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Trends in adolescent emotional problems in Wales between 2013 and 2019: the contribution of peer relationships

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Background: Epidemiological evidence shows a substantial increase in adolescent emotional problems in many countries, but reasons for this increase remain poorly understood. We tested change in emotional problems in a national sample of young people in Wales in 2013, 2017 and 2019 using identical symptom screens, and examined whether trends were accounted for by changes in youth friendship quality and bullying. **Methods:** The present study of 230,735 11–16-year olds draws on repeat cross-sectional data obtained on three occasions (2013, 2017 and 2019) in national school-based surveys in Wales (conducted by the School Health Research Network). Emotional problems were assessed with a brief validated symptom screen (the SCL-4). **Results:** There was a significant increase in emotional problem scores between 2013 and 2019 (*b*[95% CI] = 1.573 [1.380, 1.765]). This increase was observed for all ages and was more pronounced for girls than boys (interaction *b* [95% CI] = 0.229 [0.004, 0.462]) and for young people from less affluent families (interaction *b* [95% CI] = −0.564[−0.809, −0.319]). Of the total sample, 14.2% and 5.7% reported frequent face-to-face and cyberbullying respectively. There were modest decreases in friendship quality and increases in rates of bullying between 2013 and 2019, but accounting for these changes did not attenuate estimates of the population-level increase in emotional problems. **Conclusions:** This study provides evidence of a substantial increase in emotional problems among young people in Wales, particularly for young people from less affluent backgrounds. Changes in bullying or friendship quality did not explain this increase. **Keywords:** Mental health; emotional problems; trends; adolescents; social relationships; social inequalities.

Emotional problems (anxiety and depression) are associated with distress, impairment and poor long-term outcomes. For many individuals, these problems are first experienced in childhood and adolescence (Kessler et al., 2005; Uhlhaas et al., 2023). There has been a marked rise in the prevalence of emotional problems in recent decades observed in epidemiological studies in a number of countries using symptom scales and structured diagnostic assessments (Collishaw, 2015; Patalay & Gage, 2019; Pitchforth et al., 2019; Sadler et al., 2018; Wilson & Dumornay, 2022). Two important and related questions remain largely unresolved. The first question is what explains the rise in emotional problems in young people. The second is whether increases in emotional problems have impacted different socio-demographic groups to differing degrees.

Only a few studies have examined possible explanations for temporal increases in youth emotional problems using linked data on trends in emotional problems and possible explanatory factors. Studies have tested changes in family life, parenting practices and parent mental health (Collishaw, Gardner, Maughan, Scott, & Pickles, 2012; Collishaw, Goodman, Pickles, & Maughan, 2007; Schepman et al., 2011), exam-related stress (Högberg, Strandh, & Hagquist, 2020; West & Sweeting, 2003), health-related behaviours (Patalay & Gage, 2019) and the increasing use of digital technology (Twenge, 2020). Findings suggest that changes in some of these areas of young people's lives might have contributed to trends in mental health, but factors considered to date do not fully explain the substantial increases in youth emotional problems over recent decades (Collishaw & Sellers, 2020). It is therefore important to consider other factors that may play a role.

Developmental theory emphasises the importance of social relationships in adolescence (Blakemore & Mills, 2014). Good quality friendships provide support and enjoyment and are linked with young people's self-efficacy, self-esteem and better mental health (van Harmelen et al., 2016). In contrast, adverse social experiences, such as frequent bullying, are associated with a wide range of adverse health and psychosocial consequences (Arseneault, 2018; Moore et al., 2017; Singham et al., 2017); a recent meta-analysis of quasi-experimental studies provides evidence consistent with a causal effect of bullying on

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emotional problems (Schoeler, Duncan, Cecil, Ploubidis, & Pingault, 2018). Efforts to reduce bullying victimisation have shown promise in recent studies from a number of countries (Bonell et al., 2018; Tiiri et al., 2020); however, studies tracking trends in bullying provide mixed evidence on population-level trends across different countries (Cosma, Whitehead, Neville, Currie, & Inchley, 2017; Molcho et al., 2009; Smith et al., 2023). In the UK, rates of bullying victimisation remained fairly stable between 2002 and 2010 and increased when assessed again in 2014 (Cosma et al., 2020). In contrast to studies tracking bullying, little is known about trends in youth-reported friendship quality (Currie & Morgan, 2020). In summary, it remains uncertain whether and how young people's social relationships have changed over recent decades, and we are not aware of any studies testing whether changes in social relationships have contributed to trends in emotional problems. More evidence is needed that examines trends in adolescent social relationships encompassing both positive and negative experiences, and importantly whether any change in social relationships has impacted population trends in mental health.

When considering secular trends in youth mental health and social relationships, it is important to recognise that trends may vary across socio-demographic factors. For example, long-term increases in youth emotional problems appear more pronounced for girls compared to boys, and for adolescents compared to children (Collishaw, 2015). In addition, mental health problems are more common among young people from poorer backgrounds (Bor, Dean, Najman, & Hayatbakhsh, 2014; Sadler et al., 2018), and inequalities in young people's mental health have likely increased (Collishaw, Furzer, Thapar, & Sellers, 2019; Royal College of Paediatrics and Child Health, 2017). An additional aim, therefore, is to test differences in trends in youth mental health and social relationships by age, sex and family affluence.

