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**Psychological distress, self-harm and suicide attempts in gender minority compared  
with cisgender adolescents in the UK**

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## **Abstract**

**Background:** Few population-based studies have compared the mental health of gender minority to cisgender adolescents.

**Aims:** To compare reports of psychological distress, behavioural and emotional difficulties, self-harm and suicide attempts between gender minority and cisgender adolescents.

**Method:** Data came from the Millennium Cohort Study ( $n = 10\,247$ ), a large nationally representative birth cohort in the United Kingdom. At the 17-year follow-up, we assessed gender identity, psychological distress (Kessler K6 scale), behavioural and emotional difficulties (parent and child reports on the Strengths and Difficulties Questionnaire), self-harm in the previous year, suicide attempts, substance use and victimisation including harassment, physical and sexual assaults. Multivariable modified Poisson and linear regression models were used. Attenuation after the inclusion of victimisation and substance use was used to explore mediation.

**Results:** Of the 10,247 participants, 113 (1.1%) reported they were a gender minority. Gender minority participants reported more psychological distress (coefficient, 5.81, 95% CI's 4.87 - 6.74), behavioural and emotional difficulties (child report: coefficient, 5.60; 95% CI, 4.54-6.67; parent/ carer report: 2.60; 95% CI, 1.47-3.73), self-harm including cutting or stabbing (Relative Risk [RR], 4.38; 95% CI, 3.55-5.40), burning (RR, 3.81; 95% CI, 2.49-5.82), taking an overdose (RR, 5.25; 95% CI, 3.35-8.23), suicide attempt (RR, 3.42; 95% CI,

2.45-4.78), than cisgender youth. These associations were partially explained by differences in exposure to victimisation.

**Conclusions:** Gender minority adolescents experience a disproportionate burden of mental health problems. Policies are needed to reduce victimisation and services adapted to better support the mental health of gender minority adolescents.

**Keywords:** gender identity; psychological distress; self-harm; suicide attempt.

## **Introduction**

Gender minority (identity that differs from their assigned sex at birth) adults are more likely than cisgender (identity that corresponds to sex assigned at birth) adults to report symptoms of depression and anxiety, self-harm and attempt suicide.<sup>1 2</sup> The few studies on the mental health of gender minority adolescents have used convenience sampling which might introduce sampling bias, are small - so might lack statistical power, or not had matched cisgender comparators preventing the estimation of differences by gender identity.<sup>3 4 5</sup> In the one nationally representative study in New Zealand, symptoms of depression, anxiety, self-harm and suicide attempts were elevated in gender minority compared to cisgender adolescents;<sup>6</sup> however, they did not examine the role of substance use or victimisation in these associations. Two US studies<sup>4 10</sup> found that transgender young people reported more smoking, alcohol and illicit drug use as well as victimisation than their cisgender peers, suggesting these variables may play a role in the association between gender minority status and mental health.

The UK's Millennium Cohort Study with its assessments of psychological distress, emotional and behavioural difficulties, self-harm, and suicide attempts, as well as reports of substance use and victimisation ranging from insults to sexual assaults in a nationally representative sample represents a unique opportunity to explore the association between gender identity and mental health.

## **Method**

### *Setting and participants*

The Millennium Cohort Study (MCS) is a birth cohort in the United Kingdom (UK) following children born in 2000-02. In total 19,519 children were recruited and followed up seven times to date at ages 9 months, 3, 5, 7, 11, 14 and 17 years. For information regarding the design of the MCS see <https://cls.ucl.ac.uk/cls-studies/millennium-cohort-study/>.

We used data gathered at 9 months and 3-years on assigned sex. The outcomes and covariates in the analysis were assessed at 17 years of age (2018-2019), except ethnicity which was only reported by young people at 14 years of age. In the sweep when cohort members were 17 years of age, 14,496 families were invited to participate. Of this number, 10,625 (73.2%) families and 10,345 (71.4%) adolescents provided informed written consent and were interviewed.

Ethics approval for the age 17 sweep were obtained from the National Research Ethics Service Research Ethics Committee (REC) North East – York (REC ref: 17/NE/0341). Collected data is anonymised and available to researchers via the UK Data Service. We adhered to the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines in this manuscript.<sup>11</sup>

## Measures

### *Mental health outcomes*

Participants responded to the validated K6 measure of psychological distress.<sup>12</sup> It asks respondents how often in the past 30 days they felt (e.g. worthless) with five response options ranging from none to all of the time. Total scores range from 0 to 24, higher scores indicating greater distress.

