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UNDERSTANDING DRIVERS OF RECENT TRENDS IN YOUNG PEOPLE'S MENTAL HEALTH – Technical Report

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A. MODELS DETECTING CHANGE ACCORDING TO SUBGROUP

This analysis centres on trends in mental health symptoms and clinical presentations among young people using two major data sources: Understanding Society and CPRD.

For individuals 14 to 15 years old, we used the SDQ score as measured by the Understanding Society survey to identify those with (i) emotional problems, (ii) hyperactivity, or (iii) conduct problems. The SDQ score was reported in the survey at every other wave, from Wave 1 to Wave 13, years 2009-2022. For individuals 16 to 24 years old, we used the GHQ-12 score to identify those with (iv) psychological distress, measured at each wave of the Understanding Society (Waves 1-14; years 2009-2023) and each wave of the predecessor British Household Panel Survey (Waves 1-18; years 1991-2008). For each of the four outcomes, we produced line graphs to display the proportion of young people with over-the-threshold problems over time and, for those outcomes that showed an increase. Additional line graphs display the mean score over time as disaggregated by key sociodemographic variables, including sex, ethnicity, income, and region. Weighted linear regression models were applied to examine different trends according to subgroups, by adjusting for the interaction of each subgroup and time. Table T1 shows the estimates and p-values relating to this analysis.

Table T1 displays average mean yearly mental health symptoms changes within subgroups (Beta) and p-values assessing subgroup differences in trends

		Emotional problems		Hyperactivity		Psychological distress	
		Beta [95% CI]	p-value	Beta [95% CI]	p-value	Beta [95% CI]	p-value
Gender	Female	0.11 [0.08, 0.14]	0.013	0.03 [-0.002, 0.06]	0.231	0.23 [0.20, 0.26]	<0.001
	Male	0.06 [0.04, 0.09]		0.002 [-0.03, 0.03]		0.17 [0.13, 0.20]	
Ethnicity	White British	0.10 [0.07, 0.13]	0.005	0.02 [-0.003, 0.04]	0.148	0.24 [0.21, 0.26]	<0.001
	Black	-0.01 [-0.08, 0.05]		-0.03 [-0.09, 0.04]		0.04 [-0.07, 0.15]	

	South Asian	0.02 [-0.04, 0.09]		-0.04 [-0.10, 0.02]		0.10 [0.04, 0.16]	
	Mixed	0.06 [-0.03, 0.15]		0.06 [-0.04, 0.16]		0.17 [0.07, 0.26]	
Income	Most deprived	0.09 [0.04, 0.14]	0.789	0.02 [-0.03, 0.06]	0.876	0.22 [0.17, 0.28]	0.182
	Middle	0.09 [0.06, 0.12]		0.02 [-0.01, 0.04]		0.21 [0.18, 0.24]	
	Least deprived	0.07 [0.01, 0.13]		0.001 [-0.06, 0.06]		0.16 [0.12, 0.21]	
Region	Northern	0.12 [0.08, 0.17]	0.146	0.03 [-0.01, 0.07]	0.68	0.24 [0.19, 0.29]	0.243
	Midlands	0.08 [0.02, 0.14]		0.02 [-0.03, 0.07]		0.21 [0.15, 0.26]	
	Southern	0.07 [0.04, 0.10]		0.01 [-0.02, 0.04]		0.19 [0.16, 0.22]	

B. CHANGING RESILIENCE

We used data from Understanding Society (Waves 1–14) for those between 16 and 25 years old. For each wave, we identified whether a young person had experienced one of four stressors: physical attack, financial difficulty, frequent conflict with a parent, or bullying. The mental health outcome was the GHQ-12 score, treated as a continuous variable. To account for prior symptom levels, we included the GHQ score from the previous wave as a covariate. Covariates in all models included age, sex, ethnicity (grouped into five categories), and survey and wave.

To address missing data, we used multiple imputation by chained equations with 20 imputations, imputing missing values for exposures and GHQ scores. Each stressor was imputed and analysed separately, restricted to waves in which the stressor was measured. Imputation models included all covariates used in the main analysis.

For each adversity, we estimated linear regression models using data from multiple imputations. Our primary interest was whether the association between each stressor and GHQ score varied across survey waves. We therefore tested models with wave-by-stressor interaction terms, treating wave first as categorical (allowing a flexible form of change over time) and then as continuous (to test for a linear trend). By including lagged GHQ, we aimed to test whether mental health deteriorated beyond what prior symptoms would predict. An increasing effect of a stressor over time was interpreted as evidence that resilience to that stressor may be diminishing.