To directly test changes in population prevalence, it is important to compare unselected population cohorts using the same instruments and methodology on each occasion. The School Health Research Network has undertaken a national, school-based survey of young people in Wales, and this presents an unrivalled opportunity to examine trends in youth mental health at scale – utilising very large representative cohorts of children aged 11–16 years assessed in comparable ways across three occasions – 2013, 2017, 2019.

Using data from these representative surveys of young people in Wales, UK we tested the following research questions:

1 Have rates of adolescent emotional problems changed from 2013 to 2019?
2 Do changes in emotional problems vary by gender, child age or family affluence?
3 Has the quality of young people's social relationships changed from 2013 to 2019 (friendship quality, face-to-face bullying, cyberbullying)?
4 Do changes in young people's social relationships vary by gender, child age or family affluence?
5 To what extent do any changes in social relationships account for changes in young people's emotional problems?

Methods

Samples

The study used data from the 2013 Welsh Health Behaviour in School-aged Children (HBSC) and the 2017 and 2019 School Health Research Network (SHRN) Student Health and Well-being surveys (Murphy et al., 2021). These surveys provide national data on the health and well-being of school students in Wales using a common sampling frame and measurement protocol. In 2013, schools were selected for participation with a probability proportionate to their size, and one class per school year was randomly selected for participation. In 2017 and 2019, all maintained secondary schools in Wales and all classes per year group were eligible for participation. All surveys were completed during the first school term (September to December), and the 2019 survey was undertaken prior to the COVID-19 pandemic. All eligible schools were invited to participate, with student consent sought at the beginning of each survey. Parental consent followed an opt-out process in the 2017 and 2019 surveys, having switched from opt-in consent in 2013/2014. Response rates for each survey are as follows (2013: 46% school level, 91% pupil level; 2017: 89% school level, 73% pupil level; 2019: 94% school level, 77% pupil level). Please see Figure S1 for details of each survey. Further detailed methods can also be found elsewhere (Hewitt, Anthony, Moore, Melendez-Torres, & Murphy, 2019; Page, Hewitt, Young, Moore, & Murphy, 2021; Welsh Government, 2015). This resulted in survey data collected as follows: 2013 School n = 82, Student n = 7,376; 2017 School n = 193, Student n = 103,971; 2019 School n = 198, Student n = 119,388.

Survey procedure and ethics

The 2013 survey was paper-based and supervised by researchers, whereas the 2017 and 2019 surveys were delivered electronically and supervised by teachers. Schools were asked to organise classrooms to ensure privacy for students, and supervising staff were asked to remain at the front of the classroom unless a student asked for help. Students were provided with information about the surveys, and the first question asked for their consent to take part which if they declined closed the survey. Students also had the opportunity to withdraw from data collection at any time. All questions included an additional response option, 'I do not want to answer', except the consent and year group questions. To maximise the capacity for a broader range of questions, both the 2017 and 2019 surveys had a number of different pathways (or 'routes'), with some common items included within all routes (asked of all students) and some included only in certain routes (asked of subsamples of students). In the current study, all questions presented in the main analyses were included across all survey routes, with the exception of friendship quality which was included for 28% of students in 2017 and 50% in 2019. Details of routings are included in Figure S1. The surveys were each approved by the Cardiff University School of Social Sciences Ethics Committee.

Measures

Socio-demographics. Students reported their gender ('boy', 'girl' or 'neither word describes me': the latter an additional response option introduced in 2019). Students in 2019 who stated that neither gender best described them (n = 1,472, 1.25%) were excluded from the pooled sample given that this categorisation was only introduced in 2019 and thus temporal change in emotional problems for this group could not be examined. Students reported their school grade (UK school years 7–11 corresponding to the 5 years of compulsory secondary education from 11 to 16 years), used as a proxy for age. Family affluence was assessed using the Family Affluence Scale III, which comprises six items about family assets reported by young people (Hartley, Levin, & Currie, 2016), and which has been validated cross-nationally against measures of household income (Torsheim et al., 2016). Respondents reported the household's number of cars (none, one, two or more), computers (none, one, two and more than two) and bathrooms (none, one, two and more than two), whether they had their own bedroom (no and yes), whether they had a dishwasher (no and yes) and the number of holidays spent abroad in the past year (not at all, once, twice and more than twice). The scores for each item were summed to give a total affluence score ranging from 0 to 13 and then split into three groups (low – 0 to 8, medium – 9 to 10 and high affluence, 11 to 13).

Emotional problems. The Health Behaviour in School-aged Children Symptom Checklist (HBSC-SCL) assesses the occurrence of eight somatic and emotional problems. We focus on the 4-items psychological sub-scale (Gariepy, McKinnon, Sentenac, & Elgar, 2016). Participants were asked about the frequency with which they had felt each of the following over the past 6 months: (a) Feeling low, (b) Irritability or bad temper, (c) Feeling nervous and (d) Difficulties in getting to sleep (the items were reverse coded and responses included: (4) 'About every day', (3) 'More than once a week', (2) 'About every week', (1) 'About every month', (0) 'Rarely or never'). Complete case responses were summed to form a scale score ranging from 0 to 16. The internal consistency of the items was adequate across the surveys (Cronbach's α = .77 in 2013; α = .75 in 2017; α = .77 in 2019). Other studies have reported high reliability and validity with respect to measures of emotional problems of this 4-item subscale for adolescents between 11 and 15 years (Gariepy et al., 2016). Additionally, our own analysis provided evidence of good validity with respect to a well-established measure of depression symptoms in the SHRN 2019 sample, and of DSM-IV major depressive disorder in a sample of young people with a parent with a history of major depressive disorder (The Early Prediction of Adolescent Depression study; EPAD; Mars et al., 2012). See Appendix S1 for full details of validation. Main analyses use the mean emotional problem score, but for descriptive purposes, we also examine the proportion with high emotional problem scores using a threshold of SCL4 > 7 suggested by the validation analyses (see Appendix Figures S1 and S2).