Parent/carers and young people completed the Strengths and Difficulties Questionnaire (SDQ).<sup>13</sup> The SDQ is a validated screening tool to measure child and adolescent behavioural and emotional difficulties.<sup>14</sup> The SDQ consists of four subscales that rate areas of behavioural and emotional difficulties (conduct problems, hyperactivity, emotional symptoms and peer problems), with each consisting of five items on a three point scale. Individual item scores were summed to produce a continuous total score.

Self-harm was reported as a binary response (never harmed = 0; harmed = 1) to the question, ‘During the last year, have you hurt yourself on purpose in any of the following ways?’, with separate questions for the methods of: cut or stabbed, burned, bruised or pinched, overdose, pulled out hair, and other. The question has not been validated but our analyses focused on self-harm in the previous year as it is more clinically relevant and less prone to recall bias than self-harm occurring more than a year ago.<sup>15</sup>

Attempted suicide was reported with the question, ‘Have you ever hurt yourself on purpose in an attempt to end your life?’. The question has not been validated. We derived a binary measure of lifetime suicide attempt from responses (never attempted suicide = 0; made a suicide attempt = 1).

### *Gender identity*

Gender identity was assessed using self-reports from participants at the 17 years of age with the question, ‘Which of the following describes how you think of yourself?’ with the response options of: ‘male’, ‘female’ and, ‘in another way’. Those selecting ‘in another way’ then provided a description that was coded into: ‘androgenous (male and female)’, ‘gender fluid’, ‘non-binary’, and ‘other.’ We also compared the gender identification provided by young people at 17 years with the sex provided by parent/carers when they were 9 months

and 3-years of age. Parents/ carers at 9-months and 3-years could only report whether a child was only either male or female. We derived participants' gender minority status using both parent and young people's responses. If young people at 17 years identified with a gender that was: 'other', 'androgenous (male and female)', 'gender fluid', or 'non-binary' they were categorised as a gender minority. If parent/carer reported sex at 9 months or 3 years did not match that reported by young people's at 17 years of age (e.g., parent response at 9 months was male and young person's response at 17-years was female), these participants were also categorised as gender minority.

Preliminary analysis (before imputation) categorised 109 (1.1%) participants as a gender minority. Of these, 58 (53.2%) were from young people self-reports. The remaining 51 were identified from comparing participants reported male or female gender identity at 17 years of age to parent/carer reported gender identity of the participant at 9 months or three years of age.

### *Covariates*

To describe the characteristics of gender minority young people compared to their cisgender peers we analysed self-reported data collected on demographic characteristics included housing tenure (i.e. rented, owned), parent/carer composition in household (single parent or carer/both parents or carers), responding parent/carer employment status, adolescents ethnicity (i.e. white; ethnic minorities: mixed, Indian, Bangladeshi or Pakistani, black or black British, other ethnic groups), and sexual identity. Sexual identity was adjusted for given the link between gender and sexual identity, and associations between sexual identity and mental health. Sexual identity was self-reported according to categories of completely

heterosexual/ straight, mainly heterosexual/ straight, bisexual, mainly gay or lesbian, completely gay or lesbian, other, do not know and preferred not to say. In the unimputed dataset, 0.9% (n=90) indicated they were mainly gay or lesbian, 1.6% (n=160) completely gay or lesbian, 10.6% indicated they were mainly heterosexual (n=1,101), and 6.3% (n=656) bisexual. There is strong evidence that adolescents identifying as mainly heterosexual or not sure, have increased risk of mental health problems compared with those reporting they are completely heterosexuals.<sup>16 17</sup> To be consistent with this literature, participants reporting they were mainly heterosexual were categorised as bisexual, and mainly and completely gay or lesbian collapsed into one category. We assessed two hypothesized mediators of associations between gender minority status and mental health outcomes: substance use and victimisation. Substance use comprised lifetime smoking experimentation (including those who had even only had one puff of a cigarette), consumption of a whole alcoholic drink, and illicit drug use. Victictimisation assessments were self-reports of experience over the past 12 months of nine forms of harassment, abuse and violence.

