Mental health, social adversity & health-related outcomes in sexual minority adolescents: findings from a contemporary national cohort study

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ABSTRACT

Background Sexual minority adolescents are more likely to experience mental health problems, adverse social environments and negative health outcomes in contrast to their heterosexual counterparts. There is a dearth of up-to-date population level estimates of the extent of risk across these domains in the UK.

Methods Using data from the Millennium Cohort Study (N=9885), we analysed mental health, social, and health-related outcomes in sexual minority (n= 629) versus heterosexual (n= 9256) adolescents at age 14 years (mean age 14·21, SD = 0·94). In addition, we estimated the accumulation of multiple adverse outcomes in both groups.

Findings Sexual minorities were more likely to experience high depressive symptoms (OR = 5·43, 95% CI's 4·32 - 6·83), self-harm (OR = 5·80, 95% CI's 4·55 - 7·41), lower life satisfaction (OR = 3·66, 95% CI's 2·92 – 4·58), lower self-esteem (*B* = 1·83, 95% CI's 1·47 - 2·19) and all forms of bullying and victimisation. Sexual minorities were at increased odds of trying cannabis (OR = 3·22, 95% CI's 2·24 - 4·61), being less physically active (*B* = 0·36, 95% CI's 0·25 - 0·46), perceiving themselves as overweight (OR = 1·73, 95% CI's 1·40 – 2·14), and dieting to lose weight (OR = 1·98, 95% CI's 1·58 – 2·48). Sexual minorities experienced more co-occurring negative outcomes, particularly for mental health outcomes (1·43/3 vs 0·4/3 on average), overall cumulative difficulties experienced were 9·43/28 vs. 6·16/28.

Interpretation Sexual minority adolescents in the UK experience disparities in mental health, social, and health-related domains despite living in a time of progress for sexual minorities, and these adverse outcomes co-occur, with implications for lifelong health and social outcomes. Health and educational practitioners need to be aware of the increased risk for sexual minority adolescents at this age.

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RESEARCH IN CONTEXT

Evidence before this study

PubMed was searched in 20th May 2019 using the following mesh terms; 'sexual and gender minorities', 'adolescent' 'health', and 'population characteristic' to find relevant sexual minority research using population-based data sets (see supplementary material). It was found that many larger population-based cohorts were conducted in the US, focussed on a sample with a large age range, and commonly focussed on mental health outcomes. Of the search results, one study in Iceland used a large nationally representative adolescent sample analysing multiple outcomes (between 2006 to 2014), additional literature searching revealed another population study in New Zealand (between 2001 to 2012). In both studies sexual minority adolescents were more likely to experience adversity across multiple domains in comparison to heterosexuals. We did not identify any work that has investigated outcomes for sexual minority adolescents using nationally representative samples in the UK and studies that have employed unrepresentative samples in the UK have focussed on previous generations of adolescents.

Added value of this study

We extended previous work by using a contemporary population-based sample in the UK, investigating over 30 outcomes across mental health, social, and health-related domains and in addition examining how they co-occur. To our knowledge, this is the first study in the UK that provides a nationally generalisable examination of adverse outcomes in mental health, social environment, and health-related domains in sexual minority adolescents born in the 21st Century. We use a sample of adolescents born in 2000-02 who have experienced more socially progressive attitudes towards sexual minority individuals in their childhood compared to previous generations. Despite this, we find that sexual minority adolescents are many times more likely to experience depressive symptoms, self-harm, bullying and victimisation. Furthermore, they are more likely to have difficulties with their weight (perception or actual) and have engaged in various forms of substance use. In addition, we highlight the accumulation of outcomes, whereby sexual minority adolescents experienced greater co-occurring difficulties overall.

Implications of all the available evidence

Cross sectional, longitudinal, and meta-analytical research suggests that sexual minority adolescents are more likely to experience adverse outcomes in mental health, social, and health-related domains. Whether this was the case for sexual minorities born in 21st Century growing in up in an era of socio-political change was not known. Using a large nationally representative sample our research confirms that sexual minority adolescents born in the 21st Century experience more adversity relative to their heterosexual counterparts on a broad number of outcomes. We also find that sexual minorities are more likely to experience adverse experiences cumulatively with multiple mental health experiences constituting the most cumulative difficulty. Given, that many mental health problems and health problems are comorbid and exacerbate one another over time young people are likely to carry these adverse outcomes into adulthood with an associated social, health, and economic cost. As the adolescent's social environment is likely to be a major factor involved in such disparities universal interventions may need to more closely focus on reducing bullying and improving diversity and equality education.

INTRODUCTION

Sexual minorities have consistently been found to be at increased risk of experiencing a constellation of adverse outcomes relative to their heterosexual counterparts.[1] Despite modern advances in rights for sexual minorities in western societies, recent research reveals significant disparities still exist in areas of mental health, social and health behaviour domains. However, there is a lack of contemporary population level estimates of these outcomes in adolescents in the UK. Given the potential vulnerabilities experienced by adolescents, we investigate a number of mental health, social and health-related outcomes in adolescent sexual minorities who have grown up in the 21st Century, with a subsequent focus on the co-occurrence of multiple adverse outcomes across these domains.

Adolescence is an important stage of human development, where rapid biological changes occur alongside increasing psychological and social demands.[2] Mental health difficulties and other health-related behaviours such as smoking and alcohol use, are a leading cause of disability-adjusted life years lost globally, and are usually adolescent onset.[3] Adverse experiences in adolescence, including experiencing victimisation[4] and engaging in anti-social behaviours,[5] are also precursors to adversity

and health outcomes in later life, with the experience of multiple negative outcomes in adolescence potentially increasing their impacts on later life outcomes.

Throughout this paper, 'sexual minority' is used as an umbrella term including those attracted to the same or both sexes. Researchers commonly disaggregate bisexual, gay and lesbian groups and inconsistent differences between these subgroups have been found.[6,7] This disaggregation is usually based on identity or sexual behaviour, whereas measures of attraction are more developmentally appropriate for younger adolescents, which is the focus of the current study.[8]

Sexual minority adolescents are particularly at-risk during adolescence due to increased exposure to victimisation[9] and navigating an understanding of their sexual identity.[10] Previous estimates indicate that sexual minority adolescents are almost three times more likely to experience suicidal ideation and depressive symptomology,[11] reduced wellbeing,[12] and are four times more likely to self-harm with suicidal intent[6] relative to their heterosexual counterparts. In terms of health-related behaviours, sexual minority adolescents are more likely to be obese and have an eating disorder,[13] engage in risky sexual behaviour,[14] use cigarettes and other substances (e.g. alcohol, marijuana)[15] than heterosexual adolescents. The increased exposure to negative societal attitudes that sexual minority adolescents experience has been implicated in their elevated rates of mental health[16] and health-related behaviour problems.[17] Sexual minority adolescents are more likely to experience social stressors such as fear of rejection based on sexuality status, [1] increased exposure to bullying and discrimination,[9] have property stolen, be involved in physical altercations,[18] and experience sexual abuse.[19] Sexual minorities may also engage in anti-social behaviours as a response to social conflict or oppression.[20] These social contexts and interpersonal relationships are likely to heighten intrapersonal stress and thereby burden general psychopathological processes.[16] Minority stress theory proposes that sexual minorities experience more general stressors (e.g. bullying) and minority specific stressors (e.g. navigating identity) than majority population groups. Proximal (e.g. internal processes) and distal factors (e.g. prejudice) interact in the context of the adolescent's environment leading to adversity in mental (e.g.

rumination), social (e.g. lack of support, family rejection) and health-related behaviour domains (e.g. substance use).[1]

In western societies, today's generation of adolescents arguably live in a more socially progressive environment towards sexual minorities.[21] Within Great Britain, same-sex marriage is legal and currently a new curriculum focussing on sexual diversity is being implemented.[22] However, the UK governments 'National LGBT survey' in 2018 revealed that more than two thirds of participants reported avoiding holding hands in public in fear of a negative reaction from others,[23] which indicates that discrimination still exists at the societal level. As a result, the government has developed an action plan to improve feelings of safety, experiences in educational settings and health care for this group. As these data focused on 16-65 year olds there is room for additional focus on younger age groups. Furthermore, given today's shifting social climate in the UK, outcomes for more recent generations might be expected to differ from previous generations.