Social relationships. Friendship quality: Young people were asked to indicate their agreement or disagreement with four items on a 7-point Likert scale, relating to the extent to which they felt that friends tried to help them, could be counted on when things go wrong, could share in joys and sorrows, and that they could talk easily to friends. Response options ranged from very strongly disagree (1) to very strongly agree (7). Due to survey routing (see above), these questions were asked to 28% of respondents in 2017 and 50% in 2019. Items were converted to a mean scale score ranging from 1 to 7 for respondents who answered at least three out of four items. Scale items demonstrated good internal consistency (Cronbach's α = .95 in 2013; α = .96 in 2017; α = .96 in 2019).

Experience of bullying (face to face): Students were asked 'how often have you been bullied at school' in the past 2 months. Response options included 'I have not been bullied', 'it has happened once or twice', '2 or 3 times a month', 'about once a week' and 'several times a week'. Response options were combined into 'frequently bullied' if they reported being bullied 2 or 3 times a month or more in the past 2 months.

Experience of cyberbullying: Participants were asked if in the last 2 months they had ever been cyberbullied 'e.g., someone sent mean instant messages, email or text messages about you, wall postings, created a website making fun of you, posted unflattering or inappropriate pictures of you online without permission or shared them with others'. As with face-to-face bullying, response options included 'I have not been bullied', 'it has happened once or twice', '2 or 3 times a month', 'about once a week' and 'several times a week'. Response options were combined into 'frequently cyberbullied' if they reported being cyberbullied 2 or 3 times a month or more in the past 2 months.

Analysis

Statistical analyses were conducted using STATA 16 (StataCorp, 2019). Descriptive data are presented as frequencies and percentages. Emotional problem scores and associated standard errors among the whole population and stratified by survey year are presented for years 2013, 2017 and 2019.

To address research question 1, linear regression analysis examined categorical survey years as a predictor (2017 vs. 2013 and 2019 vs. 2013) of emotional problem scores. Analysis was conducted first with no covariates (unadjusted) and then repeated while adjusting for child gender, age, and family affluence to account for any cross-survey differences in response rate by gender, age or affluence.

To address research question 2, analyses were stratified by gender, age and family affluence. Differences in trends in emotional problems for each demographic variable were then examined by testing two-way interactions of survey year × each demographic.

To address research question 3, we tested for differences between surveys in mean friendship quality using linear regression and rates of frequent bullying and cyberbullying using logistic regression, with survey year entered as a categorical predictor (2013 as the reference). All analyses were conducted without covariates (unadjusted model) and again controlling for age, gender and family affluence (adjusted model).

Next, to address research question 4, analyses of social relationship outcomes were repeatedly stratified by gender, age and family affluence. In addition, two-way interactions of survey year × each demographic were tested.

To address research question 5, we compared unadjusted and adjusted (for changes in social relationships) estimates of change in mean emotional problems by survey year.

All models were conducted using complete case analysis and included cluster-robust standard errors to account for school-level clustering.

Sensitivity analyses to account for changes in school sampling and participation between 2013 and 2017/2019. First, analyses were repeated including only the common schools in all three surveys (N = 82 schools, N = 22,671 students) to assess whether findings were affected by changes in school selection and participation between 2013 and 2017/2019. Second, weighted regression models were estimated using survey weights for the 2013 HBSC data to correct for disproportionate stratification by local health board when sampling schools, varying numbers of classes per year

group, varying class sizes, and correcting for different levels of response among particular groups (Welsh Government, 2015). All sensitivity analyses were consistent with substantive conclusions, showing only minor variations in findings. Findings are presented in Supporting Information (Tables S1 and S2).

Results

The total pooled sample consisted of 230,735 responses; 7,376 from 2013, 103,971 from 2017 and 119,388 from 2019. Sample breakdown by survey year is provided in Table 1. As shown, the surveys provide coverage across all socio-demographic groups. There were some small differences in the demographic profiles of the three samples. Proportionately more girls took part in the 2019 survey (50.6%) compared to the 2013 survey (49.1%). Each survey included a greater number of younger students: 2013 survey: 21.0% year 7 and 17.7% year 11, 2019 survey: 22.4% year 7 and 16.9% year 11. Finally, fewer students (28.10%) were classified as 'high affluence' in 2013, compared to 2019 (34.64%).

Research question 1: Have rates of emotional problems changed from 2013 to 2019?

Mean SCL-4 emotional problem scores increased from 4.63 (*SD* = 4.08) in 2013 to 5.78 (*SD* = 4.40) in 2017 and 6.20 (*SD* = 4.57) in 2019 (see Table 2). The proportion with high emotional problem scores (SCL4 > 7) also increased (2013: 22.84%, 2017: 33.61%, 2019: 37.69%). Figures S2–S4 provide further information on the distribution of emotional problem scores across each survey wave.

