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Always together but still lonely: the relationship between environment at school and adolescents' loneliness

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Background: The concurrent increase in loneliness among young people and the decline in school-related protective factors is a cause for concern, given their potential implications for mental health and well-being. This study examines the association between selected aspects of school life and adolescent loneliness. Data were collected in 2022. **Methods:** Using self-report data from the England's Health Behaviour in School-aged Children (HBSC) study, we examined the responses from 5377 adolescents aged 11, 13 and 15 years old to describe to what extent the available set of school environment variables (perceived school belonging, schoolwork pressure, school liking, school safety, classmates' support and teachers' support) were associated with experiences of loneliness. **Results:** Binary logistic regression analyses indicate that lower schoolwork pressure (OR = 1.89), higher classmates' support (OR = 1.55), stronger school belonging (OR = 1.49), higher school liking (OR = 1.36) and feeling safe at school (OR = 1.18) were all significantly associated with lower odds of loneliness, after accounting for age, sex and family affluence. Teachers' support was not significantly associated with loneliness. **Conclusion:** Given the documented rise in adolescent loneliness and schoolwork pressure alongside the decline in school belonging and classmates' support, we emphasise the need for improved understanding of these constructs to inform the development of more effective interventions addressing adolescent loneliness.

Key Practitioner Message

What is currently known?

- Loneliness negatively affects adolescents' mental health, educational engagement and broader life outcomes.
- School-related factors such as school belonging, schoolmates' support, and schoolwork pressure are associated with loneliness and wider health and academic outcomes.

What has been shown?

- Older adolescents (15-year-olds), girls and those from the least affluent families report higher levels of loneliness compared with other groups.
- Higher school belonging, classmates' support, and lower schoolwork pressure are associated with lower reported loneliness, with limited evidence of interaction by age, sex or family affluence.

What is the significance of this for clinical practice?

- Findings highlight the importance of supporting schools to foster peer relationships, strengthen students' sense of belonging and consider excessive schoolwork pressure as a potentially relevant contextual factor when addressing adolescent loneliness.
- Greater conceptual clarity around school belonging is needed to inform the development of targeted and effective school-based interventions.
- Further research is required to distinguish between different types of loneliness in adolescence and to tailor interventions accordingly.

Keywords: loneliness; adolescents; school pressure; school belonging; classmates' and teachers' support; HBSC

Introduction

Loneliness is a complex and multifaceted experience, associated with a discrepancy between the actual and desired quality or extent of interpersonal relationships (Peplau & Perlman, 1982). When experienced often or over a prolonged period during adolescence, loneliness is associated with both short- and long-term health and social consequences (Christiansen et al., 2021; Hawkey & Cacioppo, 2010). Among these are poor health and sleep disruption (Zheng et al., 2022), reduced mental well-being and self-esteem (Lyyra et al., 2021), lower academic outcomes and employment prospects (Jefferson et al., 2023), as well as cardiovascular decline in adulthood (Caspi, Harrington, Moffitt, Milne, & Poulton, 2006) and raised morbidity and mortality (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015).

Loneliness among young people is increasingly recognised as a public health and social justice issue (Jefferson, Barreto, Jones, et al., 2023; Qualter et al., 2021), with rising prevalence often reported in marginalised or socioeconomically disadvantaged groups.

Prior to the pandemic, studies such as Twenge et al. (2021) suggested global increases in adolescent loneliness, though these findings have faced methodological critique. Local data from HBSC and ONS reports provide a more nuanced view, indicating rising rates but also heterogeneity by age, gender and affluence (Hulbert, Eida, Ferris, Hrytsenko, & Kendall, 2023; Manclossi, 2018).

The COVID-19 pandemic significantly disrupted adolescent routines, potentially contributing to a rise in loneliness. Our data were collected in 2022, in the early post-lockdown period. The school and societal lockdown measures during the COVID-19 pandemic have raised concerns about a further escalation in adolescent loneliness and mental health decline, with the call for services to develop and deliver early interventions and preventative strategies (Loades et al., 2020). While some reports suggest a return to pre-pandemic levels, increased school absences and altered social dynamics warrant caution in interpreting temporal trends (Department for Education, 2024; Viner et al., 2022).