C. CHANGING MEASUREMENT

It has been hypothesised that changes in young people's reported mental health symptoms are in part a result of changes in how they interpret their feelings. It may be that they are becoming increasingly likely to identify negative emotions (for example, "I worry a lot") because they experience and encounter less stigma. This phenomenon, of greater sensitivity to questions about mental health, would be likely to affect some questions more than others. Compared to prior generations, today's young people are more familiar with the language of mental health. As a result, they may be more likely to identify that they "worry a lot," but are equally likely to say that they "often complain of headaches, stomach aches or sickness", indicative of somatic symptoms of emotional distress.

We explore this hypothesis by conducting a 'measurement invariance' analysis that tests whether the relationship between individual items and their construct remains consistent across cohorts. This tests whether, for example, the relationship between 'I worry a lot' and 'emotional problems' is invariant across groups. We do this by comparing responses in 2021-2022 and 2009-2010, focused on two different measures: emotional problems reported by 14–15-year-olds from the SDQ (5 items), and general psychological distress reported by ages 16-24 from the GHQ-12 (12 items).

We test for measurement invariance using a method called Differential Item Functioning (DIF). This identifies whether mental health questions (termed 'items') are responded to differently over time, despite respondents having similar responses to all other items. It does this by comparing the probability of responding a certain way on specific items across cohorts, controlling for the overall level of mental health problems based on the other items. Thus, it helps identify whether changes in responses across time points reflect actual shifts in mental health or if they result from variations in how questions function at different time points.

1.Findings of measurement invariance analysis

We determined whether the measures that we see are increasing are invariant across time using a Differential Item Functioning (DIF) analysis. DIF occurs when an item functions differently across groups. We present our DIF analysis using the following measures: the SDQ-emotional subscale, SDQ-hyperactivity subscale, and GHQ; comparing UKHLS responses given in Wave 13 (2021-2022) to those given in Wave 1 (2009-2010). The analysis was conducted using the 'lordif' package in R. The likelihood ratio (LR) χ^2 test was used as the detection criterion for DIF. The effect size describes the

magnitude of any difference between groups and was determined using McFadden's pseudo R2. As suggested,[1] we classified DIF McFadden's pseudo $R^2 < 0.035$ is typically negligible, 0.035–0.070 as moderate, and >0.070 large.

DIF can be uniform and/or non-uniform:

> **Uniform item bias** occurs when the likelihood that they respond a certain way is different across groups, but this difference is consistent across levels of the underlying trait. For example, in 2021, young people may be more likely to respond "I worry a lot" than in 2009, and that is true whether they exhibit low or high levels of emotional problems. This represents a shift in the intercept between the item and the construct.
>
> **Non-uniform item bias** occurs when the difference in how groups respond to an item depends on their level of the underlying trait. This means that the item behaves differently across groups at different levels of the trait. For example, in 2021, young people with high levels of emotional problems may be more likely to respond "I worry a lot" compared to those in 2009, whereas for young people with low levels of emotional problems, the difference between the two years might be smaller or even reversed. In this case, the bias varies based on the individual's emotional problem severity, reflecting non-uniform DIF. This represents a change in the slope between the item and construct.

SDQ-emotional subscale

The SDQ emotional subscale contains 5 items: (1) complains of headaches/stomach aches/sickness, (2) often seems worried, (3) often unhappy, (4) nervous or clingy in new situations, and (5) has many fears, is easily scared. Only item 4 (nervous or clingy) was detected as displaying wave-related DIF.

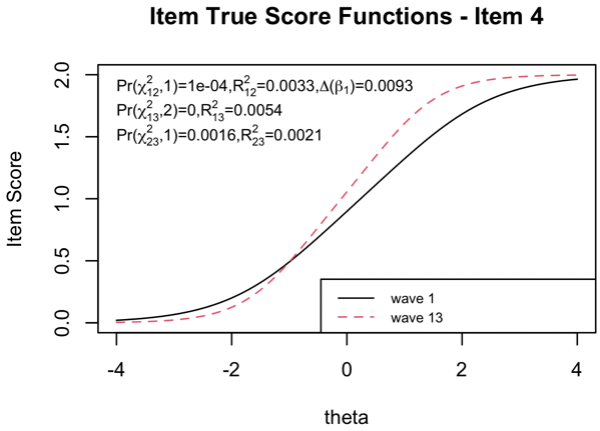
According to the likelihood ratio χ^2 tests, this item showed both uniform DIF and non-uniform DIF ($p < .001$ and $p = .002$, respectively). Uniform DIF indicates a group difference in responses to item 4, as shown in Figure T1. Specifically, young people in Wave 13 generally scored higher on this item compared to those in Wave 1. Non-uniform DIF implies that young people in the two waves also differed in terms of item discrimination (i.e. differences in the slope).