Although population based research has been conducted elsewhere[24–26] in the UK there is little representative population-based research that investigates disparities based on sexuality in mental health, social, and health-related domains in the current generation of adolescents. Studies that do utilise population-based samples are sparse, focus on a narrow range of outcomes and are based on generations born in the latter decades of the 20th Century.[6] Assessing a limited number of outcomes in different samples limits the comparability of effects due to unaccounted participant variation (e.g. different age ranges, ethnic profiles). In addition, although the increased odds of single outcomes have been studied (e.g. suicidal ideation), mental health, socially adverse outcomes, and health-related behaviours tend to be associated and co-occur.[27] Sexual minority adolescents in particular are more likely to experience multiple forms of victimisation (i.e. polyvictimisation) simultaneously.[28] The co-occurrence of multiple risk factors is likely to have a larger impact on later life health and social outcomes, hence, examining the extent of accumulation of adverse outcomes in sexual minority youth compared to heterosexual youth has implications for policy and interventions to adequately support adolescents.

To address these research gaps, we analyse outcomes across mental health, social environment, and health-related domains in sexual minorities relative to heterosexual adolescents in a large, contemporary national cohort. We used data from the Millennium Cohort Study, which is a nationally representative sample of adolescents born in 2000-02. This is the first study to use a population-based sample in the UK to estimate differences in multiple mental health (e.g. depressive symptoms, self-harm), social (e.g. relationships and victimisation) and health-related outcomes (e.g. substance use and physical activity). We also investigate the co-occurrence of negative outcomes across these domains, to help understand the cumulative difficulties sexual minority adolescents experience relative to their heterosexual counterparts, which to our knowledge no study has investigated.

METHODS

Study design and participants

The Millennium Cohort Study (MCS) is a birth cohort study in the UK following children born in 2000-02. In total 19,519 children were recruited and have been followed over six recruitment sweeps to date at ages 9 months, 3,5,7,11 and 14 years. For information regarding sampling and survey design of the MCS see https://cls.ucl.ac.uk/cls-studies/millennium-cohort-study/.

In the sixth sweep 15,415 families were issued into the field. Of this number, 11,726 (76%) families were successfully interviewed with a total sample of 11,884 adolescents. Attrition within this sweep was predicted by single parent family, lower occupation and educational level, black ethnicity and male sex.[29]

Ethics approval for the MCS study was obtained from the National Research Ethics Service Committee London – Central (REC ref: 13/LO/1786). Collected data is anonymised and available to researchers via the UK Data Service.

Measures

For mental health difficulties we looked at binary and/or continuous scale score experiences of self-harm, self-esteem, life satisfaction and depression (for full details see table S1). We also measured relative frequency of interpersonal difficulties such as bullying (peers, siblings and online), experience of victimisation (e.g. verbal, physical & sexual), antisocial behaviours, parental relationships and friendships. For health-related behaviours, we used measures of smoking use and frequency, alcohol use and frequency, other drug use and frequency, sexual activity, risky sex, rates of obesity, weight control via exercise and dieting and, rates of physical activity.

Cumulative difficulties

Finally, using all binary variables, cumulative index scores were created for each domain. Outcomes within each domain were summed to calculate an average and proportional cumulative score of mental health, anti-social, interpersonal, health-related and an overall cumulative score.

Statistical analysis

Logistic and linear regressions were used to examine outcomes in sexual minority adolescents compared to their heterosexual counterparts in STATA version 14.1. All models controlled for parental income, parent composition in household (single parent or carer/both parents or carers), housing tenure (i.e. rented, owned), how many siblings in the household, the adolescents' ethnicity, and sex.

To account for the testing of multiple models, a False Discovery Rate (FDR) was calculated via the *multproc* command in STATA generating a corrected p value, which was applied to all models. Due to the stratified cluster design of the MCS, and to account for attrition over time, all analyses are weighted with combined sampling and attrition weights to obtain nationally representative estimates using STATA's *svy* prefix for all models.

Role of funding

The source of funding had no role in the study design; in the collection, analysis, and interpretation of data, in the writing of the report, and in the decision to submit the paper for publication. The corresponding author had full access to all the data and final responsibility for the decision to submit this paper.

RESULTS

From the total sample, 9885 adolescents provided a response about their attraction. Of these 9885 adolescents, 629 (female: n = 481, male: n = 148) were coded as sexual minorities. Within the sexual minority sample 50 (female: n = 29, male: n = 21) reported same sex attraction only and 576 (female: n = 451 male: n= 125) reported bisexual attraction. The remaining 9256 (female: n = 4430, male: n =4826) participants were attracted to the opposite sex or not attracted to the same sex and coded as heterosexual. The remainder of participants (n= 1999) did not answer both questions about attraction or had not experienced attraction yet and were not included in our analysis. For details regarding demographic characteristics see Table 1.

There were significantly more female sexual minorities than males at this age $\chi^2(1) = 192\cdot70$, $p <\cdot0001$. For all regression models we also examined whether any associations observed between sexuality and outcomes were moderated by sex, which they were not.

Correlations between all outcome variables are presented in Table S2. All correlations were moderate to small. The largest correlation was between self-esteem and depressive symptoms r = 0.6 and the smallest was between arguing often with mother and being overweight/obese r = -0.0006.

Mental health

Sexual minority adolescents were at increased odds of reporting clinical levels of depressive symptoms, had lower life satisfaction, and were at increased odds of self-harming in the past year in

comparison to heterosexual adolescents. Sexual minority adolescents were more likely to have lower self-esteem scores (See table 2 & 3 and figure 1).

Anti-social behaviours

Sexual minority adolescents were at increased odds of hitting and stealing from another person. Sexual minority adolescents were not at increased odds of hitting someone with a weapon.

Health-related behaviours

Sexual minority adolescents were at significantly increased odds of having drank alcohol, smoked and of using cannabis in the past. However, there were no differences in regular smoking, regular cannabis use, regular drinking and other drug use. Sexual minority adolescents were not at increased odds of engaging in sexual activity or of engaging in risky sex behaviour.

Sexual minority adolescents were at increased odds of being overweight or obese compared to heterosexual adolescents and were also more likely to be physically inactive. Sexual minority adolescents were not at increased odds of exercising to lose weight. However, sexual minority adolescents were at increased odds of eating less to lose weight and were more likely to perceive themselves as overweight or very overweight in contrast to heterosexuals.

Interpersonal difficulties

Sexual minority adolescents were at increased odds of being bullied by siblings, peers, and online. Sexual minority adolescents were also at increased odds of experiencing verbal assault, physical assault, sexual assault, being hit with a weapon, and being stolen from. There was no difference between sexual minority adolescents and heterosexual adolescents as to whether they had close friendships or not. However, sexual minority adolescents reported being less close to their mothers and fathers and arguing more with their mothers and fathers.

