childhood. Two previous studies found elevated peer victimization in SMY from age nine onward (Birkett et al., 2015; Mittleman, 2019). We found elevated parent-reported peer problems in SMY from age five onward, which was earlier than previously observed. Qualitative research using retrospective accounts from sexual minority adults about their early experiences has documented the notion of "feeling different" to same-sex peers during childhood from around age eight, with reasons cited often including awareness of gender nonconformity and feelings of gender inadequacy (Savin-Williams & Cohen, 2007). Gender conformity, such as choosing gender-typical toys and same-sex play mates, is prevalent during preschool years (Martin et al., 2013). Therefore, it is likely that parents would be aware of gender nonconforming behaviors by age five, which could explain our results. Gender nonconformity has also been associated with increased risk for childhood parental abuse (Roberts et al., 2012), which could pose an additional risk factor for the onset of mental health difficulties in SMY, although not investigated in this study.

A novel feature of the current study was the ability to distinguish between mostly and completely heterosexual youth.

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Table 3. Results from multilevel linear spline models for parent-reported mental health trajectories in females

	Total difficulties		Emotional problems		Peer problems		Conduct problems		Hyperactivity-inattention	
	B	s.e.	*B*	s.e.	*B*	s.e.	*B*	s.e.	*B*	s.e.
Intercept	4.17***	0.25	0.57***	0.11	0.40***	0.09	1.11***	0.08	2.04***	0.13
Group										
Mostly heterosexual	−0.15	0.59	−0.45	0.24	0.03	0.27	0.07	0.19	0.29	0.30
SMY	−1.18	0.66	−0.31	0.25	−0.35	0.23	−0.14	0.22	−0.46	0.40
Age splines										
Age 5–7	0.03	0.04	0.07***	0.02	0.02	0.01	−0.05***	0.01	0.00	0.02
Age 7–11	0.00	0.02	0.07***	0.01	0.02***	0.01	−0.01	0.01	−0.09***	0.01
Age 11–14	0.13***	0.03	0.08***	0.01	0.09***	0.01	0.02**	0.01	−0.05***	0.01
Age 14-17	−0.11***	0.03	0.03	0.02	0.04***	0.01	−0.07***	0.01	−0.12***	0.01
Group-by-age										
Mostly*Age 5–7	−0.02	0.09	0.07	0.04	0.00	0.04	−0.02	0.03	−0.08	0.05
SMY*Age 5–7	0.32***	0.11	0.05	0.04	0.11***	0.04	0.05	0.04	0.13	0.07
Mostly*Age 7-11	−0.01	0.05	−0.03	0.02	0.00	0.02	−0.01	0.02	0.04	0.02
SMY*Age 7–11	0.13**	0.06	0.06**	0.02	0.05**	0.02	0.01	0.02	0.01	0.03
Mostly*Age 11–14	0.01	0.07	0.02	0.03	0.03	0.03	0.00	0.02	−0.05	0.03
SMY*Age 11–14	0.14	0.08	0.13***	0.04	0.07**	0.03	−0.02	0.02	−0.05	0.03
Mostly*Age 14–17	0.07	0.07	0.08**	0.04	−0.01	0.03	−0.02	0.02	0.01	0.03
SMY*Age 14–17	0.14	0.09	0.12***	0.04	0.01	0.03	−0.04	0.03	0.05	0.03
Covariates										
Ethnic minority	0.67***	0.15	0.11**	0.05	0.35***	0.04	0.02	0.04	0.16**	0.07
Child poverty	1.49***	0.18	0.22***	0.06	0.37***	0.05	0.41***	0.05	0.45***	0.08
Parent no degree	1.34***	0.11	0.18***	0.04	0.27***	0.03	0.27***	0.03	0.60***	0.05
Parent depression	0.26***	0.01	0.10***	0.00	0.05***	0.00	0.05***	0.00	0.07***	0.00
Single parent	0.44***	0.12	0.14***	0.05	0.08**	0.04	0.07**	0.03	0.18***	0.05
Observations	21,161		21,221		21,223		21,233		21,199	
Number of groups	5,024		5,026		5,026		5,028		5,026	

Note. Completely heterosexual was the reference group. Sample and attrition weights were applied to models at the observational level. SMY = sexual minority youth; Mostly = mostly heterosexual. $^{**}p < .01$. $^{***}p < .001$.