Defining loneliness and its modifiable drivers is essential for designing effective interventions (Wight, Wimbush, Jepson, & Doi, 2016). Loneliness can be conceptualised in social, emotional and existential terms — as a perceived insufficiency in interpersonal connections, the absence of meaningful relationships, or a sense of disconnection from life's meaning and purpose (Mansfield et al., 2021). These dimensions may overlap or be experienced independently. At cultural or spiritual levels, individuals may feel excluded from prevailing social norms or disconnected from a spiritual higher power (Chornobai & Hrytsenko, 2020; Madsen et al., 2016).

While loneliness is experienced differently across individuals and contexts, this study focuses on the general experience of loneliness among school-aged children, assessed via a single self-report item asking how often they felt lonely over the past year. Though multi-item scales offer deeper psychometric insights (Mund et al., 2023), single-item measures are well validated for large-scale youth surveys and provide a practical, reliable alternative.

Given adolescents' dynamic personal and social contexts, understanding loneliness requires attention to broader socioecological influences. The socioecological model has served as the dominant conceptual framework underpinning the HBSC survey across several international cycles since 2014 (Bronfenbrenner & Morris, 1998; Qualter et al., 2021). This model conceptualises child and adolescent development as shaped by reciprocal interactions across multiple contextual levels, with the individual situated within interconnected family, neighbourhood, school and wider societal environments.

Within this framework, schools represent a central and developmentally salient context, influencing adolescents' daily experiences through peer relationships, teacher interactions, academic demands and feelings of belonging. These proximal processes are embedded within broader neighbourhood and structural conditions, as well as macro-level cultural and policy contexts that shape educational provision and young people's opportunities. Although the complexity of the socioecological model poses methodological challenges for empirical testing, it remains a useful lens for situating school environments as one important context linked to adolescent loneliness. The present study contributes to this literature by examining how school-level factors are associated with loneliness within a wider socioecological perspective.

Recent UK evidence shows that neighbourhood-level characteristics, such as perceived safety, trust and local deprivation, are associated with adolescent loneliness, highlighting the role of contextual influences beyond the school setting (Marquez, Qualter, Petersen, Humphrey, & Black, 2023). Moreover, multilevel analyses of the Programme for International Student Assessment (PISA) data demonstrate that loneliness is influenced by individual, school and national-level factors, including students' perceptions of school climate (Jefferson, Barreto, Verity, & Qualter, 2023). Within a socioecological framework, school-related variables represent modifiable mesosystem-level influences on adolescent well-being that may be identified and strengthened.

In the 2022 HBSC England survey, several aspects of the school environment were assessed: school liking, school pressure, school belonging, school safety and support from teachers and classmates.

Adolescents experiencing a higher level of loneliness often report negative school attitudes, including lower school liking and greater academic pressure (Eccles, Qualter, Madsen, & Holstein, 2021). Girls in particular may be more vulnerable to the effects of low school liking (Rönkä, Sunnari, Rautio, Koironen, & Taanila, 2016). High school pressure is associated with frequent health complaints and poor mental well-being (Park et al., 2020; Torsheim, Aaroe, & Wold, 2001).

School safety also plays a vital role. Feeling unsafe is linked to victimisation, absenteeism and mental health problems, while school identification and trust in teachers support a sense of safety and belonging (Mitchell, Kensler, & Tschannen-Moran, 2016; Mori et al., 2021).

Peer relationships are central to adolescent well-being. High-quality friendships offer critical emotional

support, while poor peer relations can exacerbate loneliness (Schwartz-Mette, Shankman, Dueweke, Borowski, & Rose, 2020). Greater classmates' and teachers' support predicts lower loneliness (Zheng et al., 2022), and lonely adolescents are more likely to lack close friendships and experience negative social interactions (Yang, Petersen, & Qualter, 2020).

School belonging – a sense of acceptance and inclusion within the school community – is a particularly strong protective factor. Low belonging undermines resilience to loneliness (Arslan, 2021), while school engagement can buffer against risky behaviours and social disconnection (Steiner et al., 2019). Nevertheless, school belonging has received less attention than other academic outcomes in the literature (Allen & Bowles, 2012), despite evidence that inclusion and exclusion at school significantly affect mental health, academic success and school behaviour (Arslan, 2021; Delgado, Ettetal, Simpkins, & Schaefer, 2015; Demanet & Van Houtte, 2011).