As illustrated in Figure T1, young people in Wave 13, with moderately higher levels of emotional symptoms (indicated by 'theta'), tended to score this item more positively compared to those in Wave 1, whereas individuals with lower or higher levels of emotional symptoms had similar scores. However, both uniform and non-uniform DIF had

negligible effect sizes, with $R^2 = 0.003$, $R^2 = 0.002$, respectively—both values being well below the threshold of 0.13.

Figure T1: Graphical display of the DIF results for SDQ emotional item 4

Young people aged 14 to 15 years, England, 2009 to 2022



Source: Understanding Society

Figure T1: Graphical display of the item 'nervous or clingy in new situations', relationship between the item score and the level of emotional problems (theta). The relevant statistics show the extra variance explained by three models: R^2_{12}=added effect of 'group' (detecting uniform DIF); R^2_{23}=added effect of 'interaction term' (detecting non-uniform DIF), and R^2_{13}=added effect of 'group and interaction term'. We use the final model to determine the impact of DIF of different functions.

GHQ-12

The initial analysis for the GHQ-12 used the default alpha level of .01, which resulted in all 12 items being flagged for DIF and led to the model's non-convergence. The alpha level was therefore adjusted to .05. The results show that, with the exception of the item 'lost much sleep over worry', all other items exhibited wave-related DIF, both uniform ($p < .01$) and non-uniform ($p < .01$). The size of the impact for individual DIF were negligible, as McFadden's pseudo R^2 ranged from 0.003 to 0.04.

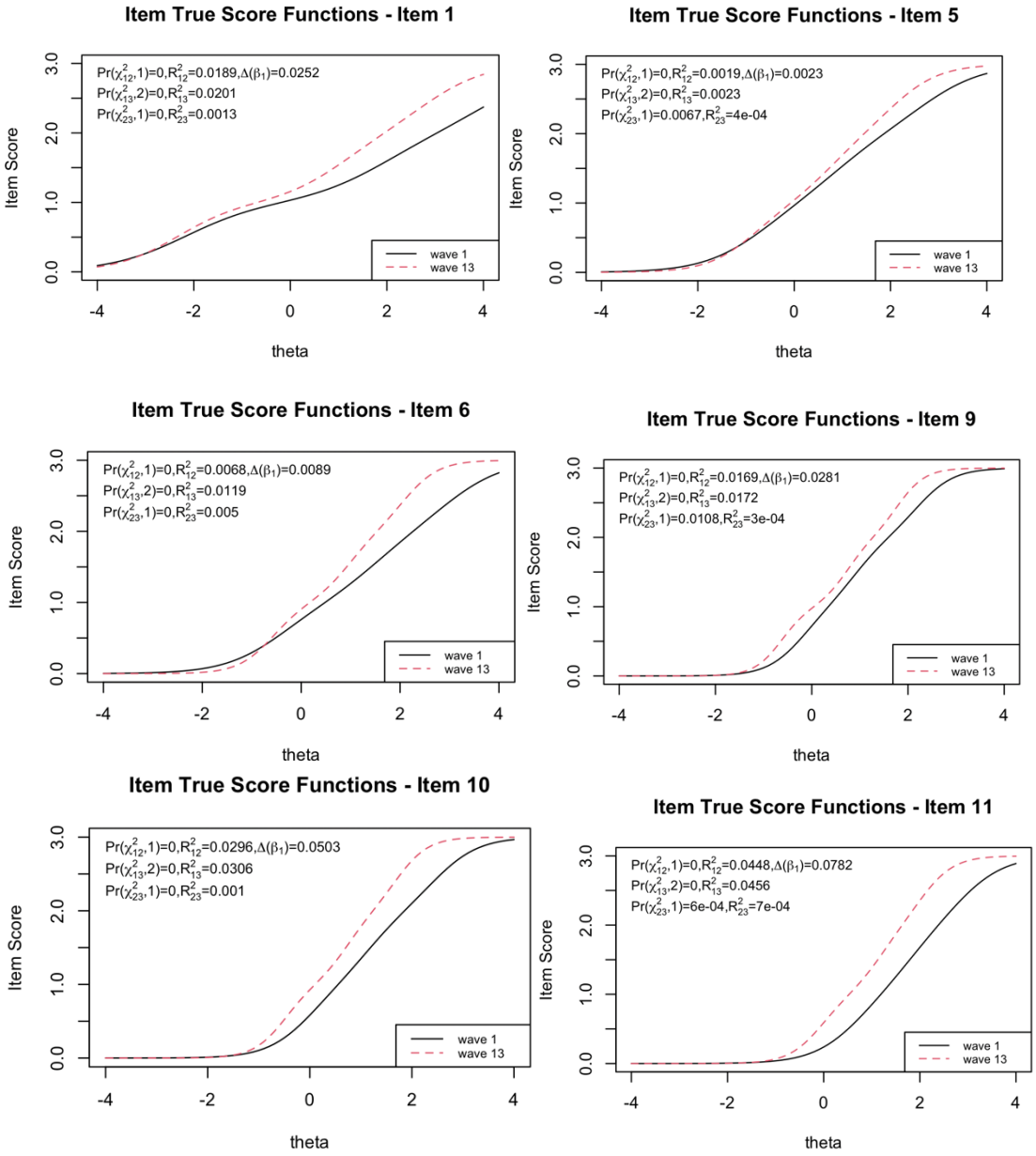
Two distinct DIF patterns were identified. The first can be characterised as individuals in Wave 13 with moderate to moderately higher levels of mental health symptoms tended to score higher on these items than those in Wave 1, while individuals with low or high symptom levels scored similarly (see Figure T2).