Cumulative difficulties

Sexual minorities experienced more cumulative difficulties in total (9·43 out of 28, 95% CI's 9·09 – 9·76) versus heterosexual adolescents (6·16, 95% CI's 6·08 – 6·23). In the mental health domain sexual minorities experienced an average of 1·43 (95% CI's 1·34 – 1·52) cumulative difficulties out of 3, versus 0·40 (95% CI's 0·38 – 0·41) for heterosexual adolescents. The mental health domain also evidenced the highest percentage of cumulative difficulty (see figure 2 for cumulative difficulties expressed as percentages). In the health-related domain sexual minorities experienced an average of 3·75 (95% CI's, 3·59 – 3·92) cumulative difficulties out of 9 in comparison to 2·68 (95% CI's, 2·64 – 2·72) for heterosexual adolescents. For the interpersonal difficulties domain sexual minorities experienced 3·93 (95% CI's, 3·77 – 4·10) cumulative difficulties out of 13 on average, versus 2·79 (95% CI's, 2·76 – 2·83) for heterosexual adolescents. There was no difference in cumulative difficulty in the anti-social behaviour domain between sexual minorities (0·39 out of 3, 95% CI's 0·34 – 0·43) and heterosexual adolescents (0·36, 95% CI's 0·35 – 0·37).

Descriptive statistics are also provided for bisexual versus same-sex attracted adolescents on all outcomes (see supplementary table S3). There only difference identified was for depressive symptoms (binary and continuous) where bisexual attracted adolescents were more likely to be above the depression cut off (56·15% [95% CI's 50·92, 61·25] vs 31·21% [95% CI's 17·97, 48·45]).

DISCUSSION

The current study provides much needed population-based estimates of sexual minority adolescents' mental health, social environment, and health-related outcomes in the UK. Across most domains we find increased odds of more adverse adolescent outcomes. We also demonstrate that these adverse adolescent outcomes accumulate at higher levels in sexual minority adolescents, highlighting the potentially severe extent of negative lifetime consequences based on their experiences and outcomes in adolescence.

In line with previous research, we found that sexual minority adolescents were at increased likelihood of experiencing mental health problems namely depression, self-harm, lower self-esteem, and lower

life satisfaction. Mental health outcomes had amongst the most elevated odd ratios, with sexual minority adolescents over five times more likely to experience depression and self-harm in contrast to their heterosexual counterparts. Mental health difficulties also constituted the highest proportion of cumulative difficulty experienced in sexual minorities. This pattern of mental health disparity is concerning given depression is a leading cause of years lived with disability and carries a significant health burden world-wide.[3] There has been a call to prioritise preventative strategies that address the development of depression globally and for these preventative strategies to also focus on at risk groups and at earlier stages of onset.[2,27] Increased mental health problems have been linked to adversity in adolescent's social environment.[27] In this study, we found that sexual minority adolescents were more likely to argue with their parents and were less close to them and were also significantly more likely to experience all forms of bullying and victimisation including sexual assault. In accordance with the minority stress theory, these patterns of social adversity are likely to impact sexual minority adolescent's mental health and the adverse health behaviours they engage in.[1] Our research highlights that sexual minority adolescents should be amongst the priority groups, and that interventions should be targeted at a variety of different contexts (e.g. school, and family settings).[20] The recent publication of the governments LGBT action plan recognises that social discrimination needs to be further reduced.

In addition, we found that sexual minority adolescents were more likely to have drank alcohol, have smoked tobacco and used cannabis. They were also more likely to be physically inactive, perceive themselves as overweight, and restrict food intake to control their weight. These health-related behaviours are associated with increased mortality rates over the life course, having detrimental consequences for the individual's quality of life and increasing the likely development of further comorbidities over time. [3] In line with expectations from the literature,[13] we find that precursors of eating disorders (i.e. restricting food & perceiving themselves as overweight) are elevated in sexual minorities at this age. At the age of 14 years, sexual minorities were not more likely to engage in regular alcohol consumption, use other drugs, have tried sexual intercourse, or risky sex. Of note, the overall sample prevalence of some of these outcomes were low (e.g. 0·76/1·94% for other drug use).

Alcohol use in sexual minorities is generally elevated on a number of indicators i.e. younger age of initiation and heavy drinking,[15] here we find sexual minorities are more likely to try substances such as alcohol but not regularly. It is likely that, mental social, physical health and mental health outcomes interact in a multi-directional fashion and evidence suggests that social variables play a key part in the dynamic development of later adverse outcomes.[12,20] However, due to the cross-sectional nature of the analysis conducted we could not examine these potentially causal relationships over time.

This is the first study to use a large population-based sample in the UK to estimate discrepancies in a broad host of outcomes within the same sample. This permitted the investigation of the relative increased odds of a range of outcomes and the measurement of cumulative difficulty. We see from these results that sexual minority adolescents are more likely to experience negative outcomes in a range of domains, as well as multiple negative outcomes simultaneously, with nine co-occurring outcomes on average, compared to six in heterosexual adolescents. Given the consequences of cumulative difficulties the associated risk is likely to be additive. Mental health comorbidities are likely to perpetuate one another and increase severity over time.[3] As such, there is likely to be lifelong health and social repercussions associated with the cumulative difficulties seen in sexual minority adolescents. In contrast to findings elsewhere,[30] we do not observe sex differences in the associations between sexuality and outcomes. A recent UK based analysis of adolescents born in the 1990s also did not find a moderation of sex for depressive symptoms and self-harm.[6]

The main strength of this study is that we utilised a probability-based sample allowing the findings to be generalized to the UK population. Also, we used a recent sample of adolescents born in 21st Century, providing a much-needed overview of sexual minority adolescent's experiences who have lived in an era of socio-political change towards equality and diversity.[21] Another strength, is that by assessing multiple domains within the same sample, the relative likelihoods of multiple outcomes can be compared meaningfully. For example, we can see that within this sample mental health factors such as high depressive symptoms are elevated five-fold in sexual minority adolescents but two to

three-fold for most experiences of victimisation and assault. To date, most research in sexual minority youth has focussed on these domains separately, making this relative understanding difficult.

Study limitations include the way in which sexual minority adolescents were identified. Sexuality was derived from responses about sexual attraction. However, given the fluidity of sexuality at this age and the complexity of navigating one's identity during adolescence,[10] attraction was considered an appropriate measure of sexual minority status at this age. Some research shows that across varying labels of sexual minority (i.e. lesbian, gay or bisexual), there are differences in levels of adversity experienced within the sexual minority group itself, specifically with behaviourally bisexual individuals experiencing worse outcomes.[7] In our sample comparisons between bisexual and same sex attracted adolescents were underpowered. Descriptive statistics revealed differences on depressive symptoms only, with bisexual youth being more depressed on average. With the available data we cannot establish whether those experiencing increased odds of poorer outcomes had yet disclosed attraction status at school or to family, and hence we could not examine whether the observed outcomes were different based on disclosure status. Another limitation is that our proxy of risky sex is derived from a question that assumes penile-vaginal intercourse, given that most of the sexual minority sample is female this variable may under-represent 'risky sex' for female sexual minorities.

It is evident that a broad range of disparities based on sexual attraction are visible as early as 14 years of age. Problems such as increased rates of depression, smoking tobacco, and cannabis use are likely to affect sexual minority adolescents throughout the course of their lives, making early intervention a public health priority. Schools provide an ideal infrastructure to implement effective public health change and social policies.[9] In light of this, a new curriculum teaching students about gender and relationship diversity has been developed but the guidance around its implementation currently lacks clarity.[22] Therefore, at the policy level clearer universal education guidelines are needed. Finally, the parental tensions identified for sexual minority adolescents here needs investigating more to see whether support can be offered at the family level and whether there is scope to develop interventions targeting families of sexual minority youth.

To conclude, sexual minority adolescents experienced higher levels of mental health difficulties (e.g. self-harm, depressive symptoms), social adversities (e.g. more bullying, less parental closeness, sexual assault), and health-related behaviours (e.g. smoking and cannabis use). This highlights the need for further prevention efforts and intervention at the school, community and policy level to ensure sexual minority adolescents do not face lifelong negative social, economic and, health outcomes. Despite high profile policies such as the legalisation of same sex marriage in 2013 and the introduction of sexual orientation as a protected characteristic during these adolescents' lifetime, the evidence presented here indicates that large inequalities in social and health outcomes still exist for sexual minority adolescents growing up in the 21st Century.