#### *Statistical analysis*

A detailed description of attrition in the cohort has been provided elsewhere.<sup>18</sup> Missing data per variable ranged from 2.3 to 12.9%. Participants who reported that they, ‘didn’t know’, ‘preferred not to say’, or ‘do not want to provide’ their gender (n = 47), sexual (n = 51), or ethnic identity (n = 56) were removed from the sample. There were 7,829 participants with no missing data on the variables used in our statistical models which made up the complete data sample. The imputed analytical sample had 10,247 participants. We assumed missingness was dependent on the observed data and imputed 20 datasets by multiple imputation using chained equations. The imputation prediction model included all other

analysis variables, along with combined sampling and attrition weights,<sup>19</sup> and an indicator variable denoting if participants were the only cohort member in the household or not. Estimates were obtained by pooling results across 20 imputed data sets, and the Monte Carlo errors suggested this was a suitable number.<sup>20</sup>

The association between gender minority status and outcomes was analysed using multivariable modified Poisson regression with robust errors.<sup>21</sup> Seven separate multivariable modified Poisson regressions were performed for the association between gender minority status with each binary outcome (model 1). Next, we used linear regression to estimate associations between gender minority status and the three continuous measures of reported psychological distress, behavioural and emotional difficulties (adolescent and parent/carer report). We adjusted estimates for sexual identity (model 2). To explore potential mechanisms, we then added to model 2 the hypothesized mediating substance use variables (model 3) and victimisation variables (model 4). Results for the binary outcomes are presented as risk ratios (RRs) and continuous outcomes as coefficients, both with 95% confidence intervals (CIs). To examine the influence of missing data we re-ran the analysis on a complete data sample.

All analyses were performed in Stata version 17.0 (Stata Corp).

## Results

Online Fig. 1 shows how we derived the analytical sample. Of the 10,247 participants, 113 (1.1%) reported they were a gender minority. In Table 1, we show the characteristics of young people according to gender minority status. Young people who identified as a gender minority were more likely to be bisexual (33.0 vs. 17.2%), gay (28.5 vs. 2.2%), or report an ‘other’ sexual identity (30.3% vs. 1.1%), and report all forms of victimisation, including

sexual assault (12.2 vs. 3.1%), an unwelcome sexual approach (31.0 vs. 12.2%), experience physical violence (36.9 vs. 17.3%), but less likely to identify as an ethnic minority (21.3 vs. 12.2%), than their cisgender peers. There were no other differences in participant characteristics according to gender minority status.

Gender minority young people were three times more likely than their cisgender peers to report a suicide attempt (RR, 3.42; 95% CI, 2.45-4.78) (Table 2). There was evidence of an association between gender minority status and reporting self-harm in the previous year including cutting or stabbing (RR, 4.38; 95% CI, 3.55-5.40), burning (RR, 3.81; 95% CI, 2.49-5.82), bruising or pinching (RR, 3.69; 95% CI, 3.07-4.44), taking an overdose (RR, 5.25; 95% CI, 3.35-8.23), pulling out hair (RR, 3.51; 95% CI, 2.52-4.88), harm in other ways (RR, 6.39; 95% CI, 4.63-8.83), as well as the Kessler K6 screening scale (coefficient 5.81; 95% CI, 4.87-6.74), Strengths and Difficulties total score from study members responses (coefficient, 5.60; 95% CI, 4.54-6.67) and their parents/carers (coefficient, 2.60; 95% CI, 1.47-3.73). Associations were markedly reduced after the adding sexual identity to models, but there was little evidence of further attenuation after substance use was added. After the adjustment of reports of victimisation, the association between gender minority status was weakened (Table 2).

In the subset with no missing data, the confidence intervals for estimates overlapped with those from the main results using imputed data (Table S1 in the Supplement).

## **Discussion**

### *Main findings*

Gender minority adolescents were more likely to report ever making a suicide attempt, self-harm in the previous year, psychological distress, behavioural and emotional difficulties than

their cis-gender peers. These associations were markedly reduced after accounting for sexual identity and reports of victimisation, but adjustment for substance use had little impact on the strength on associations. To our knowledge, this is the first study that provides nationally generalisable estimates of inequities in UK adolescents' mental health according to gender identity, and indicates these differences may be related to exposure to victimisation.