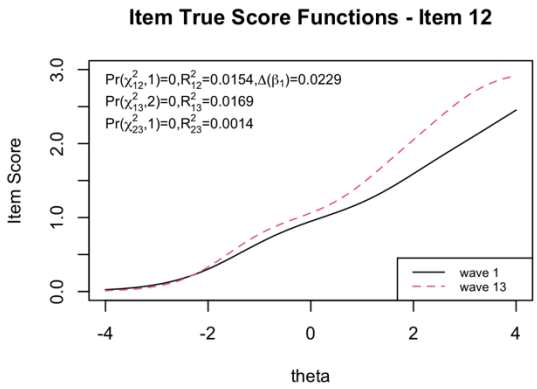
The second pattern shows that individuals in Wave 13 with lower levels of mental health symptoms tended to score generally lower than those in Wave 1. However, as mental

health symptoms worsened, individuals in Wave 13 tended to rate the item higher compared to those in Wave 1 (Figure T3).

Figure T2: Graphical display of the DIF results for the GHQ-12 questions where individuals identify with symptoms at higher level of mental health

Young people aged 16-24, England, 2009 to 2022



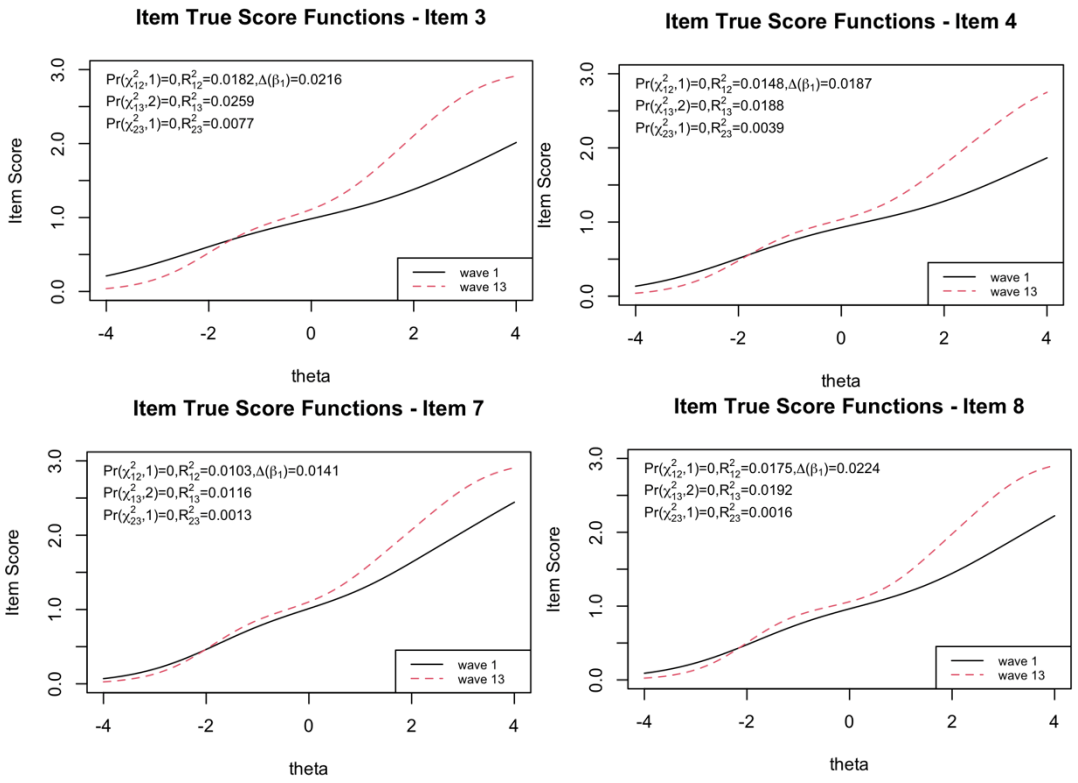


Source: Understanding Society

Figure T2: Graphical display of DIF for GHQ-12 questions where individuals identify with symptoms at higher level of mental health: item 1 ('less able to concentrate'), item 5 ('constantly under strain'), item 6 ('less able to overcome difficulties'), item 9 ('unhappy or depressed'), item 10 ('losing confidence'), and item 11 ('thinking of yourself as a worthless person'), and item 12 ('feeling less happy'). These statistics show the additional variance explained by three models: R^2_{12}=adding wave (detecting uniform DIF); R^2_{23}=adding interaction term between wave and mental health (detecting non-uniform DIF), and R^2_{13}=added the effect of wave and interaction term. It is the latter that we use to determine the impact of DIF of different functions.

Figure T3: Graphical display of the DIF results for the GHQ-12 questions that display lower scores at low trait and higher scores at high trait levels

Young people aged 16-24, England, 2009 to 2022



Source: Understanding Society

Figure: T3 Graphical display of DIF for GHQ-12 questions that display lower scores at low trait and higher scores at high trait levels: item 3 ('playing a less useful part in things'), item 4 ('less capable of making decisions'), item 7 ('less able to enjoy day-to-day activities'), item 8 ('not able to face up to problems'). The relevant statistics show the extra variance explained by three models: R^2_{12}=added effect of 'group' (detecting uniform DIF); R^2_{23}=added effect of 'interaction term' (detecting non-uniform DIF), and R^2_{133}=added effect of 'group and interaction term'. It is the latter that we use to determine the impact of DIF of different functions.

Table T2: Items in the GHQ-12 flagged as DIF and their corresponding McFadden's R^2 values indicating explained variance

Item	R-squared	Pattern
11 thinking of yourself as a worthless person	0.0456	Scores higher at moderate and high levels of distress
10 losing confidence	0.0306	Scores higher at moderate and high levels of distress
3 playing a less useful part in things	0.0259	Scores higher at higher levels of distress and lower at lower levels