Linear regression indicated a significant increase of 1.153 (95% CI [.957, 1.349], $p < .001$) in mean SCL-4 emotional problem scores between 2013 and 2017 and an increase of 1.573 (95% CI [1.380, 1.765], $p < .001$) in scores between 2013 and 2019 (see Table 3, Model 1a). Accounting for differences in the demographic profiles of the three samples showed closely comparable results (Table 3, Model 1b).

Research question 2: Do changes in emotional problems vary by gender, child age or family affluence?

Emotional problem scores are summarised by gender, age and family affluence in Figures 1–3 respectively (and in Table S4). Stratified linear regression analyses (adjusting for other demographic covariates) estimated the effect of survey year separately for each subgroup. As shown, emotional problem scores increased between 2013 and 2019 for both boys and girls (Figure 1; Table 4, Models 1a, b), for all age groups (Figure 2; Table 4, Models 1c–1g) and each of the three family affluence groups (Figure 3; Table 4, Models 1h–j).

Next, a multivariable regression analysis tested for variation in change over time by testing two-way interactions of age, gender and affluence by survey year (Table 4, Model 2). A significant interaction between survey year and gender showed that the increase in emotional problems between 2013 and

Table 1 Sample characteristics, 11–16 year olds participating in the Welsh school surveys between 2013 and 2019

	2013 (*N* = 7,376)	2017 (*N* = 103,971)	2019 (*N* = 119,388)	Total (*N* = 230,735)
Gender (*N*, %)				
Male	3,743 (50.93)	50,452 (49.51)	57,787 (49.38)	111,982 (49.49)
Female	3,607 (49.07)	51,458 (50.49)	59,234 (50.62)	114,299 (50.51)
Age (*N*, %)				
Year 7	1,546 (20.96)	22,634 (21.77)	26,786 (22.44)	50,966 (22.09)
Year 8	1,547 (20.97)	22,421 (21.56)	25,808 (21.62)	49,776 (21.57)
Year 9	1,565 (21.22)	22,208 (21.36)	24,375 (20.42)	48,148 (20.87)
Year 10	1,413(19.16)	19,704 (18.95)	22,210 (18.60)	43,327 (18.78)
Year 11	1,305 (17.69)	17,004 (16.35)	20,209 (16.93)	38,518 (16.69)
Family affluence (*N*, %)				
Low	2,814 (39.35)	33,597 (34.40)	38,807 (34.67)	75,218 (34.70)
Med	2,328 (32.55)	30,700 (31.43)	34,358 (30.69)	56,386 (31.09)
High	2,010 (28.10)	33,366 (34.16)	38,780 (34.64)	74,156 (34.21)

Table 2 Emotional problems and social relationship variables, 11–16-year olds participating in Welsh HBSC/SHRN SHW surveys between 2013 and 2019[a]

	2013 (*N* = 7,376)	2017 (*N* = 103,971)	2019 (*N* = 119,388)	Total (*N* = 230,735)
Emotional problems score (*M*, *SD*)	4.63 (*SD* = 4.08)	5.78 (*SD* = 4.40)	6.20 (*SD* = 4.57)	5.96 (*SD* = 4.49)
Friendship quality (*M*, *SD*)	5.01 (*SD* = 1.89)	4.98 (*SD* = 1.96)	4.92 (*SD* = 1.98)	4.95 (*SD* = 1.97)
Experienced frequent bullying (*N*, %)	914 (12.71)	13,108 (14.71)	14,382 (13.81)	28,404 (14.17)
Experienced frequent cyberbulling (*N*, %)	317 (4.52)	5,472 (6.20)	5,624 (5.43)	11,413 (5.74)

[a]The mean friendship quality score measure was asked to all participants in the 2013 survey, 28% in the 2017 survey and 50% in the 2019 survey due to survey routing.

Table 3 Coefficient estimates for change over time in emotional problem scores among students in Wales between 2013 and 2019, unadjusted and adjusted for age, gender and family affluence

	Model 1a: Main effect of cohort (unadjusted) $N = 213,057$				Model 1b: Main effect of cohort adjusted for age, gender and family affluence. $N = 201,265$			
	Coef	Robust se	95% CI	Sig p	Coef	Robust se	95% CI	Sig p
2017	1.153	.099	0.957 to 1.349	<.001	1.104	.092	0.923 to 1.285	<.001
2019	1.573	.098	1.380 to 1.765	<.001	1.539	.090	1.362 to 1.717	<.001

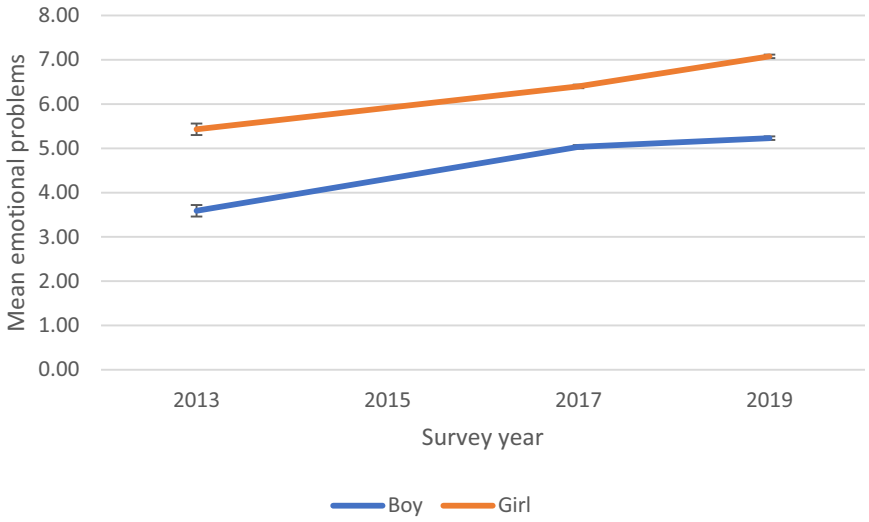

Figure 1 Mean emotional problems score by gender, 2013–2019. Error bars indicate 95% confidence intervals. The 2015 survey represents a predicted midpoint figure