While individual studies have explored these factors separately, comprehensive large-scale research examining them together is still lacking. This study addresses that gap using representative national data to evaluate how these contextual school variables jointly relate to adolescent loneliness.

The current study

The current study draws on data from the 2022 Health Behaviour in School-Aged Children (HBSC) survey in England (Hulbert et al., 2023). We examine the relative associations between selected contextual school environment variables and adolescent loneliness using a two-step analytical approach. First, we estimate the impact of demographic factors, such as age, sex and family affluence (derived using the Family Affluence Scale (FAS)) (Currie, Díaz, Bosáková, & De Looze, 2024). Then we determine the relative importance of school environment factors, such as school pressure, school safety, school liking, school belonging, classmates' and teachers' support, as predictors of loneliness among these demographic groups.

Methods

This study draws on data from the 2022 HBSC survey in England. Data collection took place between February 2022 and July 2022 using a paper or electronic version of the questionnaire, depending on school preference.

The survey used a stratified, probabilistic sampling strategy across 37 state-funded and independent secondary schools. In total, 5377 adolescents aged 11, 13 and 15 participated; 48.1% of the participants were girls. Together, they were aged 11 years (34.3%), 13 years (34%) and 15 years (31.7%) old, while 20% came from families categorised as Low Affluence/FAS, 63% as Medium Affluence/FAS and the remainder, 17%, as High Affluence/FAS (see Table 1). The data were weighted for age and sex according to their prevalence in the 2021 Census. All analyses were conducted using HBSC survey weights to account for the complex sampling design. Parental consent procedures followed HBSC national and school-specific ethical requirements. Information sheets were provided to parents and pupils prior to data collection. Parental consent was obtained using an opt-out procedure, and adolescents provided informed consent at the start of the questionnaire, with the option to withdraw at any time.

Table 1. Sample

	N ^a	%	Total
Age (years)			
11	1841	34.3	
13	1822	34	
15	1698	31.7	5361
Sex			
Boys	2782	51.9	
Girls	2574	48.1	5356
Family Affluence			
Low	1053	20	
Medium	3321	63	
High	891	17	5265

^aPer cent missing ranged from 1 to 2 on individual variables; analyses based on $N = 5377$ overall sample and $N = 4938$ after list-wise deletion of values in subsequent analyses.

Measures

All measures used are validated as described in the HBSC 2022 international protocol and report (Inchley et al., 2023).

Loneliness was measured by a single item: 'During the past 12 months, how often have you felt lonely?' with a 5-point scale from 'never' to 'always'. While single-item measures carry limitations, they have shown reliability in adolescent populations (Mund et al., 2023). This ordinal measure was dichotomised so that those answering 'most of the time' and 'always' were grouped to represent the 'lonely' category, and those answering 'rarely' or 'never' represented the 'not lonely' category.

Schoolwork pressure was assessed by asking participants how pressured they felt by the schoolwork they had to do. Participants could answer: 'not at all', 'a little', 'some' or 'a lot'. We treat this variable as a continuous predictor in the regression analyses but also report on the proportion selecting 'a lot' as representing high levels of schoolwork pressure in the descriptive section.

School liking. The participants were asked how they felt about school at present. Answer options were coded from 1 to 4 and represented by the labels 'I don't like it at all', 'I don't like it very much', 'I like it a bit' or 'I like it a lot' respectively.

School Belonging and *School Safety* were assessed by measuring agreement on a 5-point Likert scale ranging from 1 'strongly disagree' to 5 'strongly agree' in response to two statements: 'I feel safe in this school' and 'I feel like I belong in this school'. As with the other Likert-type measures described below, these items were treated as continuous variables in the analyses (Norman, 2010; Sullivan & Artino, 2013).

Classmates' support was computed by averaging the answer scores to three items asking the extent to which 'Students in my classes: enjoy being together, are kind and helpful, and accept me as I am'. Participants responded to each using a 5-point Likert (1: strongly disagree to 5: strongly agree).