Contributors

RA was responsible for and led on data analysis, data management, drafting of the manuscript and literature review. PP substantially contributed to the study conceptualisation, analysis plan and drafting of the manuscript. RA, EJM, RW & PP contributed to the overall concept of the paper, study protocol and drafting of the manuscript. All authors critiqued the work for intellectual content, read and revised the article and approved it for submission.

Declaration of interests

All authors report no conflicts of interest.

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Table 1. Adolescent's family composition and social economic status split by sexual attraction (descriptives are also presented for the group that did not have sexual attraction data and are not included in further analysis)

		Heterosexual n= 9256		**Sexual Minority n= 629**		**No attraction data n= 1999**
	n	**Mean or % [95% CI]**	**n**	**Mean or % [95% CI]**	**n**	**Mean or % [95% CI]**
Sex (% Female)	4255	46.02 [44·69,47·34]	466	74.05 [69·29, 78·29]	948	52·52 [49·59, 55·44]
Ethnicity (% minority ethnic group)	1548	16·89 [14·51,19·66]	73	11·59 [6·46, 20·94]	590	36·39 [29·38, 45·11]
Housing (% Homeowner)	5196	57·18 [5519, 59·21]	310	50·21 [43·49, 57·66]	993	51·62 [47·43, 56·09]
Housing (% Renting)	3716	40·91 [37·76,43·88]	298	48·25 [37·24, 61·74]	873	45·26 [39·27, 52·74]
Housing (% Care)	5	0·06 [0·02 0·19]	2	0·25 [0·04, 1·76]	16	0·96 [0·32, 2·82]
Parent education (% NVQ5)	781	8·82 [8·21,9·47]	70	11·82 [9·26, 14·98]	93	4·89 [3·98, 6·00]
Parent education (% NVQ4)	2671	30·16 [29·02,31·32]	194	32·49 [28·19, 37·11]	388	20·39[18·39, 22·55]
Parent education (% NVQ3)	1250	14·11 [13·24,15·03]	74	12·43 [9·46 ,16·17]	262	13·78 [11·91, 15·88]
Parent education (% NVQ2)	2357	26·61 [25·40,27·86]	148	24·76 [20·49, 29·58]	430	22·64 [20·26, 25·21]
Parent education (% NVQ1)	605	6·83 [6·07,7·68]	39	6·51 [4·26, 9·83]	174	9·15 [7·43, 11·21]
Parent Education (% no qualifications)	935	10·56 [9·53,11·68]	63	10·58 [6·99, 15·69]	448	23·58 [20·94, 26·44]
Single parent/guardian1 %	2733	29·56 [28·28,30·87]	213	33·91 [29·15, 39·01]	618	30·94 [28·19, 33·84]
Unemployed parent(s) %	2290	25·85 [24·62 ,27·13]	183	30·63 [25·89, 35·80]	874	45·97 [43·03, 48·94]

Number of siblings in household	..	2·56 [2·54, 2·58]	..	2·31 [2·23, 2·38]	..	2·77 [2·72, 2·83]
Disadvantaged stratum* %	3636	39·30 [37·25, 41·49]	255	40·56 [33·16, 49·76]	859	43·04 [38·37, 48·30]
Income quintile (% lowest)	1612	17·43 [16·31, 18·61]	100	15·85 [12·09, 20·52]	666	33·36 [30·55, 36·29]
Income quintile (% second)	1790	19·35 [18·23, 20·53]	137	21·70 [17·73, 26·27]	441	22·11 [19·61, 24·82]
Income quintile (% third)	1919	20·75 [19·70, 21·85]	133	21·11 [17·17, 25·68]	322	16·12 [14·16, 18·28]
Income quintile (% fourth)	1966	21·26 [20·26, 22·30]	110	17·54 [14·39, 21·22]	304	15·23 [13·41, 17·25]
Income quintile (% highest)	1961	21·20 [20·27, 22·17]	150	23·79 [20·16, 27·85]	263	13·19 [11·59, 14·97]

[1] This refers to biological mother/father or guardian responsible for the young person. *Socio-economically disadvantaged areas. Percentages reflect t proportion of prevalence in each sub group for which data was available, for some questions the full sub sample did not participate and percentages are calculated based on the number of responses available from each sub sample.

Table 2. Descriptive statistics: means, percentages and 95% confidence intervals for all variables of interest, split by sexual attraction

		Heterosexual Mean or % [95% CI]	Sexual Minority Mean or % [95% CI]
Mental health			
Depressive symptoms	(n = 9125/622)	5·53 [5·41, 5·64]	12·77 [12·16, 13·38]
Above depressive symptoms cut-off %	(n = 9125/622)	15·15 [14·19, 16·15]	54·27 [49·24, 59·21]
Low subjective wellbeing†	(n = 9163/623)	15·33 [15·20, 15·47]	20·30 [19·71, 20·90]
Low life satisfaction %	(n = 9204/627)	10·15 [9·33, 11·04]	34·40 [29·63, 39·49]
Self-harm %	(n = 9206/624)	14·20 [13·26, 15·19]	53·78 [48·73, 58·74]
Self-esteem	(n = 9092/621)	9·46 [9·40, 9·52]	11·81 [11·53, 12·10]
Anti-social behaviours			
Stole from another person %	(n = 9225/628)	1·25 [0·98, 1·61]	3·09 [1·83, 5·15]
Hit another person %	(n = 9224/629)	33·76 [32·50, 35·05]	34·31 [29·78, 39·16]
Hit someone with a weapon %	(n = 9225/629)	1·17 [0·89, 1·53]	1·27 [0·55, 2·94]
Health related outcomes			
Ever drank alcohol%	(n = 9227/628)	51·51 [50·17, 52·84]	67·45 [62·52, 72·02]
Regular drinking %	(n = 4048/385)	1·27 [0·94, 1·72]	1·07 [0·36, 3·11]
Ever smoked %	(n = 9203/625)	17·51 [16·47, 18·60]	34·73 [30·02, 39·75]
Regular smoking %	(n = 9201/625)	2·80 [2·33, 3·37]	6·18 [4·13, 9·16]
Ever used cannabis %	(n = 9226/627)	5·56 [4·92, 6·28]	15·87 [12·17, 20·44]
Regular cannabis use %*	(n = 414/76)	49·90 [43·59, 56·22]	35·98 [23·43, 50·80]
Other drug use %	(n = 9224/628)	0·76 [0·55, 1·06]	1·94 [1·00, 3·72]
Sexual activity %	(n = 527/82)	31·42 [26·44, 36·86]	44·24 [31·69, 57·56]
Risky sex %	(n = 154/33)	20·59 [12·60, 31·79]	13·35 [4·34, 34·34]
Overweight/obese %	(n = 8890/595)	25·92 [24·71, 27·18]	33·04 [28·39, 38·04]
Physically inactive	(n = 9231/629)	2·72 [2·70, 2·74]	3·20 [3·12, 3·28]
Exercised to lose weight%	(n = 9212/629)	61·35 [60·03, 62·66]	66·33 [61·31, 71·02]
Dieted to lose weight %	(n = 9204/627)	43·59 [42·28, 44·92]	65·55 [60·48, 70·30]
Perceives self as overweight %	(n = 9209/629)	32·59 [31·35, 33·85]	49·47 [44·49, 54·47]
Interpersonal difficulties			
Sibling bullying %	(n = 8620/582)	26·54 [25·35, 27·77]	37·27 [32·26, 42·58]
Frequency of sibling bullying	(n = 8620/582)	2·72 [2·68, 2·76]	3·24 [3·08, 3·39]
Peer bullying %	(n = 9216/ 628)	10·37 [09·56, 11·23]	27·10 [22·89, 31·76]
Frequency of peer bullying	(n = 9216/ 628)	2·00 [1·97, 2·03]	2·91 [2·76, 3·05]
Cyber Bullying %	(n = 9220/626)	2·32 [1·93, 2·79]	7·56 [5·27, 10·72]
Frequency of cyber bullying	(n = 9220/626)	1·47 [1·45, 1·49]	2·00 [1·89, 2·10]
Verbally assaulted %	(n = 9223/629)	44·94 [43·62, 46·27]	65·86 [61·07, 70·36]
Physically assaulted %	(n = 9221/627)	24·22 [23·07, 25·41]	34·85 [30·21, 39·81]
Hit with a weapon %	(n = 9217/628)	3·70 [3·16, 4·30]	6·55 [4·19, 10·09]
Stolen from %	(n = 9219/628)	7·94 [7·23, 8·74]	12·36 [9·51, 15·91]
Sexually assaulted/harassed %	(n = 9220/627)	2·53 [2·16, 2·96]	11·11 [8·46, 14.47]
Close friends %	(n = 9230/629)	96·93 [96·37, 97·40]	96·41 [93·65, 98·00]
Not close to mother%	(n = 9131/617)	3·02 [2·56, 3·55]	8·74 [6·04, 12·50]
Not close to father%	(n = 8546/568)	11·05 [10·39, 11·72]	16·84 [13·75, 19·93]
Close to mother	(n = 9131/617)	3·20 [3·18, 3·22]	2·83 [2·76, 2·90]
Close to father	(n = 8546/568)	2·84 [2·82, 2·86]	2·49 [2·41, 2·57]
Argues with mother often %	(n = 9117/615)	26·37 [25·20, 27·58]	40·82 [35·85, 45·98]
Argues with father often %	(n = 8531/568)	16·06 [15·06, 17·12]	23·84 [19·73, 28·50]