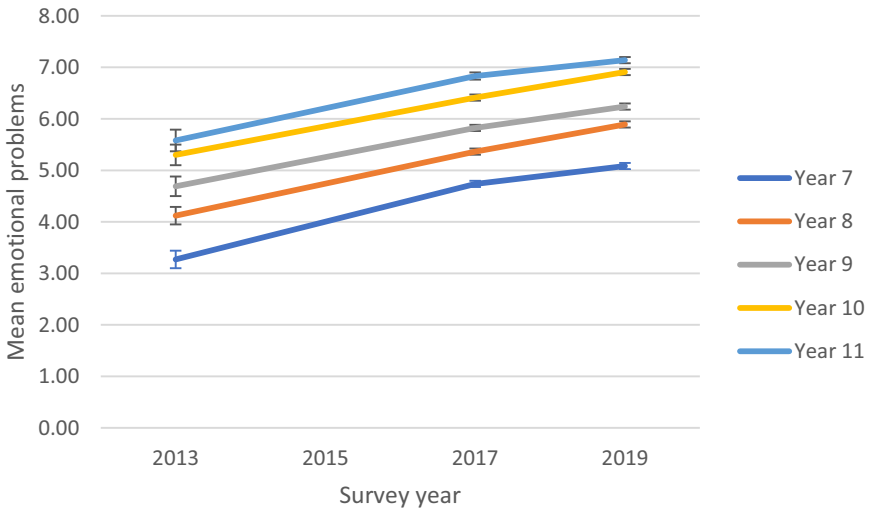

Figure 2 Mean emotional problems score by age, 2013–2019. Error bars indicate 95% confidence intervals. The 2015 survey represents a predicted midpoint figure

2017 was more marked for boys than girls (b [95% CI] = −0.238 [−0.469, −0.007]), but more marked for girls for the whole period between 2013 and 2019 (b [95% CI] = 0.229 [0.004, 0.462]). There was no interaction between survey year and student age indicating broadly similar increases in emotional problem scores between 2013 and 2019 for younger and older children. Finally, a significant interaction between survey year and family affluence indicated that the increase in emotional problems between 2013 and 2019 was less pronounced for those from medium- and high-affluent backgrounds relative to those from lower family affluence backgrounds (b [95% CI] = −0.568 [−0.799, −0.338]).

Research question 3: Has the quality of young people's social relationships changed from 2013 to 2019 (friendship quality, face-to-face bullying, cyberbullying)?

Table 2 summarises the peer relationship measures by survey year. Friendship quality reduced slightly

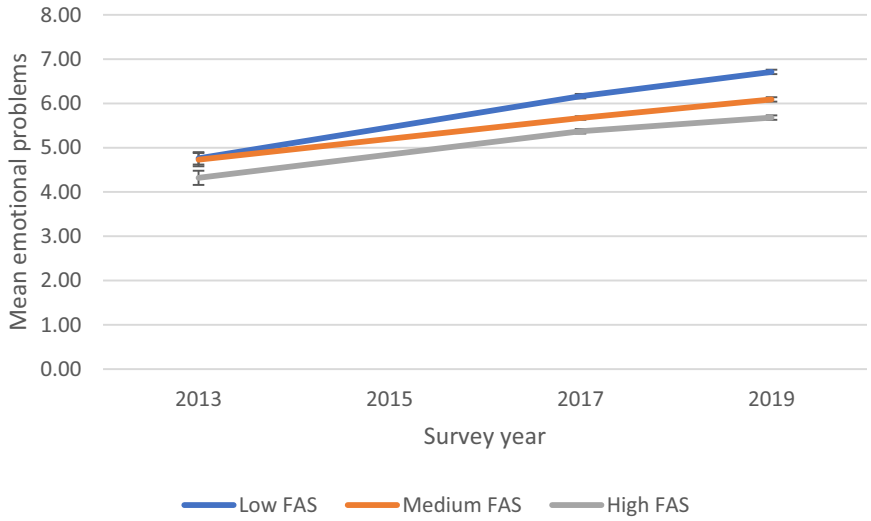

Figure 3 Mean emotional problems score by family affluence, 2013–2019. Error bars indicate 95% confidence intervals. FAS = Family affluence. The 2015 survey represents a predicted midpoint figure

between 2013 and 2019 (*b* [95% CI] = −0.093 [−0.163, −0.024]). The proportion experiencing frequent face-to-face bullying increased between 2013 and 2017 (*OR* [95% CI] = 1.185 [1.063, 1.320]). Frequent cyberbullying also increased over time (2013 to 2017 *OR* [95% CI] = 1.396 [1.213, 1.606]; 2013 to 2019 *OR* [95% CI] = 1.213 [1.055, 1.394]). Trends in friendship quality, bullying and cyberbullying stratified by gender, age and affluence are summarised in Figures S5–S13 and Tables S6–S11.