8 not able to face up to problems	0.0192	Scores higher at higher levels of distress and lower at lower levels
4 less capable of making decisions	0.0188	Scores higher at higher levels of distress and lower at lower levels
9 unhappy or depressed	0.0172	Scores higher at moderate and high levels of distress
12 feeling less happy	0.0169	Scores higher at moderate and

		high levels of distress
6 less able to overcome difficulties	0.0119	Scores higher at moderate and high levels of distress
7 less able to enjoy day-to-day activities	0.0116	Scores higher at higher levels of distress and lower at lower levels
5 constantly under strain	0.0023	Scores higher at moderate and high levels of distress

2. Conclusion of measurement invariance analysis

The analysis found that, while there were statistically significant differences in how young people responded to individual GHQ-12 items between 2009–2010 and 2021–2022, the magnitude of these differences was very small, with McFadden's pseudo R^2 values for all items falling below commonly accepted thresholds for practical significance[2] (Table T2, $R^2 < 0.05$).

Nonetheless, for the 16-24 age group, 11 out of the 12 GHQ-12 items displayed evidence of differential item functioning (DIF) between waves, and all showed the same directional pattern: young people in Wave 13 were more likely to endorse symptoms of distress at the higher levels of the underlying construct. This pattern suggests a modest uniform shift in the way distress is reported over time.

While the effect sizes for individual items were small, the cumulative nature of this uniform DIF could indicate a subtle recalibration or response shift among later respondents. That

is, young people in this age group in 2021–2022 may have become more likely to acknowledge symptoms of psychological distress, potentially due to changes in mental health awareness, social norms, or reduced stigma. Similar findings have been reported elsewhere; for example, Benítez et al. (2019)[3] using the same data but across all adults, noted declining item-level bias in GHQ-12 across successive waves, interpreting this as a sign of increasing familiarity or openness. Despite the presence of DIF, the small effect sizes are consistent with conclusions from Jones (2019),[4] and others, who found that even widespread item-level non-invariance typically has minimal impact on the validity of total scores. Therefore, the GHQ-12 can still be considered a stable measure of psychological distress across these time points, although this subtle response shift should be acknowledged when interpreting observed changes.