*Based on those who answered yes to using cannabis. †Higher score indicates lower wellbeing.

Table 3. Regression coefficients, odd ratios and 95% confidence intervals for sexual minorities compared to heterosexual adolescents from multivariable models including control variables

	Odd ratios [95% CI's] (binary outcomes)	**Coef. [95% CI's] (continuous outcomes)**	**p-value***
Mental health			
Depressive symptoms score		6·32 [5·51, 7·13]	<0·0001
Above depressive symptoms cut-off	5·43 [4·32, 6·83]		<0·0001
Subjective wellbeing score†		4·18 [3·38, 4·98]	<0·0001
Low life satisfaction	3·66 [2·92, 4·58]		<0·0001
Self-harm	5·80 [4·55, 7·41]		<0·0001
Self-esteem		1·83 [1·47, 2·19]	<0·0001
Anti-social behaviours			
Stole from another person	3·36 [1·87, 6·01]		<0·0001
Hit another person	1·42 [1·12, 1·79]		0·004
Hit someone with a weapon	1·90 [0·73, 4·97]		0·189
Health-related behaviours			
Ever drank alcohol	1·85 [1·47, 2·33]		<0·0001
Regular drinking	0·50 [0·14, 1·81]		0·288
Ever smoked	2·41 [1·92, 3·03]		<0·0001
Regular smoking	1·84 [1·11, 3·05]		0·018
Ever used cannabis	3·22 [2·24, 4·61]		<0·0001
Regular cannabis use	0·57 [0·27, 1·18]		0·129
Other drug use	2·70 [1·20, 6·09]		0·017
Sexual activity	1·56 [0·81, 3·00]		0·180
Risky sex	0·54 [0·14, 2·07]		0·365
Overweight/obese	1·35 [1·08, 1·67]		0·007
Physically inactive		0·36 [0·25, 0·46]	<0·0001
Exercised to lose weight	1·04 [0·82, 1·32]		0·746
Dieted to lose weight	1·98 [1·58, 2·48]		<0·0001
Perceives self as overweight	1·73 [1·40, 2·14]		<0·0001
Interpersonal difficulties			
Sibling bullying		0·48 [0·26, 0·70]	<0·0001
Sibling bullying	1·62 [1·25, 2·09]		<0·0001
Peer bullying		0·92 [0·70, 1·13]	<0·0001
Peer bullying	3·36 [2·56, 4·40]		<0·0001
Cyber Bullying		0·42 [0·28, 0·56]	<0·0001
Cyber Bullying	2·62 [1·66, 4·14]		<0·0001
Verbally assaulted	2·25 [1·79, 2·84]		<0·0001
Physically assaulted	2·15 [1·69, 2·74]		<0·0001
Sexually assaulted/harassed	3·38 [2·36, 4·85]		<0·0001
Hit with a weapon	2·14 [1·28, 3·58]		0·004
Stolen from	1·61 [1·14, 2·28]		0·007
Close friends	0·64 [0·35, 1·16]		0·142

Close to mother		-0·35 [-0·45, -0·25]	<0·0001
Close to father		-0·29 [-0·39, -0·18]	<0·0001
Not close to mother	2·42 [1·58, 3·73]		<0·0001
Not close to father	1·47 [1·05, 2·07]		0·026
Argues with mother often	1·71 [1·33, 2·21]		<0·0001
Argues with father often	1·62 [1·25, 2·11]		<0·0001

*FDR corrected p value of .00879. Sex, socioeconomic factors; parental income, number of siblings, housing tenure and ethnicity variables were controlled for in all models in this table. †higher scores indicate less wellbeing (max score = 49). Heterosexual adolescents were used as the reference group.

SUPPLEMENTARY MATERIAL

Mental health, social adversity & health-related outcomes in sexual minority adolescents: findings from a contemporary national cohort study

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Table S1. Outcome measures and how they are assessed and coded in analysis

Variable	Question asked /measure used	Variable recoding	Variable name
Sexual attraction†	'Have you ever been attracted to a female/male?'	Heterosexual = attracted to opposite sex/not attracted to same sex Sexual minority = Attracted to same sex/both sexes	**Sexual attraction**
Mental Health			
Depressive symptoms	Short mood and feelings questionnaire[1] This is a 13-item measure with a 0-2 response scale (0=Not true, 2= True). (Cronbach's α = ·93)	Score total on measure (continuous) Exceeds/equal to a clinical score of > =12 (binary) 0 = Non-clinical 1 = Clinical	**Depressive symptoms** **Above depressive symptoms cut-off**
Subjective wellbeing	On a scale of 1 to 7 where '1' means completely happy and '7' means not at all happy, how do you feel about the following parts of your life? (Cronbach's α = ·84) - Your schoolwork - The way you look - Your family - Your friends - The school you go to - Your life as a whole	Addition of all items = score total (continuous)	**Subjective wellbeing**
Life satisfaction	Using response to the 'your life as a whole' question.	0 = Happy (responses 1-4) 1 = Less/not at all happy (responses 5-7)	**Low life satisfaction**
Self-harm	'In the past year have you hurt yourself on purpose in any way?'	0 = No 1 = Yes	**Self-harm**
Self-esteem	5 Positive self-esteem items were used from the Rosenberg scale.[2] (Cronbach's α = ·90)	Addition of all items = score total (continuous)	**Self-esteem**
Anti-social behaviours	'In the last 12 months have you done any of the following things?' - Stolen something from someone. e.g. a mobile phone, money etc.? - Pushed or shoved/hit/slapped/punched someone? - Used or hit someone with a weapon?	0 = No 1 = Yes	**Stole from another person** **Hit another person** **Hit someone with a weapon**
Health-related outcomes			