#### *Interpretation of our findings and comparison with existing literature*

The prevalence of young people identifying as a gender minority was small (1.2%) and comparable to estimates from community samples of young people in North America (2.1%,  $n = 65,231$ ,<sup>22</sup> 1.9%,  $n = 908$ )<sup>23</sup> and the Youth'12 study, the only other nationally representative sample of high school students conducted in New Zealand (1.2% transgender,  $n = 8,166$ ).<sup>6</sup> In agreement with the results from this study,<sup>6</sup> we found gender minorities were around three times more likely to report having made a suicide attempt, three to six times more likely to have self-harmed in the previous year than those who identified as cisgender. In two US studies, the online US Teen Health and Technology Study,<sup>4</sup> and The Youth Risk Behavior Survey<sup>10</sup> conducted in ten US states, bullying and victimisation were reported more by transgender than cisgender young people. We replicated the findings of inequalities in mental health and victimisation according to gender identity, but explicitly investigated whether victimisation explained associations between gender identity and mental health. Our analysis has also extended the results from other studies by assessing six types of self-harm and a continuum of victimisation covering experiences ranging from insults to sexual assaults.

Among the mechanisms linking gender minority status with mental health problems, victimisation is likely to form part of an indirect mechanism. The marked attenuation of the

association between gender minority status and outcomes we observed after adjustment for victimisation is consistent with it acting as a mediator. This hypothesis is consistent with the predictions of minority stress theory that mental health problems are more likely in gender minority compared to cisgender youth due to the added stressors that accompany this stigmatised group membership.<sup>8 9</sup> Other studies with cisgender comparator groups have found gender minority adolescents report more victimisation than their cisgender peers,<sup>6 10</sup> providing support for this hypothesis. In contrast to previous studies,<sup>4 10</sup> we found little difference in substance use by gender minority status. If these substances were being used to cope with victimisation, they may be better characterised as a downstream outcome of victimisation than mediator of the association between gender identity and mental health problems.

### *Limitations and strengths*

One limitation is use of a single combined gender minority group meant that we did not further disaggregate analyses by gender identity (e.g., transmasculine, transfeminine, androgenous, gender fluid or non-binary) and did not include a not sure about gender category. A related limitation is that we did not have enough young people to model all combinations of gender and sexual identity. There is likely to be variability in the lived experiences of different gender and sexual minority groups and larger studies should investigate these differences. Some misclassifications could also have occurred if gender-minority identities were under-reported because of perceived stigma. This would lead to a misclassification which would likely attenuate associations to the null rather than introduce a spurious effect. Attrition and missing data are a concern in birth cohorts and can introduce selection biases. We used multiple imputation to maximise the plausibility of the missing at

random assumption. Results were comparable when using the datasets with no missing and imputed data. Our assessment of suicide attempts was a lifetime measure, so may reflect events that occurred before young people became aware of or identified as a gender minority. However, reverse cause, where a suicide attempt leads to a change in identity, seems a less plausible explanation for the associations reported that gender minority status acting as a putative causal factor.

The main strength of our study lies in the use of a large contemporary, nationally representative, sample of adolescents. Our findings are therefore likely to be generalisable across the UK. The use of a birth cohort with sex recorded by parents at a young age meant we doubled the number of people identified as a gender minority through a comparison of parent/carer reported gender identity as a child with adolescent reports. This likely increased power and precision in our estimates. Another strength was the assessment of self-harm that occurred in the last year, that is more clinically relevant and less prone to recall bias than assessments of self-harm occurring more than a year ago.<sup>15</sup>

### *Implications*

In conclusion, we found that gender minority adolescents were more likely to report symptoms of psychological distress, emotional and behavioural difficulties, self-harm and have made a suicide attempt than their cisgender peers. We extend the findings from previous studies by showing that adjusting for victimisation explained variation in the association between gender minority status and outcomes. The implication of this finding is that reducing victimisation may be helpful in narrowing the gap in mental health problems between gender minority and cisgender adolescents. The unquestioning acceptance of rigid concepts of gendered behaviour should be challenged by wider society, including young people's families

and communities. Clinicians need to consider discussing self-harm and suicide with gender minority young people and help them find safer ways of coping. Policies, organizational practices, and school-based interventions should seek to reduce victimisation of gender minority young people.

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**Author Contribution:** J.W. conceptualised the study, conducted the statistical analysis and wrote the first draft of the manuscript. J.W., C.R. and M.T. interpreted the analysis. C.R. and M.T. provided critical input into the manuscript.

**Data availability:** The Millennium Cohort Study data are available to all researchers, free of cost from the UK Data Service (<https://www.ukdataservice.ac.uk>).