Research question 4: Do changes in young people's social relationships vary by gender, child age or family affluence?

Tables 2, and Tables S6, S8 and S10 and Figures S5, S8 and S11 summarise trends in relationship measures. Multivariable models tested interactions with survey year to examine if trends in social relationships varied by gender, age and affluence. Trends in friendship quality did not vary by gender or affluence, while a significant interaction between age and survey year (*b*[95% CI] = −0.063 [−0.108, −0.018]) showed that older students showed a steeper decline in friendship quality than younger students between 2013 and 2017 (see Table S7). There was no evidence that trends in face-to-face bullying differed by gender or affluence, but a significant interaction between survey year and age (OR [95% CI] = 1.059 [1.004, 1.118]) suggested a steeper increase in face-to-face bullying between 2013 and 2019 for older children (Table S9). There was no evidence that trends in cyberbullying differed by age or affluence. However, a significant interaction between survey year and gender suggests that the increase in cyberbullying over time was less marked for girls than boys between 2013 and 2019 (OR [95% CI] = 0.694 [0.513, 0.941]; Table S11).

Research question 5: To what extent do changes in social relationships account for changes in young people's emotional problems?

To test if changes in social relationships contributed to trends in emotional problems, analyses compared estimates of the effect of survey year in an unadjusted model (Table 5a, Model 3a), when adjusted only for sample demographics (Table 5b, Model 3b) or when additionally adjusted for measures of social relationships (Table 5c, Model 3c). As shown, there was no attenuation of cross-survey differences in emotional problems when accounting for cross-survey changes in social relationships (*b* = 1.434 vs. *b* = 1.439).

We note that poorer friendship quality (*b* [95% CI] = −0.264 [−0.288, −0.241]), frequent face-to-face bullying (*b* [95% CI] = 2.758 [2.660, 2.855]) and frequent cyberbullying (*b* [95% CI] = 2.117 [1.938, 2.296]) were each independently associated with worse emotional problems in the multivariable analysis (Table 5c, Model 3c). Table S5 also shows univariable associations with emotional problems, with comparison of effect sizes and their confidence intervals indicating a strengthening of associations between face-to-face bullying and friendship quality with emotional problems.

Discussion

This large whole-nation study provides further evidence for an increase in adolescent emotional problems over the second decade of the 21st Century. Findings suggest that this is not a trivial increase in difficulties – mean scores increased by more than a third of a standard deviation over a 6-year period, and the proportion with high emotional problem scores increased from 22.84% in 2013 to 37.69% in 2019.

Table 4 Coefficient estimates for emotional problems among students in Wales between 2013 and 2019; stratified by age, gender and family affluence. Adjusted for socio-demographics

Mean emotional problems		Coef	Robust SE	95% CI	Sig.
		Model 1a: boys			
Total *n* = 98,506	2017 cohort	1.211	.089	1.035 to 1.386	$p < .001$
	2019 cohort	1.409	.089	1.234 to 1.583	$p < .001$
		Model 1b: girls			
Total *n* = 102,759	2017 cohort	.997	.125	0.751 to 1.244	$p < .001$
	2019 cohort	1.660	.124	1.417 to 1.903	$p < .001$
		Model 1c: Year 7			
Total *n* = 42,117	2017 cohort	1.046	.122	0.807 to 1.285	$p < .001$
	2019 cohort	1.397	.120	1.160 to 1.634	$p < .001$
		Model 1d: Year 8			
Total *n* = 42,728	2017 cohort	1.191	.150	0.896 to 1.486	$p < .001$
	2019 cohort	1.731	.151	1.434 to 2.029	$p < .001$
		Model 1e: Year 9			
Total *n* = 42,407	2017 cohort	1.041	.139	0.768 to 1.314	$p < .001$
	2019 cohort	1.462	.138	1.190 to 1.734	$p < .001$
		Model 1f: Year 10			
Total *n* = 38,773	2017 cohort	1.070	.168	0.739 to 1.401	$p < .001$
	2019 cohort	1.604	.165	1.280 to 1.928	$p < .001$
		Model 1g: Year 11			
Total *n* = 35,240	2017 cohort	1.157	.176	0.811 to 1.503	$p < .001$
	2019 cohort	1.483	.173	1.142 to 1.825	$p < .001$
		Model 1h: Low family affluence			
Total *n* = 68,790	2017 cohort	1.325	.113	1.102 to 1.548	$p < .001$
	2019 cohort	1.892	.113	1.669 to 2.115	$p < .001$
		Model 1i: Medium family affluence			
Total *n* = 62,763	2017 cohort	.882	.117	0.652 to 1.112	$p < .001$
	2019 cohort	1.321	.117	1.091 to 1.551	$p < .001$
		Model 1j: High family affluence			
Total *n* = 69,712	2017 cohort	1.022	.117	0.792 to 1.252	$p < .001$
	2019 cohort	1.325	.113	1.102 to 1.549	$p < .001$
		Model 2: Including interactions			
Total *n* = 201,265	2017 cohort	1.408	.168	1.078 to 1.738	$p < .001$
	2019 cohort	1.744	.170	1.410 to 2.078	$p < .001$
	Female	1.608	.112	1.388 to 1.828	$p < .001$
	Age	.520	.046	0.430 to 0.610	$p < .001$
	Med FAS	−.017	.110	−0.233 to 0.199	$p = .879$
	High FAS	−.435	.115	−0.661 to −0.210	$p < .001$
	2017 × Gender	−.238	.117	−0.469 to −0.007	$p < .05$
	2019 × Gender	.229	.118	0.004 to 0.462	$P < .05$
	2017 × age	.014	.049	−0.082 to 0.110	$p = .774$
	2019 × age	.010	.048	−0.085 to 0.105	$p = .833$
	2017 × Med FAS	−.446	.117	−0.676 to −0.215	$p < .001$
	2017 × High FAS	−.307	.124	−0.551 to −0.063	$p < .05$
	2019 × Med FAS	−.568	.117	−0.799 to −0.338	$p < .001$
	2019 × High FAS	−.564	.124	−0.809 to −0.319	$p < .001$