Similarly, *Teachers' support* was computed as the average answer scores to four items: 'My teachers accept me as I am', 'My teachers care about me as a person', 'I feel a lot of trust in my teachers' and 'There is at least one teacher I can go to if I have a problem'. The agreement was measured on a Likert scale, from 1: strongly disagree to 5: strongly agree. For classmates' and teachers' support, mean scores ≤ 2 were categorised as 'low support', representing respondents who tended to disagree with the support statements; this cut-off was used to contrast with the HBSC convention of defining high support as mean scores ≥ 4 based on prior HBSC literature (Inchley et al., 2023; Torshem et al., 2001).

Statistical analysis

Given the ordinal nature of the loneliness measure, ordinal logistic regression was initially considered. However, testing indicated violations of the proportional odds assumption;

therefore, ordinal models were not appropriate for these data. Consequently, loneliness was dichotomised and analysed using binary logistic regression, an approach commonly used in large population-based studies when ordinal model assumptions are not met. School pressure was analysed as a continuous predictor in regression models to retain variability, while binary categorisation was used descriptively to aid interpretability.

Multilevel modelling was also explored to account for clustering within schools. The intraclass correlation coefficient was small, and the random intercept for school was non-significant, indicating minimal between-school variance in loneliness. As multilevel models did not meaningfully improve model fit or alter standard errors compared with single-level models, a single-level binary logistic regression was retained for parsimony and interpretability. All models controlled for sex, age and family affluence.

Data were analysed using SPSS (Version 29.0.2.0 (20)). Weights were computed based on the age, gender and ethnicity of respondents in the sample against the expected proportions derived from the 2021 census data. Missing data were handled using listwise deletion. While up to 4938 participants had valid data on loneliness and key demographic variables, item-level missingness across the school environment measures resulted in a final analytic sample of 4821 adolescents with complete data on the outcome, all predictors and covariates. The data had two nested levels: level 1 represented each pupil as an independent observation/unit, while level 2 represented the 37 clusters/schools to which level 1 participants belonged. In order to account for these two levels, a multilevel approach was initially followed. However, results indicated that the random intercept was non-significant, suggesting that a multilevel approach was not useful. Binary logistic regression analyses were therefore run with loneliness recategorised as a binary categorical outcome measure, the six school-related variables entered as continuous predictors, and age, sex and family affluence as covariates.

Results

Descriptives

Overall, 23% of participants reported feeling lonely most or all of the time (see Table 2), with loneliness less prevalent among younger adolescents compared with their older peers (18% of 11-year-olds; 24% of 13-year-olds; and 28% of 15-year-olds). The proportion of girls reporting high levels of loneliness was higher than that of boys

(32% and 15% respectively), and overall, a higher proportion of young people from the least affluent families reported high levels of loneliness compared with those from the most affluent families (30% and 18% respectively).

Across all school attitude and environment variables, consistent differences by age, sex and family affluence emerged, with older adolescents, girls and those from the least affluent families reporting more disadvantaged outcomes than the rest of the sample. Table 2 shows proportions of participants for each outcome variable by age, sex and FAS, where all pairwise comparisons are noted as significantly different apart from a few between medium and high FAS and 13- and 15-year-olds.

Table 3 presents the means and standard deviations for those continuous variables otherwise described so far in terms of proportions of respondents who selected response options on the high end of the scale. Collinearity diagnostics indicated no problematic overlap among predictors (all VIFs < 2.5; tolerance values > 0.40).

Binary logistic regression analyses

A binary logistic regression analysis was used to assess the association between loneliness and the six school-level variables: school liking, school pressure, school safety, school belonging, teachers' and classmates' social support, controlling for sex, age and FAS differences. Overall, the model was a good fit, Chi-square = 1349, df = 11, $p < .001$; explaining a moderate amount of variance: Nagelkerke R -squared = .48. This corresponded to the correct prediction of 88.3% of cases with reported low loneliness and 66.7% of cases with high loneliness, giving an overall percentage correct prediction rate of 80.5%. The OR listed in Table 4 under the Exp(B) column indicates that a change of 1 unit in school pressure was significantly associated with an increase in the likelihood of feeling lonely of 89% ($p < .001$), an increase of 1 unit in perceptions of classmates' social support decreased the odds of feeling lonely by 54% ($p < .001$), an increase of 1 unit in feelings of

Table 2. The proportion of participants in the high/low end of each variable by age, sex and FAS