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**Table 1. Characteristics of Young People by Self-Reported Gender Identity**

Characteristic	Gender identity, % <sup>a</sup>		
	Cisgender (n = 10134)	Gender Minority (n = 113)	P Value <sup>b</sup>
<b>Demographics</b>			
Resident in a rented property	28.0	33.2	0.31
One resident parent/ carer in household	28.1	32.7	0.33
Parent/carer unemployed	24.3	21.1	0.48
Ethnic minority	21.1	12.2	0.03
<b>Sexual identity <sup>c</sup></b>			
Heterosexual	79.5	8.2	
Bisexual	17.2	33.0	<0.001
Gay	2.2	28.5	<0.001
Other	1.1	30.3	<0.001
<b>Substance use</b>			
Lifetime smoking	41.4	35.5	0.23
Lifetime alcohol use	78.9	80.8	0.62
Lifetime drug use	28.9	32.9	0.36
<b>Victimisation</b>			
Insulted you, threatened or shouted at you in public	38.6	65.2	<0.001
Spread gossip, ignored, other emotional abuse	38.3	63.7	<0.001
Been physically violent towards you	17.3	36.9	<0.001
Hit or used a weapon against you	3.1	8.5	0.002
Stolen something from you	8.1	16.8	0.001
Harassed via mobile phone or email	14.7	29.8	<0.001
Sent pictures of you/ rumours	7.0	17.0	<0.001
Made an unwelcome sexual approach	12.2	31.0	<0.001
Assaulted you sexually	3.1	12.2	<0.001

<sup>a</sup> All numbers estimated from imputed proportions. <sup>b</sup> Determined by Poisson regression. <sup>c</sup> Bisexual comprised bisexual and mainly heterosexual/ straight respondents, gay comprised: mainly gay or lesbian completely gay or lesbian.

**Table 2. Self-Reported Suicide Attempt, Self-Harm, and Psychological Distress by Gender Minority Status**

Outcome	% <b>Cisgender</b> <b>(n = 10134)</b>	<b>Gender Minority</b> <b>(n = 113)</b>	<b>Risk ratio (95% confidence interval)</b>			
			<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
Suicide attempt	7.4	25.3	3.42 (2.45, 4.78)	1.77 (1.22, 2.57)	1.82 (1.28, 2.59)	1.19 (0.85, 1.66)
Self-harm						
Cut	10.8	47.3	4.38 (3.55, 5.40)	1.99 (1.58, 2.50)	2.02 (1.61, 2.53)	1.41 (1.12, 1.77)
Burned	4.5	17.3	3.81 (2.49, 5.82)	1.69 (1.06, 2.71)	1.77 (1.12, 2.79)	1.12 (0.72, 1.76)
Bruised or pinched	14.7	54.4	3.69 (3.07, 4.44)	1.77 (1.46, 2.15)	1.77 (1.46, 2.14)	1.35 (1.12, 1.62)
Overdose	3.0	15.8	5.25 (3.35, 8.23)	2.31 (1.36, 3.92)	2.38 (1.45, 3.92)	1.43 (0.87, 2.34)
Pull hair	7.3	25.8	3.51 (2.52, 4.88)	1.58 (1.11, 2.25)	1.61 (1.14, 2.28)	1.10 (0.78, 1.56)
Other way	4.3	27.5	6.39 (4.63, 8.83)	2.65 (1.82, 3.84)	2.59 (1.78, 3.79)	1.84 (1.26, 2.69)
<hr/>						
<b>Psychological distress</b>		<b>Mean (SD)</b>	<b>Coefficient (95% confidence interval)</b>			
Kessler K6 screening scale total	7.21 (4.93)	13.02 (5.17)	5.81 (4.87, 6.74)	3.19 (2.24, 4.13)	3.23 (2.30, 4.16)	2.23 (1.37, 3.10)
Strengths and Difficulties (child)	11.23 (5.64)	16.83 (6.54)	5.60 (4.54, 6.67)	2.82 (1.72, 3.91)	2.88 (1.80, 3.95)	1.73 (0.71, 2.76)
Strengths and Difficulties (parent)	7.38 (6.04)	9.98 (6.87)	2.60 (1.47, 3.73)	0.73 (-0.46, 1.92)	0.83 (-0.36, 2.01)	0.21 (-0.96, 1.38)

Model 1: gender identity; Model 2: model 1 plus sexual identity; Model 3: model 2 plus substance use; Model 4: model 2 plus victimisation