For younger people – aged 14-15 – only one item was flagged as functioning differently across waves indicating that we are broadly measuring the same construct across years, and therefore the changes are likely to represent real changes in mental distress.

References

1. Zumbo BDW, W R. A Handbook on the Theory and Methods of Differential Item Functioning (DIF): Logistic Regression Modeling as a Unitary Framework for Binary and Likert-Type (Ordinal) Item Scores. Ottowa, ON.: Directorate of Human Resources Research and Evaluation, Department of National Defense; 1999.

2. Jodoin MGG, J G. Evaluating Type I Error and Power Rates Using an Effect Size Measure With the Logistic Regression Procedure for DIF Detection. Applied Measurement in Education. 2001(4):324-49.

3. Benítez IA, B G; He, J. An Integrated Approach to Bias in a Longitudinal Survey in the United Kingdom: Assessing Construct, Method, and Item Bias in the General Health Questionnaire (GHQ-12). Assessment. 2019;7(26):1194-206.

4. Jones RN. Differential item functioning and its relevance to epidemiology. Current Epidemiological Reports. 2019;6(15):174-83.

D. CHANGING IMPACTS ASSOCIATED WITH MENTAL HEALTH PROBLEMS

Understanding society analysis

We used data from the UK Understanding Society survey to examine whether the association between mental distress and subsequent adverse outcomes has changed over time. Our focus was on three outcomes reported one year after the exposure: (i) daily drinking, (ii) smoking, and (iii) not being in education, employment or training (NEET status).

Mental distress was operationalised as reporting at least four symptoms on a validated mental health symptom scale. We used multiply imputed datasets to address missing data, implementing multiple imputation by chained equations (MICE), and performed analyses using the mi estimate suite in Stata. The imputation model included mental health symptoms, outcome variables, and a range of socio-demographic predictors.

For each outcome, we fitted logistic regression models to estimate the association between mental distress and the outcome one year later. Models adjusted for age (continuous), sex, and ethnicity. To assess whether these associations changed over time, we included a linear interaction term between mental distress and survey year. The year was modelled as a continuous variable.

We report adjusted odds ratios and 95% confidence intervals and examine trends over time using predicted probabilities derived from model margins. Sensitivity analyses using unadjusted models were also conducted.

E. THEORIES ON CHANGES IN YOUNG PEOPLE'S MENTAL HEALTH – FULL EVALUATIONS

Search Strategies

For each theory, a systematic search of Web of Science was carried out, supplemented by additional searches of Google Scholar, hand searching of references, and input from topic experts. Table T3 presents the core search terms used across all searches, and theory-specific search terms are presented at the start of each subsection. The following criteria were used to guide our inclusion:

(1) Exposure measures are related to the theory of interest

(2) Outcome measures are related to general mental health or internalising symptoms

(3) Youth is the targeted population, defined as the mean age of the review is within the ages 10-24 years

(4) Umbrella review/reviews of review, systematic review or meta-analyses which include longitudinal studies

(5) Includes studies within the UK, or similar countries such as European nations, and the USA.

(6) Published in the last five years

(7) Peer-reviewed journals only

We were necessarily pragmatic with the application of these criteria. Where umbrella reviews were identified, we did not include every identified systematic review or meta-analysis. Where little was found in the way of reviews, or the identified reviews were not up to date, we conducted further searches for individual longitudinal empirical studies, limiting search dates to after the latest identified reviews. Where little evidence was available from the UK or similar countries, we included studies from around the world.

Table T3: search terms used in each literature search

Mental health search terms	(((mental OR psych*) NEAR/1 (health OR disorder OR illness OR well-being OR outcome*)) OR "internalising symptom*" OR (depressi* OR "depressive disorder*") OR (anxiet* OR "anxiety disorder*" OR "generalised anxiety disorder*" OR "specific phobia disorder*" OR "separation anxiety disorder*" OR "social phobia")) OR ADHD OR hyperactiv* OR "attention deficit" OR PTSD OR "conduct disorder" OR "eating disorder")
Population search terms	((young NEAR/1 (people OR person OR adult)) OR youth* OR adolescen* OR teen*)
Study design search terms	"review of reviews" OR "umbrella review" OR overview OR "systematic review" OR "meta-analysis"

1. Academic Pressure

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

("academic" OR educat* OR school* OR exam) NEAR/1 (pressure* OR stress* OR "worry" OR "demand")

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

Academic pressure – manifesting through high workloads, exam stress, and fear of failure – has been suggested to exacerbate these specific mental health symptoms.[1] The theory is consistent with the rising trends in depression and anxiety among young people. A list of potential mechanisms underpinning the impact of academic pressure on young people's mental health has been summarised in the four themes below.