Smoking	'Please read the following statements carefully and decide which one best describes you.' - 1= I have never smoked cigarettes - 2= I have only ever tried smoking cigarettes once - 3= I used to smoke sometimes but I never smoke a cigarette now - 4= I sometimes smoke cigarettes now, but I don't smoke as many as one a week - 5= I usually smoke between one and six cigarettes a week - 6= I usually smoke more than six cigarettes a week	0 = Never smoked (a response of 1) 1 = Ever smoked (responses 2-6) 0 = Non-regular smoker (1- 4 response) 1 = Regular smoker (5-6 response)	**Ever smoked** **Regular smoking**
Drinking alcohol	'Have you ever had an alcoholic drink? That is more than a few sips?'	0 = No 1 = Yes	**Ever drank alcohol**
	'How many times have you had an alcoholic drink in the last 4 weeks?' - 1 = Never - 2 = 1-2 times - 3 = 3-5 times - 4 = 6-9 times - 5 = 10-19 times - 6 = 20-39 times - 7 = 40 or more times	0 = Not a regular drinker (1-4 response) 1 = Regular drinker (5-7 response)	**Regular drinking**
Drug use	'Have you ever tried any of the following things?' - Cannabis (also known as weed, marijuana, dope, hash or skunk)? - Any other illegal drug (such as ecstasy, cocaine, speed)?	0 = No 1 = Yes	**Cannabis use /Other drug use**
	'How many times have you used or smoked cannabis or weed?' - 1 = Once or twice - 2 = Three or four times - 3 = Five to ten times - 4 = More than ten times	0 = Non regular use (response of 1) 1 = Regular cannabis use (response of 2-4)	**Regular cannabis use**
Sexual activity	'In the last 12 months have you had sexual intercourse with another young person?'	0 = No 1 = Yes	**Sexual activity**
Risky sex	'The last time you had sex which of the following did you do?'	0 = Not risky sex (responses of 1 -2) 1 = Risky sex (a response of 3)	**Engaged in risky sex ***

	- 1 = Used a condom - 2 = Used another form of contraceptive - 3 = Did not use any contraception		
Overweight/obese	International obesity taskforce (IOTF) thresholds were calculated for adolescents as follows: - 0 = Not overweight (including underweight) - 1 = Overweight - 2 = Obese	0 = Not overweight 1 = Overweight/obese	**Overweight/obese**
Weight perception	'Which of these do you think you are?' - 1 = Underweight - 2 = About the right weight - 3 = Slightly overweight - 4 = Very overweight	0 = Does not perceive self as overweight (responses 1-2) 1 = Perceives self as overweight (responses 3-4)	**Perceives self as overweight**
Physically inactive	'How many days in the last week were spent doing vigorous physical activity' - 1 = Everyday - 2 = 5-6 days - 3 = 3-4 days - 4 = 1-2 days - 5 = Not at all	Continuous variable	**Physically inactive**
Dieted to lose weight	'Have you ever eaten less food, fewer calories, or foods low in fat to lose weight or to avoid gaining weight?'	0 = No 1 = Yes	**Dieted to lose weight**
Exercised to lose weight	'Have you ever exercised to lose weight or to avoid gaining weight?'	0 = No 1 = Yes	**Exercised to lose weight**
Interpersonal difficulties			
Bullying	On a scale of 1-6 (1= Never, 6 = Most days):	Continuous variable	
	- How often do other children hurt you or pick on you on purpose?'	0 = not bullied (Once a month or less) 1 = bullied (At least once a week) ††	**Peer bullying**
	- How often have other children sent you unwanted or nasty emails, texts or messages or posted something nasty about you on a website?		**Cyber bullying**
	- How often do you hurt or pick on your brothers or Sisters on purpose?		**Sibling bullying**

Victimisation	'In the past 12 months has anyone done any of these things to you?'	0 = No 1 = Yes	
	- Insulted you, called you names, threatened or shouted at you in a public place, at school or anywhere else?		**Verbally assaulted**
	- Been physically violent towards you, e.g. pushed, shoved, hit, slapped or punched you?		**Physically assaulted**
	- Hit you with or used a weapon against you?		**Hit with a weapon**
	- Stolen something from you e.g. a mobile phone, money etc.?		**Stolen from**
	- Made an unwelcome sexual approach to you or assaulted you sexually?		**Sexually assaulted**
Friendship	'Do you have any close friends?'	0 = No 1 = Yes	**Close friends**
Parental relations	'Overall, how close would you say you are to your mother/father?' - 1 = Not very close - 2 = Fairly close - 3 = Very close - 4 = Extremely close	Continuous variable 0 = Close to mother/father (responses 2-4) 1 = Not close to mother/father (response 1)	**Not close to mother/father**
	'How often do you argue with your mother/father?' - 1= Most days - 2= More than once a week - 3= Less than once a week - 4= Hardly ever - 5= Never	0 = Infrequently (responses 3-5) 1 = Frequently (responses 1-2)	**Argues with mother/father often**
Cumulative difficulties	All binary scores were summed and means scores calculated in the following domains: - Mental health - Anti-social behaviours - Health-related behaviours - Interpersonal difficulties - All	Percentages and averages were used for both groups	**Cumulative difficulties**

†Sex is recorded in this study as the biological assigned sex at birth, which helped the formation of this variable. *If a participant answered no to having engaged in sexual activity, they would not be asked the question about safe sex. ††Binary transformation based on transformation used in previous literature[3]

Table S2. Correlations among all variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1. Depressive symptoms	1																													
2. Low life satisfaction	0.58	1																												
3. Self-harm	0.52	0.34	1																											
4. Self-esteem	0.6	0.58	0.35	1																										
5. Sibling bullying	0.2	0.19	0.12	0.15	1																									
6. Peer bullying	0.28	0.24	0.19	0.18	0.22	1																								
7. Cyber Bullying	0.24	0.15	0.21	0.14	0.11	0.33	1																							
8. Verbally assaulted	0.35	0.27	0.24	0.23	0.15	0.31	0.16	1																						
9. Physically assaulted	0.25	0.19	0.18	0.11	0.13	0.28	0.15	0.4	1																					
10. Hit with a weapon	0.18	0.15	0.12	0.09	0.08	0.14	0.15	0.18	0.3	1																				
11. Stolen from	0.18	0.16	0.14	0.11	0.09	0.17	0.15	0.18	0.24	0.2	1																			
12. Sexually assaulted/harassed	0.21	0.14	0.19	0.13	0.05	0.11	0.12	0.13	0.11	0.11	0.13	1																		
13. Close friends	-0.06	-0.1	-0.03	-0.5	-0.01	-0.09	-0.03	-0.04	-0.06	-0.03	-0.02	-0.06	1																	
14. Close to mother	-0.28	-0.36	-0.17	-0.3	-0.14	-0.11	-0.07	-0.13	-0.08	-0.08	-0.07	-0.08	0.05	1																
15. Close to father	-0.26	-0.34	-0.16	-0.27	-0.1	-0.08	-0.06	-0.12	-0.09	-0.07	-0.06	-0.08	0.02	0.43	1															
16. Argues with mother often	0.26	0.25	0.18	0.19	0.2	0.12	0.09	0.14	0.13	0.08	0.07	0.08	-0.02	-0.26	-0.14	1														
17. Argues with father often	0.19	0.19	0.14	0.11	0.16	0.14	0.08	0.13	0.12	0.09	0.07	0.04	-0.05	-0.1	-0.17	0.38	1													
18. Stole from another person	0.09	0.1	0.07	0.06	0.05	0.05	0.05	0.06	0.11	0.13	0.15	0.11	-0.01	-0.05	-0.03	0.05	0.06	1												
19. Hit another person	0.14	0.14	0.11	0.03	0.09	0.12	0.07	0.27	0.43	0.17	0.16	0.07	-0.02	-0.12	-0.09	0.16	0.12	0.11	1											
20. Hit someone with a weapon	0.05	0.06	0.06	0.001	0.05	0.05	0.01	0.06	0.12	0.28	0.11	0.05	-0.01	-0.27	-0.04	0.02	0.06	0.21	0.15	1										
21. Ever drank alcohol	-0.21	-0.19	-0.19	-0.17	-0.05	-0.03	-0.04	-0.19	-0.16	-0.07	0.1	-0.09	-0.05	0.13	0.11	-0.15	-0.09	-0.06	-0.2	-0.08	1									
22. Ever smoked	0.22	0.21	0.2	0.16	0.05	0.04	0.08	0.13	0.14	0.11	0.11	0.12	0.008	-0.16	-0.18	0.15	0.09	0.06	0.18	0.09	-0.32	1								