Findings are consistent with other data from the United Kingdom, United States and high-income European countries (Bor et al., 2014; Collishaw, 2015; Cybulski et al., 2021; Högberg, Strandh, Johansson, & Petersen, 2023; Thorisdottir, Asgeirsdottir, Sigurvinsdottir, Allegrante, & Sigfusdottir, 2017) suggesting a substantial long-term increase in adolescent emotional problems predating the COVID-19 pandemic. While not directly assessed in our study, findings also accord with UK data showing an increasing rate of emotional disorders (Sadler et al., 2018), referrals to Child and Adolescent Mental Health Services (CAMHS; Grimm et al., 2022) and youth self-harm and suicide (Cybulski et al., 2021; Padmanathan, Bould, Winstone, Moran, & Gunnell, 2020) over this period.

One aim of our study was to test whether trends varied by gender, age or family affluence. As expected, we found higher emotional problems among girls than boys and in older children in each survey. In line with some previous findings (Keyes, Gary, O'Malley, Hamilton, & Schulenberg, 2019; Potrebny et al., 2019; Riecher-Rössler, 2017; Slee, Nazareth, Freemantle, & Horsfall, 2021), the study suggests an overall greater increase in emotional problems between 2013 to 2019 for girls than boys (though results comparing 2013 and 2017 were contradictory). Previous evidence has suggested that secular increases in emotional problems have been

Table 5 Coefficient estimates for emotional problems among students in Wales between 2013 and 2019, adjusting for social relationships

		Coef	Robust se	95% CI	Sig
Model 3a: Unadjusted model					
Total n = 73,025	2013 cohort (ref)				
	2017 cohort	.897	.117	0.666 to 1.127	$p < .001$
	2019 cohort	1.434	.110	1.218 to 1.650	$p < .001$
Model 3b: Main effect of cohort controlling for age, gender and family affluence					
Total n = 73,025	2017 cohort	.907	.106	0.699 to 1.116	$p < .001$
	2019 cohort	1.479	.101	1.280 to 1.679	$p < .001$
	Age	.525	.017	0.492 to 0.558	$p < .001$
	Female	1.727	.048	1.632 to 1.822	$p < .001$
	Family affluence				
	Medium	−.505	.043	−0.589 to −0.421	$p < .001$
	High	−.861	.058	−0.975 to −0.746	$p < .001$
Model 3c: Main effect of time controlling for age, gender, family affluence and measures of social relationships					
Total n = 73,025	2017 cohort	.850	.094	0.665 to 1.035	$p < .001$
	2019 cohort	1.439	.089	1.263 to 1.615	$p < .001$
	Age	.498	.016	0.467 to 0.529	$p < .001$
	Female	1.749	.045	1.661 to 1.838	$p < .001$
	Family affluence				
	Medium	−.361	.040	−0.441 to −0.282	$p < .001$
	High	−.668	.049	−0.766 to −0.571	$p < .001$
	Friendship quality	−.264	.012	−0.288 to −0.241	$p < .001$
	Frequent face-to-face bullying	2.758	.050	2.660 to 2.855	$p < .001$
	Frequent cyberbullying	2.117	.091	1.938 to 2.296	$p < .001$

more pronounced for adolescents than for children (Armitage et al., 2023; Sadler et al., 2018). The current study found no differences in trends according to age. Emotional problems increased over time for all levels of family affluence; however, those from poorer families experienced a steeper increase between 2013 and 2019. These findings provide evidence that inequalities in youth mental health have further increased in the UK, continuing a longer-term trend observed over previous decades (Collishaw et al., 2019; Reiss, 2013).

The study is one of the first to directly examine whether the quality of young people's social relationships has changed over time and to test the implications for trends in youth emotional problems. Despite increased recognition of its harmful effects, bullying remains a common experience in Wales. One in seven young people reported being bullied at least two to three times a month. Frequent face-to-face bullying was more common among girls, younger children and those from lower affluent family backgrounds. Frequent face-to-face bullying showed only minor differences in prevalence between 2013, 2017 and 2019 and broadly similar trends for different demographic groups. These results extend previous evidence showing a rise in the prevalence of bullying in Wales between 2002 and 2014 (Cosma et al., 2020).

Around 1 in 20 children in Wales reported frequent (at least 2 to 3 times per month) experiences of cyberbullying, with rates higher in girls, older children and those from less affluent backgrounds. Cyberbullying rates showed a small increase over this period – in line with international evidence (Kennedy, 2021; Trompeter et al., 2022) and little evidence that trends varied markedly by demographic group.