While there was clear evidence of heightened risk for concurrent, self-reported, mental health problems in mostly heterosexual youth at age 17, fewer disparities were reported by parents throughout development, with the exception of heightened emotional problems at age 11 in males, and age 17 in females. Some research suggests that mostly heterosexual males report an earlier awareness of same-sex attraction than females, which could explain the earlier observation of parent-reported emotional problems in males (Savin-Williams & Vrangalova, 2013). However, it is unclear why emotional problems returned to the reference level in mostly heterosexual males, especially at age 17, when self-reports of self-harm, depression, and attempted suicide were substantially higher than the reference group. Research on parent–adolescent informant discrepancy suggests that parent-reports of adolescent mental health are accurate, but likely reflect underreporting of symptoms, particularly for emotional problems in males (Booth et al., 2023), perhaps because internalizing symptoms are more subtle and harder to recognize, or easier to mask (Bergström & Baviskar, 2021).

Although this study focused on the onset of disparities in mental health outcomes, stark differences in concurrent, self-reported, mental health problems were observed between groups at age 17. Compared to completely heterosexual females, SMY females had 4.4 times increased risk for depression, and mostly heterosexual females had 2.2 times increased risk. In males, SMY had 4.9 times increased risk for depression, and mostly heterosexual males had 3.0 times increased risk. These findings largely concur with previous research, that mostly heterosexuals report more mental health difficulties than completely heterosexuals, but fewer than bisexuals (Vrangalova & Savin-Williams, 2014). However, with regard to attempted suicide, we found that compared to completely heterosexual males, mostly heterosexual males had 6.3 times increased risk, while SMY males had 5.8 times increased risk. This is in contrast to the findings for females, where SMY females had 3.6 times increased risk for attempted suicide, while results for mostly heterosexual females were nonsignificant. Together, this suggests that mostly heterosexual males may struggle more with mental health problems than mostly heterosexual

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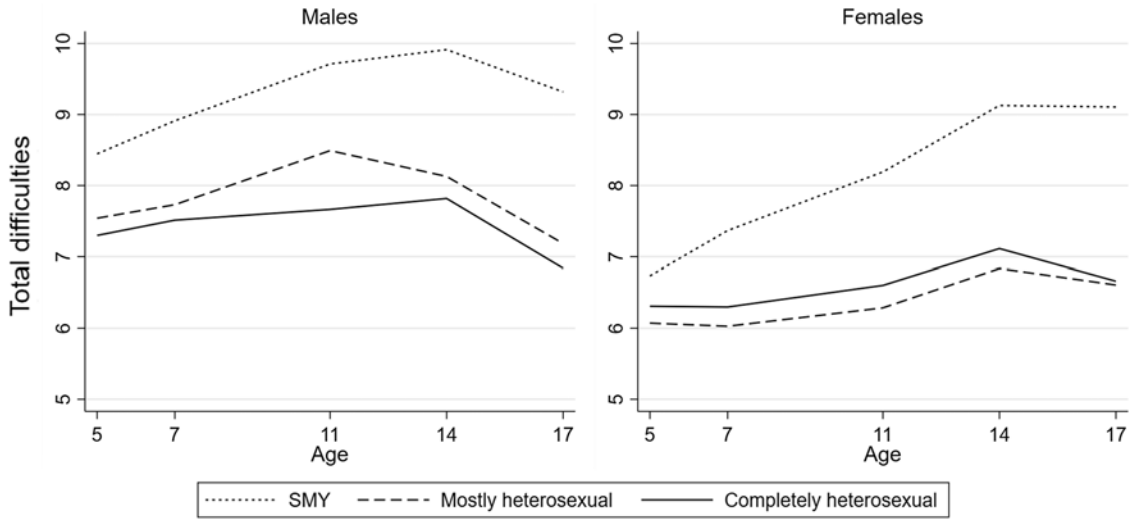

Figure 1. Marginal predicted means for total difficulties by sexual identity group across waves.