23. Ever used cannabis	0.18	0.15	0.15	0.1	0.03	0.03	0.09	0.1	0.13	0.12	0.11	0.13	-0.05	-0.13	-0.13	0.11	0.07	0.1	0.16	0.12	-0.22	0.47	1							
24. Other drug use	0.09	0.06	0.1	0.03	0.006	0.05	0.11	0.04	0.07	0.1	0.06	0.1	-0.03	-0.08	-0.07	0.07	0.06	0.08	0.09	0.14	-0.08	0.16	0.33	1						
25. Sexual activity	0.15	0.11	0.15	0.1	0.03	0.03	-0.03	-0.02	-0.06	0.02	-0.002	0.01	-0.06	-0.12	-0.17	0.12	0.002	0.07	-0.02	0.06	-0.15	0.29	0.35	0.17	1					
26. Overweight/obese	0.08	0.09	0.04	0.11	0.02	0.02	0.02	0.04	0.02	0.02	0.04	0.02	-0.01	0.01	-0.04	-0.001	0.004	0.002	0.002	0.01	-0.04	0.05	0.03	-0.01	-0.04	1				
27. Physically inactive	0.12	0.14	0.05	0.19	0.02	0.04	-0.01	0.02	-0.05	-0.02	-0.05	0.02	-0.06	-0.07	-0.1	-0.02	-0.01	0.01	-0.09	-0.02	0.05	-0.02	-0.03	-0.01	0.13	0.11	1			
28. Exercised to lose weight	0.18	0.14	0.12	0.16	0.05	0.008	0.03	0.07	0.04	0.02	0.05	0.05	0.06	-0.04	-0.04	0.05	0.03	0.04	0.04	0.003	-0.11	0.09	0.05	0.02	0.01	0.27	-0.05	1		
29. Dieted less to lose weight	0.29	0.21	0.21	0.25	0.1	0.02	0.07	0.11	0.05	0.02	0.08	0.08	0.03	-0.06	-0.09	0.09	0.06	0.04	0.03	0.0002	-0.11	0.1	0.06	0.02	0.07	0.3	0.03	0.51	1	
30. Perceives self as overweight	0.23	0.22	0.15	0.27	0.07	0.06	0.04	0.09	0.04	0.03	0.04	0.05	-0.02	-0.07	-0.08	0.07	0.05	0.03	0.02	0.02	-0.07	0.09	0.04	0.01	0.1	0.15	0.15	0.31	0.4	1

Table S3. Descriptive statistics, means, percentages and 95% confidence intervals split by sexual attraction type.

		Bisexual attraction n = 576	**Same sex attraction n = 50**
Mental health			
Depressive symptoms	(n = 571/48)	13·07 [12·44, 13·70]	9·29 [6·97, 11·61]
Above clinical cut off %	(n = 571/48)	56·15 [50·92, 61·25]	31·21 [17·97, 48·45]
Subjective wellbeing score†	(n = 572/48)	20·53 [19·91, 21·15]	17·66 [15·55, 19·77]
Low life satisfaction %	(n = 575/49)	34·75 [29·79, 40·08]	31·74 [16·57, 52·11]
Self-harm %	(n = 571/49)	54·13 [48·84, 59·33]	48·97 [31·77, 66·41]
Self-esteem	(n = 569/49)	11·92 [11·62, 12·21]	10·71 [9·59, 11·83]
Anti-social behaviours			
Stole from another person %	(n = 575/50)	3·13 [1·82, 5·32]	2·75 [0·36, 18·18]
Hit another person %	(n = 576/50)	33·91 [29·22, 38·94]	37·84 [21·81, 57·04]
Hit someone with a weapon %	(n = 576/50)	1·26 [0·51, 3·10]	··
Health related outcomes			
Ever drank alcohol%	(n = 575/50)	68.84 [63·75, 73·52]	51.49 [33·93, 68·70]
Regular drinking %	(n = 359/25)	1·10 [0·36, 3·33]	0·58 [0·07, 4·78]
Ever smoked %	(n = 572/50)	34·58 [29·65, 39·86]	34·77 [20·12, 53·00]
Regular smoking %	(n = 572/50)	5·85 [3·76, 9·01]	10·12 [3·67, 24·97]
Ever used cannabis %	(n = 574/50)	16·30 [12·36, 21·19]	10·04 [3·52, 25·46]
Regular cannabis use %	(n = 70/5)	35·84 [22·76, 51·42]	27·77 [1·86, 88·64]
Other drug use %	(n = 575/50)	1·72 [0·79, 3·68]	2·79 [0·65, 11·22]
Sexual activity %	(n = 76/7)	42·25 [29·28, 56·39]	66·22 [18·24, 94·51]
Risky sex %	(n = 29/4)	15·24 [4·91, 38·50]	··
Overweight/obese %	(n = 545/47)	33·09 [28·22, 38·35]	33·96 [19·50, 52·18]
Physically inactive	(n = 576/50)	3·22 [3·13, 3·31]	3·07 [2·69, 3·44]
Exercised to lose weight%	(n =576/50)	67·71 [62·48, 72·52]	50·54 [33·15, 67·81]
Dieted to lose weight %	(n = 574/50)	66·60 [61·31, 71·50]	53·45 [35·54, 70·52]
Perceives self as overweight %	(n =576/50)	49·61 [44·39, 54·84]	50·04 [32·75, 67·32]
Interpersonal difficulties			
Sibling bullying %	(n = 530/49)	38·26 [32·94, 43·87]	23·85 [12·65, 40·37]
Frequency of sibling bullying	(n = 530/49)	3·28 [3·12, 3·45]	2·63 [2·10, 3·17]
Peer bullying %	(n =575/50)	27·32 [22·88, 32·26]	25·84 [14·31, 42·09]
Frequency of peer bullying	(n = 575/50)	2·96 [2·81, 3·10]	2·39 [1·87, 2·90]
Cyber Bullying %	(n = 573/50)	8·18 [5·69, 11·62]	0·89 [0·19, 4.13]
Frequency of cyber bullying	(n = 573/50)	2·03 [1·92, 2·14]	1·66 [1·34, 1·97]
Verbally assaulted %	(n = 576/50)	67·03 [62·03, 71·67]	52.32 [34·86, 69·24]
Physically assaulted %	(n =574/50)	35·74 [30·82, 40·99]	24·91 [13·80, 40·73]
Hit with a weapon %	(n = 575/50)	6·81 [4·29, 10·64]	2·46 [0·32, 16·58]
Stolen from %	(n = 575/50)	12·48 [9·47, 16·27]	11·54 [4·84, 25·06]
Sexually assaulted/harassed %	(n = 575/50)	11·51 [8·68, 15·13]	6·91 [2·55, 17·39]
Close friends %	(n =576/50)	97·31 [95·25, 98·49]	86·04 [58·56, 96·41]

Not close to mother%	(n = 565/49)	9·14 [6·25, 13·19]	4·59 [0·95, 19·48]
Not close to father%	(n =519/47)	16·84 [13·08, 21·43]	17·26 [8·37, 32·29]
Close to mother	(n = 565/49)	2·83 [2·75, 2·90]	2·89 [2·62, 3·16]
Close to father	(n = 519/47)	2·49 [2·41, 2·57]	2·48 [2·21, 2·75]
Argues with mother often %	(n = 563/49)	41·83 [36·58, 47·27]	29·65 [17·22, 46·08]
Argues with father often %	(n = 519/47)	23·78 [19·58, 28·56]	25·15 [11·01, 47·71]

†Maximum score is 49, higher scores indicate less subjective wellbeing.