	Loneliness (‘Most of the time’ or ‘Always’)		School work pressure (‘A lot’)		School liking (‘Not very much’ or ‘Not at all’)		School safety (‘Strongly agree’ or ‘Agree’)		School belonging (‘Strongly agree’ or ‘Agree’)		Classmates’ support (‘Strongly agree’ or ‘Agree’)		Teachers’ support (‘Strongly agree’ or ‘Agree’)	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Whole sample	1213	23.1	1672	32.4	2099	40.7	2967	58.1	2420	47.4	1968	38.7	2139	42.1
Age (years)														
11	325	18.0 ^a	447	25 ^a	527	29.6 ^a	1088	63.7 ^a	991	56.1 ^a	812	46.1	935	53
13	418	23.5 ^b	546	31 ^b	774	44.1 ^b	917	52.5 ^b	738	42.2 ^b	590	33.9 ^b	592	33.9 ^b
15	461	28.2 ^c	671	42.2 ^c	788	49.6 ^b	912	58.2 ^c	680	43.3 ^b	558	35.7 ^b	606	38.9 ^b
Sex														
Boys	400	14.8 ^a	615	23.3 ^a	892	33.9 ^a	1697	65.2 ^a	1496	57.4 ^a	1167	45 ^a	1309	50.4 ^a
Girls	804	31.9 ^b	1045	41.8 ^b	1194	47.9 ^b	1254	50.7 ^b	659	37.0 ^b	790	32.1 ^b	819	33.3 ^b
Family Affluence														
Low	296	29.5 ^a	324	32.1 ^a	460	45.5 ^a	521	51.7 ^a	415	41.4 ^a	318	31.9	412	41.1 ^{abc}
Medium	719	22.2 ^b	1028	32.1 ^a	1275	39.9 ^b	1894	59.8 ^b	1531	48.3 ^b	1238	39.1	1352	42.8 ^{abc}
High	160	18.3 ^c	283	32.9 ^b	319	37.2 ^b	511	60.7 ^b	441	52.1 ^b	384	45.7	340	40.3 ^{abc}

Proportions within columns not sharing the same superscript letter (a, b, c) differ significantly at $p < .01$ based on chi-square tests.

Table 3. Descriptive statistics

	N ^a	Min	Max	Mean	SD
Loneliness	5220	1	5	2.73	1.10
School Liking	5132	1	4	2.40	0.94
School Pressure	5143	1	4	2.83	0.98
School Safety	5082	1	5	2.46	1.11
School Belonging	5074	1	5	2.68	1.17
Teachers' Social Support	5061	1	5	2.45	0.98
Classmates' Social Support	5059	1	5	2.50	0.83
Valid N (listwise)	4938				

^aPer cent missing ranged from 3 to 6 on individual variables reported above; analyses were based on an overall sample of $N = 5377$ and $N = 4938$ following listwise deletion in subsequent analyses.

school belonging decreased the odds of feeling lonely by 49% ($p < .001$), an increase of 1 unit if feelings of school liking decreased the odds of feeling lonely by 36% ($p < .001$) and an increase of 1 unit if feelings of school safety decreased the odds of feeling lonely by 10% ($p < .05$). On the other hand, perceived teachers' social support had no significant effects on perceptions of loneliness.

Collinearity Statistics and Collinearity Diagnostics reported in Table 5 show no significant statistical overlap between the six predictor measures of school environment. All Condition Index values are lower than 15, and none of the Variance Proportions is >0.70 . Moreover, all tolerance coefficients are >0.1 with the smallest being 0.42 and all VIF statistics are small, with the largest being 2.41.

Table 4. Parameter estimates for the binary logistic regression

	B	SE	Wald	df	Sig.	Exp (B)	LL 95% CI	UL 95% CI
School liking ^a	0.306	0.065	22.156	1	<.001	1.358	1.195	1.542
Pressured by schoolwork	0.636	0.054	138.992	1	<.001	1.889	1.699	2.1
Feel safe in this school ^a	0.163	0.061	7.197	1	.007	1.178	1.045	1.327
Feel like I belong in this school ^a	0.399	0.059	45.254	1	<.001	1.49	1.327	1.674
Teachers' Social Support ^a	-0.008	0.062	0.016	1	.900	0.992	0.88	1.119
Classmates' Social Support ^a	0.437	0.072	36.697	1	<.001	1.548	1.344	1.783
Constant	-5.348	0.282	360.85	1	<.001	0.005		

Dependent Variable: Felt lonely, past 12 months.