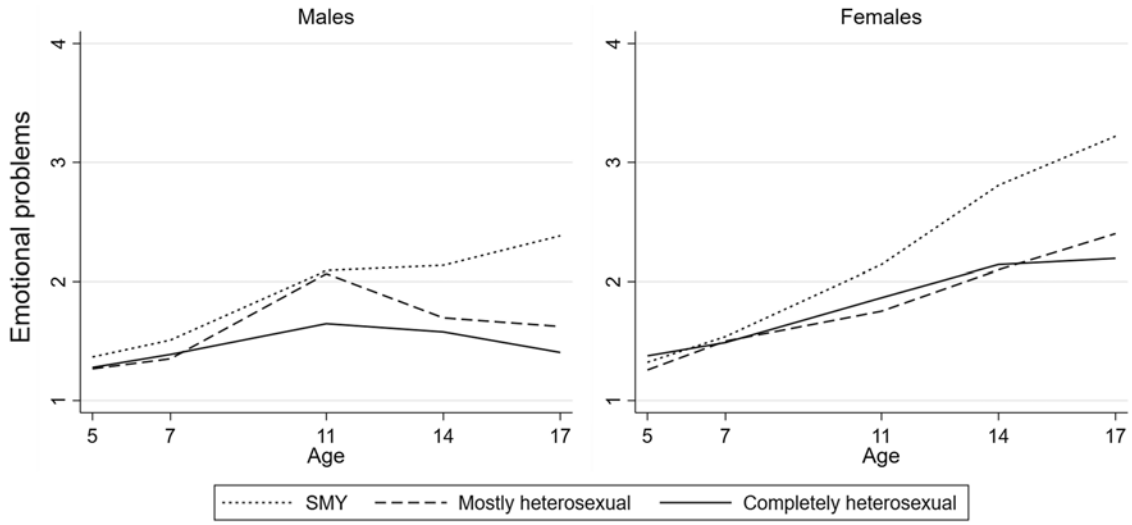

Figure 2. Marginal predicted means for emotional problems by sexual identity group across waves.

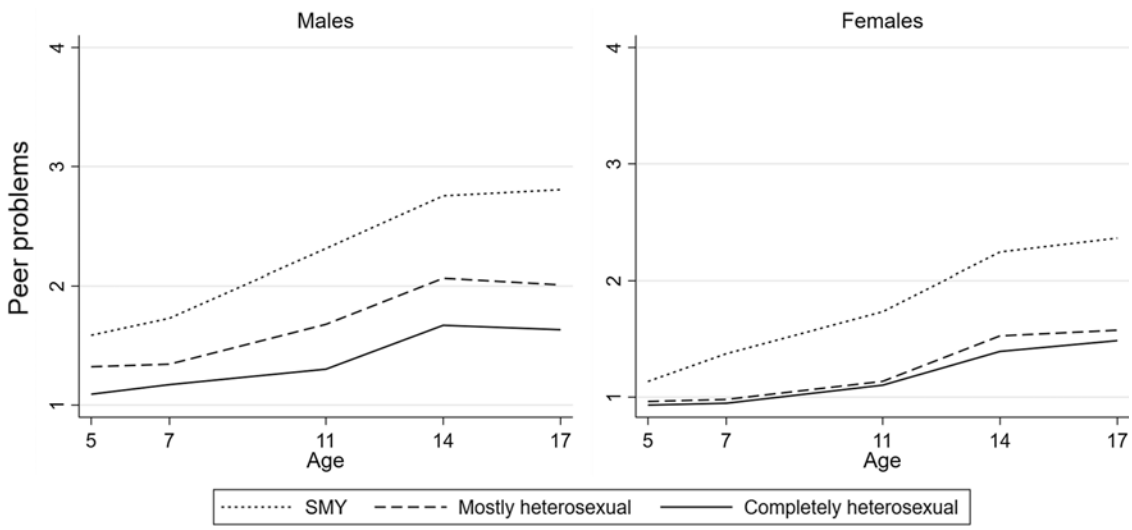

Figure 3. Marginal predicted means for peer problems by sexual identity group across waves.