Societies' increased emphasis on education

Modern societies place significant emphasis on education, with life opportunities increasingly dependent on academic success. The rise of knowledge economies and a competitive labour market has made educational performance more consequential for young people's social and economic future, contributing to higher levels of school-related pressures that lead to a more stressful academic environment. Young people face not only a more competitive academic environment and pressure from school staff, but also an internalised pressure to meet these standards.[2, 3]

Changes in UK Assessment Systems

The UK's educational framework has shifted towards placing greater emphasis on high-stakes assessments.[4] Reforms to GCSEs and A-levels have increased the rigour of these qualifications, with a move towards more heavily weighted exams. For instance, Year 6 Standard Assessment Tests (SATs) have become highly pressurised, occurring at a

vulnerable developmental stage. This change has amplified the stakes associated with individual assessments, heightening anxiety and fear of failure among students.

Parental Pressure and Family Dynamics

Parental expectations around academic performance can place additional pressure on young people, perhaps particularly in middle- and upper-class families.[5] They may feel the need to meet these expectations, adding to the stress they experience in school. Family-related stressors, such as conflicts or high parental expectations, can further compound feelings of anxiety and depression.[5]

Peer Comparison and Academic Competition

The academic environment fosters a culture of competition, where students constantly compare their performance to that of their peers. This social comparison, particularly around academic achievements, can lead to feelings of inadequacy.[6]

Reduction in sleep and well-being

Excessive academic workloads and schoolwork can lead to poor sleep patterns. Young people who experience disrupted sleep due to late-night studying are more prone to mental health issues such as anxiety, depression, and irritability.[6]

Fear of failure and emotional instability

The fear of academic failure could lead to emotional instability in young people. This fear can result in maladaptive behaviours like procrastination and avoidance, which only increase stress. Young people who fail to meet academic expectations may internalise these failures, leading to higher levels of anxiety and depression.[4]

School Disengagement

Some young people, overwhelmed by academic pressures, begin to disengage from school altogether. This disengagement heralds poor academic outcomes and contributes to social isolation, which worsens mental health problems such as depression and anxiety.[5]

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

Most studies have focused on symptoms of low mood and anxiety.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. The theory of academic pressure acknowledges that it operates within a broader context influenced by socio-economic status, family dynamics, cultural expectations, and systemic educational structures.

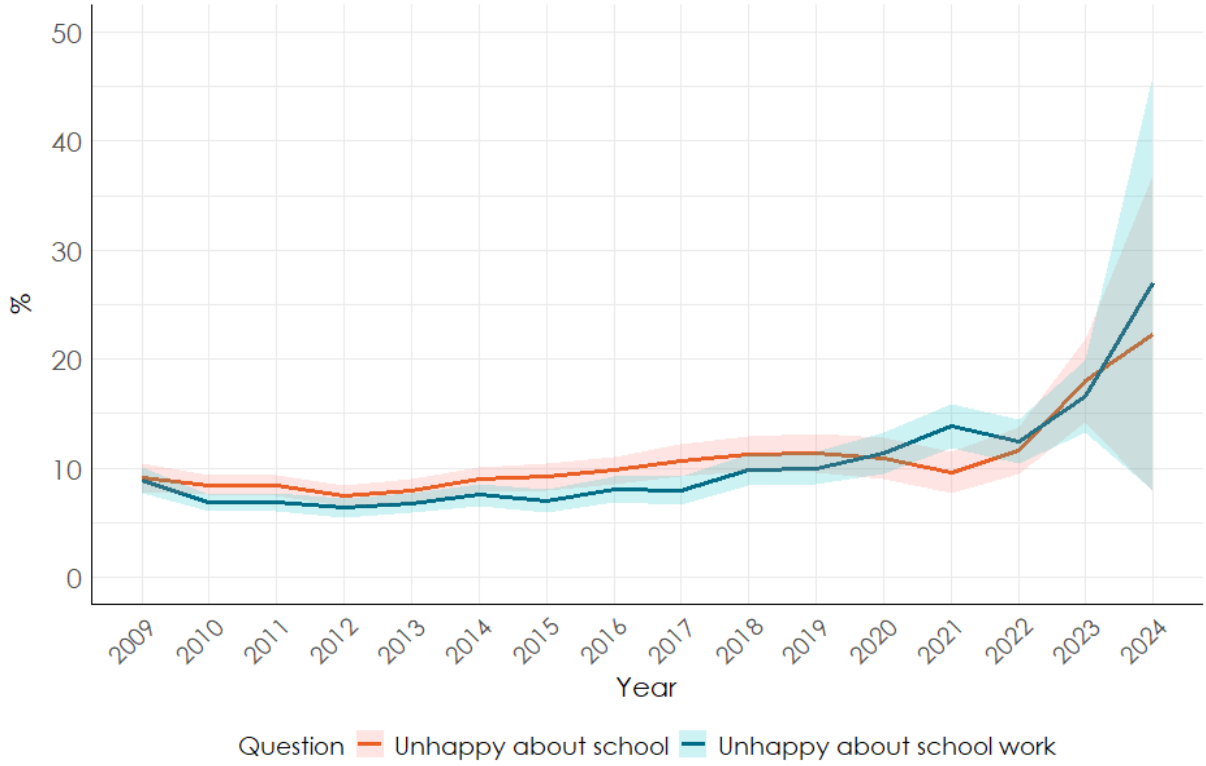
Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