^aHigh score represents low agreement/frequency.

Table 5. Collinearity Diagnostics for the binary logistic regression analyses

Variance proportions									
Dimension	Eigenvalue	Condition Index	Constant	School Liking	School Pressure	School Safety	School Belonging	Teachers' Social Support	Classmates Social Support
1	6.578	1.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.128	7.161	0.11	0.00	0.24	0.13	0.09	0.01	0.00
3	0.076	9.302	0.11	0.41	0.07	0.02	0.01	0.01	0.27
4	0.070	9.706	0.00	0.02	0.03	0.02	0.10	0.93	0.02
5	0.063	10.251	0.06	0.31	0.44	0.33	0.01	0.00	0.08
6	0.048	11.692	0.01	0.24	0.06	0.43	0.70	0.04	0.00
7	0.038	13.216	0.71	0.02	0.16	0.06	0.09	0.01	0.63
Tolerance				0.562	0.815	0.432	0.415	0.587	0.602
VIF				1.779	1.227	2.277	2.409	1.703	1.662

Dependent Variable: Felt lonely, past 12 months.

Proportions of loneliness by the main significant predictors

Table 2 indicates that, overall, 23% of the sample reported high levels of loneliness. Using this as a reference point, model-based estimates show that among adolescents reporting a high sense of school belonging, low levels of schoolwork pressure, and high perceived classmates' social support, the proportion reporting high loneliness is substantially lower (4.6%). In contrast, 77.4% of adolescents reporting a low sense of school belonging, high schoolwork pressure, and low perceived classmates' social support reported feeling lonely most of the time or always, independent of age, sex and family affluence. Together, these findings indicate strong associations between school belonging, classmates' social support, schoolwork pressure and reported levels of loneliness.

The highest prevalence of loneliness is observed in 15-year-old girls from the least affluent families who report high schoolwork pressure and a low sense of school belonging (71.5%). In comparison, the lowest prevalence of loneliness is seen in 11-year-old boys from the most affluent families, reporting low schoolwork pressure and a high sense of school belonging (5.1% feeling lonely most of the time or always).

Discussion

Our findings are consistent with previous research in showing that: (1) age, sex, and family affluence (FAS) are associated with loneliness and perceived aspects of the school environment, with older adolescents – especially

girls and those from less affluent families — being the most vulnerable (Arslan, 2021; Jefferson, Barreto, Verity, & Qualter, 2023); and (2) among the school variables analysed, schoolwork pressure, classmates' support and school belonging show the strongest potential protective associations with adolescent loneliness. The term 'protective' is used descriptively and does not imply causal direction, as perceptions of school experiences may also be influenced by loneliness. Accordingly, findings should be interpreted as relating to general perceived loneliness, rather than specific social, emotional or other types of loneliness.

The lack of an independent association between teachers' support and loneliness may reflect overlap with broader constructs such as school belonging and perceived safety, which remained significant in the model. Although previous research has identified associations between teachers' support and loneliness, our findings suggest that, when considered alongside broader indicators of the school relational climate, teachers' support does not emerge as a distinct predictor.

Although English adolescents spend considerable time in school, recent data suggest a troubling increase in reported loneliness (Jefferson, Barreto, Verity, & Qualter, 2023; Qualter et al., 2021). The 2022 HBSC England data indicate higher levels of loneliness compared with earlier waves (Qualter et al., 2021). Pandemic-related lockdowns likely further disrupted adolescent social development and connections (Jefferson, Barreto, Jones, et al., 2023), raising the risk of loneliness and associated mental health challenges (Loades et al., 2020). These trends underline the importance of ongoing research and policy focus.

Sex differences in loneliness observed here partly align with prior work showing girls tend to report higher loneliness levels (Vanhalst et al., 2013). Importantly, the adolescents most at risk – 15-year-olds, girls and those from lower affluence families – mirror groups experiencing multiple layers of disadvantage. This reinforces the conceptualisation of loneliness as a social justice issue (Jefferson, Barreto, Jones, et al., 2023; Qualter et al., 2021). Qualitative studies could help explore how intersecting factors like sex and socioeconomic status shape loneliness experiences, potentially informing more targeted and equitable interventions.