MESH terms used in literature search via PubMed

Sexual & gender minority

- Non-Heterosexuals
- Non Heterosexuals
- Non-Heterosexual
- Sexual Dissidents
- Dissident, Sexual
- Dissidents, Sexual
- Sexual Dissident
- GLBT Persons
- GLBT Person
- Person, GLBT
- Persons, GLBT
- GLBTQ Persons
- GLBTQ Person
- Person, GLBTQ
- Persons, GLBTQ
- LGBT Persons
- LGBT Person
- Person, LGBT
- Persons, LGBT
- LGBTQ Persons
- LGBTQ Person
- Person, LGBTQ
- Persons, LGBTQ
- Lesbigay Persons
- Lesbigay Person
- Person, Lesbigay
- Persons, Lesbigay
- Non-Heterosexual Persons
- Non Heterosexual Persons
- Non-Heterosexual Person
- Person, Non-Heterosexual
- Sexual Minorities
- Minorities, Sexual
- Minority, Sexual
- Sexual Minority
- LBG Persons
- LBG Person
- Person, LBG
- Persons, LBG
- Gays
- Gay
- Men Who Have Sex With Men
- Gender Minorities
- Gender Minority
- Minorities, Gender
- Minority, Gender
- Lesbians
- Lesbian
- Women Who Have Sex with Women
- Bisexuals

- Bisexual
- Homosexuals
- Homosexual
- Queers
- Queer

Health

- Adolescent Health
- Cardiorespiratory Fitness
- Child Health
- Family Health
- Global Health
- Holistic Health
- Infant Health
- Men's Health
- Mental Health
- Minority Health
- Occupational Health
- One Health
- Oral Health
- Physical Fitness
- Cardiorespiratory Fitness
- Physical Functional Performance +
- Population Health
- Rural Health
- Suburban Health
- Urban Health
- Public Health
- Reproductive Health
- Sexual Health
- Social Determinants of Health
- Veterans Health
- Women's Health
- Maternal Health

Population characteristics

- Characteristic, Population
- Characteristics, Population
- Population Characteristic
- Population Statistics
- Statistics, Population
- Population Heterogeneity
- Heterogeneity, Population

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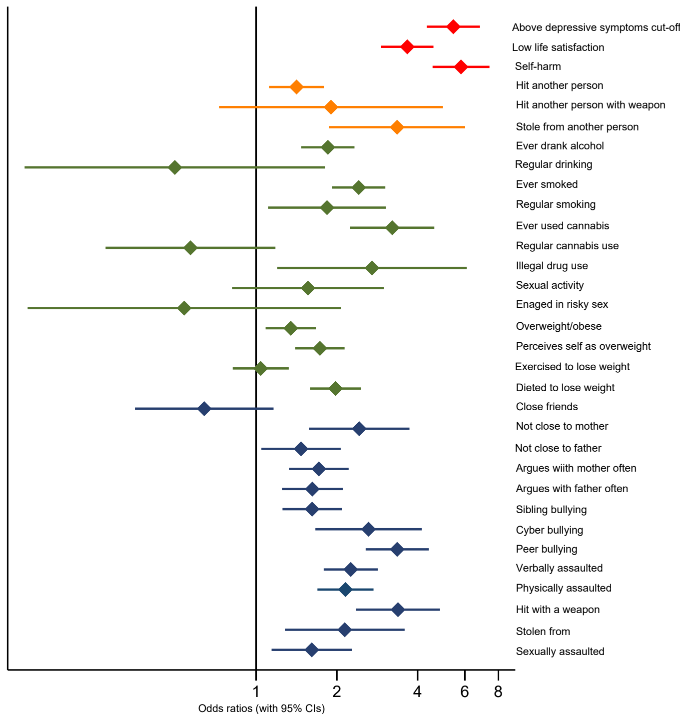
3. Patalay P, Fitzsimons E. Correlates of mental illness and wellbeing in children: are they the same? Results from the UK Millennium Cohort Study. Journal of the American Academy of Child & Adolescent Psychiatry. 2016 Sep 1;55(9):771-83.

Figure 1. Odd ratios for sexual minorities compared to heterosexual adolescents



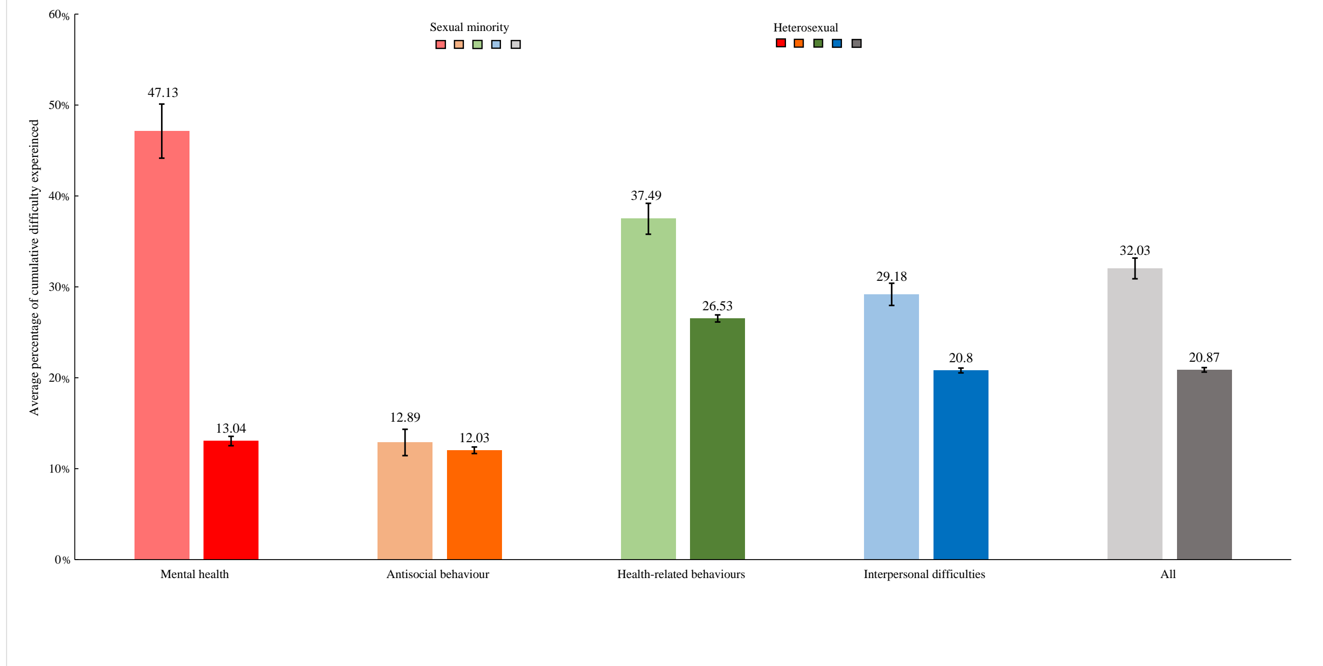


Figure 2. Percentage of cumulative difficulty experienced by sexual minority and heterosexual adolescents across domains of adversity