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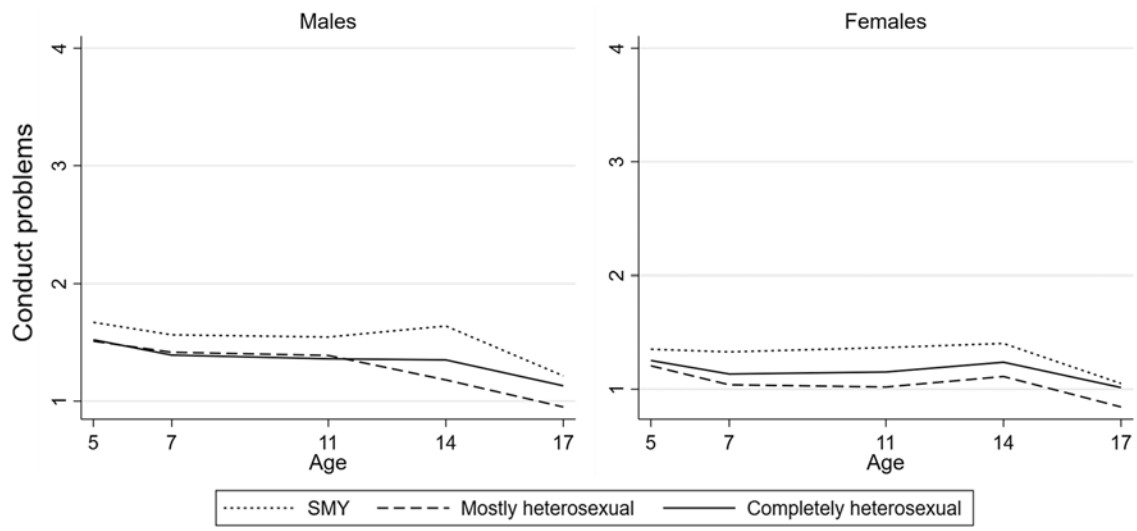

Figure 4. Marginal predicted means for conduct problems by sexual identity group across waves.

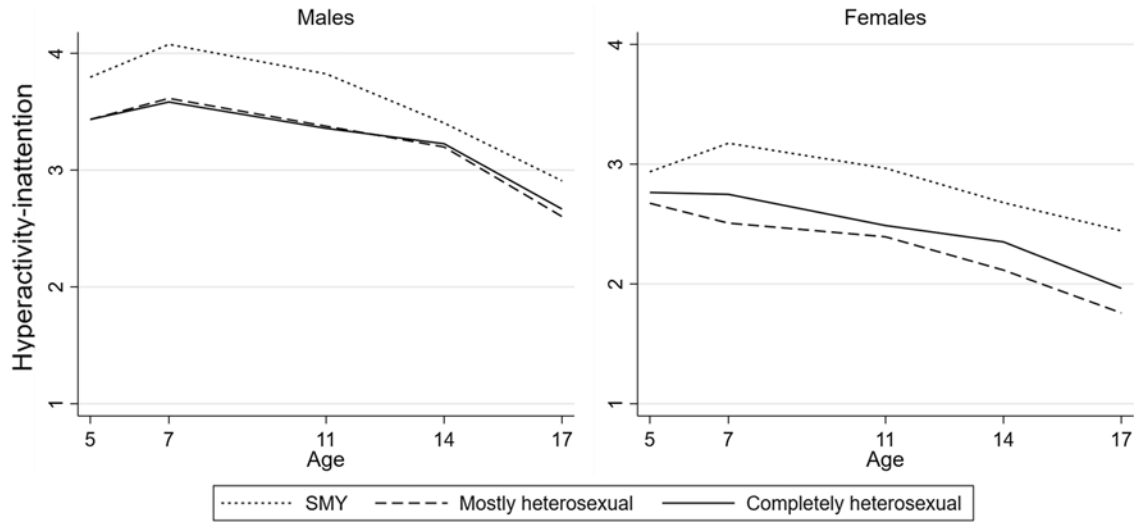

Figure 5. Marginal predicted means for hyperactivity-inattention by sexual identity group across waves.

females, which was also evident in the parent-reported data, with elevated emotional symptoms occurring earlier in males.