Our findings reinforce existing trends: potentially protective factors for adolescent mental health appear to be weakening. For example, analyses of HBSC 2002–2018 data from 32 countries show rising schoolwork pressure, particularly among 15-year-old girls in 20 countries and boys in 11 (Löfstedt et al., 2020). In higher income countries, this pressure has increased notably (Cosma et al., 2020). In England, the proportion of adolescents reporting 'a lot' of schoolwork pressure increased from 17% in 2014 to 32% in 2022, while the proportion reporting a strong sense of school belonging decreased from 75% to 47% over the same period (Hulbert et al., 2023). A similar decline in classmate relationships (by 18 percentage points from 68% to 50%) is shown between 2014 and 2022 (Hulbert et al., 2023).

While HBSC does not systematically track school belonging across countries, PISA data show a decline in related indicators globally, particularly between 2003 and 2015 (Allen et al., 2023). Between 2018 and 2022, the trend has been mixed but with a continued decline

overall, most acutely among students from less advantaged backgrounds.

In our study, a consistent pattern emerged across all variables, indicating that 15-year-olds, girls, and those from the least affluent families were in a more disadvantaged situation compared with the rest of the sample. However, half of young people with a low sense of school belonging, low classmates' support and high schoolwork pressure feel lonely most of the time or always, regardless of age, sex and family affluence. These results indicate strong associations between school belonging, perceived classmates' support, schoolwork pressure and reported loneliness, with limited evidence of interaction by age, sex or family affluence.

Existing literature indicates that social and environmental factors are strongly associated with adolescent well-being, with school-related experiences consistently linked to students' social and emotional outcomes. Previous studies have highlighted the relevance of the school environment in relation to adolescents' experiences of loneliness (Schnepf, Boldrini, & Blaskó, 2023). In this context, the observed associations between schoolwork pressure, perceived classmates' support, and school belonging and loneliness are consistent with the existing literature, pointing to the potential relevance of supportive school environments and positive social connections with classmates in relation to adolescent loneliness.

Despite its widespread use, the construct of school belonging remains inconsistently defined. In HBSC, it is assessed via a single item — 'I feel like I belong in this school'—leaving interpretation open to each respondent. This ambiguity limits our ability to assess what belonging means in practice and how best to strengthen it. Alink, Denessen, Veerman, and Severiens (2023) propose a multidimensional framework for belonging that includes identification with school, feeling valued, peer connections, positive relations with others in school and active participation. These findings highlight the conceptual overlap between the HBSC items on classmates' support and school belonging, underscoring the need for a clearer definition and differentiation of these constructs. Despite the absence of problematic statistical collinearity, classmates' support and school belonging represent conceptually proximate aspects of the school social environment. This theoretical overlap may account for some shared variance and should be considered when interpreting their independent associations.

Further analysis of PISA survey data from 2015 takes the concept of school belonging beyond the immediate school level and supports the hypothesis that school belonging is a composite of parts from each layer of Bronfenbrenner's ecological model (Allen et al., 2023; Bronfenbrenner & Morris, 1998). This illustrates the importance of understanding the wider context of the adolescent's development and life experience beyond school itself, taking into account factors such as local funding, policy and geography of schools.

Limitations

This study has several limitations. First, both loneliness and school belonging were assessed using single-item measures. Accordingly, findings relate to general perceived loneliness rather than its specific social, emotional or existential types. While recent evidence

supports the reliability of a single-item loneliness measure in adolescents (Mund et al., 2023), single items lack nuance and may be interpreted differently by respondents. Similarly, the single-item measure of school belonging allows for idiosyncratic interpretation by adolescents. This limits the depth of insight into students' experiences and the ability to design precise interventions. Moreover, asking directly about loneliness may carry stigma, particularly for boys, potentially leading to underreporting (Cacioppo et al., 2015).

In addition, although missing data were limited, the use of listwise deletion may have reduced the analytic sample and could introduce bias if data were not missing completely at random.