This study is among the first to examine trends in friendship quality. Developmental theory and research highlight the importance of friends as a source of enjoyment, intimacy and support (Blakemore & Mills, 2014; van Harmelen et al., 2016). Positive friendships are associated with better mental health, well-being and can promote resilience in the context of adversity (Collishaw et al., 2016). In general, girls, younger pupils and those from higher affluent backgrounds reported higher quality friendships. There was also a modest reduction in reported friendship quality between 2013 and 2019, and this trend particularly affected older pupils who reported a steeper decline in perceived friendship quality over the study period.

Implications

We found strong associations between social relationship measures and emotional problems in line with other studies (Källmén & Hallgren, 2021). However, there were only modest changes in rates of bullying and friendship quality over time, and these did not explain the population-level increases in emotional problems.

Population health efforts have often focused on the development, implementation and evaluation of anti-bullying strategies (Bonell et al., 2018; Tiiri et al., 2020). Some evidence suggests that where this is successful this could impact population trends in youth emotional problems. For example,

a comparison of trends in emotional problems unadjusted or adjusted for trends in peer victimisation (which declined between 2005 and 2017 in the Netherlands) supports this conclusion (De Looze et al., 2020). Whole school interventions aim to provide a supportive context for healthy relationships in schools more generally, and it will be interesting to consider their success in supporting young people's positive peer relationships and friendships. This study found no evidence that trends in social relationships accounted for the observed increase in youth emotional problems, but it supports the view that improving the quality of young people's social relationships and reducing their exposure to bullying are important population health priorities.

Strengths and limitations

A main strength of this study is its large, robust, national and comparable repeated cross-sectional samples, which allowed us to monitor temporal change in young people's mental health on a population-wide scale. This study is based on three comparable and well-designed surveys conducted in 2013, 2017 and 2019 in mainstream secondary schools in Wales. Moreover, young people's emotional problems were assessed using the same measure, and we provide evidence of the validity of this measure against established measures of adolescent mental health included in the 2019 survey and in a separate (older) high-risk sample (Powell et al., 2021) as shown in Appendix S1. Additionally, this study is one of the largest contemporary studies to assess both positive and negative experiences of young people's peer relationships and one of the few studies to our knowledge to examine how these experiences have changed over time and how they relate to trends in mental health.

There are also important potential limitations. Emotional problems were assessed using a brief measure (four items) not designed as a diagnostic tool. Caution is needed in extrapolating to trends in clinical need or clinical outcomes. Nevertheless, the findings are in accord with previous epidemiological evidence in the UK showing an increase in emotional disorders in this age group between 1999 and 2017 (Sadler et al., 2018). Measures of social relationships were relatively crude, and several key aspects were not covered, including loneliness, emotional support, and characteristics (including mental health) of peers. The most recent surveys (2017 and 2019) had greater coverage across schools (and classrooms within schools) in Wales, and one possibility is that differences between the schools included on each occasion might have contributed to the observed findings. However, the sensitivity analysis showed similar findings for analysis restricted to common schools in all three surveys. In addition, it is possible that the different modes of delivery across surveys (on paper supervised by researchers in 2013 vs. on a computer supervised by teachers in 2017 and 2019) may have differentially influenced young people's responses. However, in all surveys, schools were instructed to ensure that young people could complete questionnaires in privacy. We excluded students who stated that neither gender best described them given that this categorisation was only introduced in the 2019 survey. This is important to note as this population has particularly poor mental health and well-being (Ghassabian et al., 2022; Page et al., 2021), thus their exclusion may have led to an underestimation of emotional problems for the 2019 survey. Further population-based research is needed to examine the mental health of this underrepresented group, including trends over time, and relevant risk and protective factors. More generally, despite overall high school and pupil participation rates, there were non-trivial differences in response rates to the three surveys. Whilst school-level participation improved between 2013 and 2019, pupil participation rates dropped over this period. There was also modest item-level non-response particularly in relation to more sensitive questions (e.g. bullying), see Table S3. Previous research demonstrates that survey non-response is often greater for more vulnerable groups (Mostafa et al., 2020). As such, rates of emotional problems might be underestimated, and cross-survey estimates of increases in emotional problems may be conservative given increasing levels of pupil non-response over time. A further important consideration is that the survey did not include children outside of mainstream educational settings. Finally, we note the large sample size and the number of statistical tests performed.

Conclusion

An accurate understanding of trends in adolescent psychopathology is essential for planning population health priorities. Our findings highlight a growing need for mental health support for young people, as indicated by a substantial increase in emotional problems over the past decade, particularly among those from lower affluent families. Friendship quality and experiencing any form of bullying were strongly associated with higher emotional problems in all three surveys, but trends in social relationships did not account for the increase in emotional problems over time.

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article:

Appendix S1. Validation of the four-item symptoms checklist (SCL).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Key points

- Epidemiological evidence highlights long-term increases in emotional problems in young people. It is currently unknown what explains this increase.
- In a population-wide study covering secondary school pupils across a whole nation, we found a large increase in adolescent emotional problems between 2013 and 2019. The study confirms widening mental health inequalities.
- The study found a strong and increasing association between adolescent social relationships and emotional problems, but while rates of bullying increased slightly over time and friendship quality reduced these did not explain the population-level increases in emotional problems.
- Policymakers, schools and mental health practitioners should be aware of the high burden of emotional problems in young people, particularly among those from less affluent families.

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