Some sex differences in parent-reported mental health trajectories were observed, as females showed greater emotional problems than males, which continued to increase up to at least age 14, while emotional problems decreased at ages 14 and 17 in males. This gender gap in emotional difficulties has been widely reported and shown to persist into adulthood, which requires further investigation from the research community (Patalay & Demkowicz, 2023). We found steadily increasing peer problems up to age 14 in males and up to age 17 in females, which could be an area for further investigation. However, in support of a previous study (Irish et al., 2019), there was little evidence for sex differences in the onset or trajectory of mental health problems in SMY, as both sexes showed onset for disparities in peer problems at age five, and emotional problems at age 11, which continued to increase at older ages. This suggests that similar mechanisms may be involved in the onset of mental health problems in SMY and that intervention efforts targeted at these ages would benefit both males and females.

Sensitivity analyses were conducted to examine whether results held after removing individuals who reported a different gender to sex reported at baseline, as this has been shown to be a particularly high risk group for poor mental health outcomes (Jadva et al., 2023). Some interaction effects reduced to the null, which included the increase in total difficulties at age 11 for mostly heterosexual males and SMY males and females, and the increase in peer problems at age 11 and 14 for SMY females. Although our main findings about the onset of peer and emotional problems remained unchanged, this could indicate that gender minority youth may experience more severe mental health problems, particularly during early adolescence, perhaps coinciding with the onset of puberty, although this requires further investigation.

Strengths and limitations

A major strength of the current study was the use of comprehensive mental health data, spanning back to age five, providing an early baseline for examining mental health over time. However, in relation to this, we were limited to parent-reported

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data, because self-reported mental health measures were not consistent across waves and were only collected from age 11 onward. The SDQ is widely regarded as a valid measure of child and adolescent mental health, showing reasonable concordance rates between parent and adolescent report (Bergström & Baviskar, 2021). However, parents tend to underreport mental health symptoms compared to adolescents (Booth et al., 2023). Therefore, our results likely reflect conservative estimates. A further limitation was the use of a forced choice question to assess sexual identity, which may have misrepresented certain identities (e.g., pansexual, queer, asexual). Future research would benefit from incorporating qualitative research methodologies and by conducting multiple assessments of sexual identity over time.

A further strength of the study was the possibility to explore mostly heterosexual as a unique identity, adding to the literature base. However, we included "bisexual," "mostly gay or lesbian," "completely gay or lesbian," and "other" as one homogeneous group, due to their relatively smaller frequencies, which meant that we were unable to draw inferences about these potentially heterogeneous groups separately. Previous research used similar groupings; therefore, results can be compared across studies, however further research is needed to determine whether these groups follow distinct developmental pathways. For example, cross-sectional research suggests that bisexuality reflects a particularly high risk group for poor mental and physical health (Liu & Reczek, 2021). Therefore, longitudinal modeling of more nuanced SMY groups is an area for future research, although beyond the scope of the current paper. In addition, although it was not possible in this study due to low prevalence, it is important to note that more research is needed to understand mental health trajectories in gender minority youth, which may require sampling from specific populations to achieve a large enough sample size (Salk et al., 2020).

Conclusions

In this large and representative sample of UK adolescents, we found that SMY showed elevated risk for early-onset peer problems from age 5, and emotional problems from age 11, increasing further at later stages of adolescence. Those reporting a mostly heterosexual identity also showed marginally higher risk for parent-reported emotional problems during adolescence, and much higher risk for self-reported mental health problems at age 17. These results highlight the significant role that sexual identity plays in the development of mental health problems in children and adolescents, with detrimental outcomes, including increased risk of self-harm and attempted suicide. This calls for more to be done to protect SMY from adverse outcomes. Interventions could focus on reducing stigma and discrimination against sexual minorities and promoting more inclusive environments and relational support networks. Our findings suggest that interventions should start early, during childhood, and be provided throughout adolescence, which is a particularly risky period reflecting increasing mental health problems.

Supplementary material. For supplementary material accompanying this paper visit https://doi.org/10.1017/S0954579424000105

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Competing interests. The authors declare none.

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