Second, the cross-sectional design does not allow for causal conclusions. While we identified associations between predictors and loneliness, these cannot be interpreted as evidence of causal relationships. It is also possible that feelings of loneliness influence adolescents' perceptions of their school environment, including perceived belonging, classmates' support and schoolwork pressure.

Finally, elevated school absences in the post-pandemic period may have affected who completed the survey, limiting the generalisability of our findings.

Implications

Our findings contribute to growing evidence that loneliness among adolescents has far-reaching consequences for health, well-being, and academic engagement. They reinforce the importance of addressing academic pressure and fostering classmates' support and school belonging through coordinated action at the levels of school practice and education policy. A socioecological approach is needed – one that engages educators, families and policymakers in building environments where young people feel connected, valued and safe.

Importantly, loneliness is not experienced equally. Students from marginalised groups – such as those from low-affluence families – are often at greater risk. For these students, loneliness may reflect not only individual challenges but also systemic exclusion and stigma within the school environment. Recognising loneliness as a social justice issue shifts the focus from individual vulnerability to structural forms of exclusion and calls for equity-driven interventions ensuring connectedness and belonging.

Targeted interventions should include culturally responsive belonging programmes, inclusive peer mentoring systems, and proactive strategies to reduce stigma around loneliness. Schools should ensure equitable access to extracurricular participation and leadership opportunities. These measures should be co-designed with students to reflect their diverse experiences and needs.

Our recommendations take a socioecological approach, calling for action across the school setting and the policy drivers that influence how schools operate. With this in mind, we recommend (a) policy setting in support for whole-school well-being frameworks that embed inclusion, belonging and support (b) multilevel action with policymakers and representatives of schools, adolescents and their families to find the right balance between the pursuit of adolescents' academic achievements and the level of school pressure, and (c) the

adoption of more nuanced, multi-item loneliness measures in surveys with school-aged children, so that further studies can explore what types of loneliness the children suffer from to find the correct interventions, targeting to promote school belongingness, mental health and well-being in school settings.

Finally, we call for greater conceptual clarity around 'school belonging' and for further research into the different types of loneliness experienced by adolescents. A consistent and multidimensional understanding of these constructs is essential for informing the development of equitable strategies aimed at addressing loneliness and supporting student well-being at scale.

Conclusion

Using binary logistic regression, our study shows that age, sex and family affluence are associated with the likelihood of reporting loneliness, with older adolescents – particularly girls and those from less affluent families – being more likely to report loneliness. In addition, significant associations were observed between loneliness and several school-related factors, including schoolwork pressure, classmates' support, and school belonging. Specifically, lower perceived schoolwork pressure, higher classmates' support, and a stronger sense of school belonging were associated with lower odds of reporting loneliness. While causal inferences cannot be drawn, these findings highlight the importance of school environments as potentially modifiable contexts linked to adolescent loneliness and underscore the value of initiatives that foster supportive peer relationships, manageable academic demands, and a sense of belonging to promote young people's well-being.

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AI statement

During the revision of this manuscript, the authors used ChatGPT (OpenAI; GPT-5.6 Luna, accessed July 2025, February 2026) to assist with language refinement, clarity, conciseness and the development of alternative wording, including in response to reviewer comments. All AI-generated suggestions were critically reviewed, substantially revised where appropriate, and verified by

the authors. The authors retained full responsibility for the manuscript's content, interpretation of the findings, statistical analyses and conclusions. No AI technology was used to conduct the statistical analyses or to generate or modify the research data.

Conflict of interest statement

The authors have declared that they have no competing or potential conflicts of interest.

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Ethical considerations

Informed parental consent was obtained through an opt-out procedure, and adolescents provided informed assent prior to participation, with the option to withdraw at any time. The 2022 HBSC England study received ethical approval from the Division for the study of Law, Society and Social Justice Research Ethics Committee, University of Kent, on 24th November 2021 (ref. 0492).

Data availability statement

All HBSC data will be made open access from October 2026. The data that support the findings of this study are available from the Department of Health and Social Care. Restrictions apply to the availability of these data, which were used under licence for this study. Data are available from the authors or at <https://hbscengland.org/> with the permission of the Department for Health and Social Care. The SPSS code is publicly available via the following link: <https://doi.org/10.5281/zenodo.23260862>.

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