There is no quantitative direct evidence that academic pressure has been increasing in recent years. One study used data from 32 countries that participated in the Health Behaviour in School-aged Children (HBSC) study, a World Health Organization collaborative cross-sectional study currently conducted in 49 countries across Europe and North America.[7] While the study showed an overall increase in school pressure among adolescents between 2002 and 2018, the findings for England suggest that school pressure levels did not escalate in 2018 compared to 2002 (OR = 0.96 [0.92, 1.01] for boys and OR = 1.00 [0.99, 1.10] for girls). In contrast, school pressure levels increased in Scotland (OR = 1.26 [1.20, 1.32] for boys and OR = 1.43 [1.36, 1.51] for girls).

The Understanding Society survey didn't include a question that would allow us to assess changes in pressure over time, but it did have a variable where young people were asked about the importance of exams; we found a *decrease* over time in how much importance young people placed on exams, though we emphasise this does not necessarily mean that pressure has reduced (See Figure T4).

Figure T4: Trends in feeling 'unhappy' about school and school work.
Young people aged 14 to 15 years, England, 2009 to 2024



Source: Understanding Society

We also examined whether young people felt happy with their school or with their schoolwork, and there was little change in this proportion up to; however, it has then declined considerably since 2021. Specifically, we drew upon questions asking, "How do you feel about your school" and "how do you feel about your schoolwork?"

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

Yes, it is plausible. Changes in the UK's national curriculum and increased emphasis on high-stakes exams have led to concerns around increased academic pressure. The UK government implemented various reforms to the national curriculum and assessment methods throughout the 2010s. These reforms included a shift towards more rigorous content and a greater emphasis on final examinations, reinforcing the high-stakes nature of assessments, which may reflect an increase in academic pressure over the past decade.[8]

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Yes. One systematic review by Steare et al. (2023) provided evidence that academic pressure is associated with poor mental health outcomes in young people, particularly in the domains of depression and anxiety.[1] Of the 19 studies on depression, 17 found a positive association.[9] Similarly, five out of six studies on anxiety reported significant associations. Mixed anxiety and depressive symptoms were also consistently linked to academic pressure across 20 studies, with evidence showing the strength of the association increasing over time.[6] Additionally, two time-series studies indicated that stress-related hospital admissions were highest during term time, in part supporting the connection between academic pressure and increased mental health service use. [10, 11]

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

To some degree. However, the systematic review by Steare et al. (2023) notes that 39 out of the 52 included studies were cross-sectional.[1] Among the studies focusing on internalising symptoms, the review includes four prospective cohort studies and two longitudinal studies that measured academic pressure at baseline and internalising symptoms or service use at follow-up. These studies provide some evidence of a temporal relationship between academic pressure and subsequent depressive and anxiety symptoms. For instance, Kaman et al. (2021) found that school-related stress predicted depressive symptoms five years later, particularly among boys.[9]

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

Inconsistently. Several longitudinal studies attempt to control for important confounding variables, although the extent and rigour of these controls vary. Of the six longitudinal studies focusing on internalising symptoms and service use included in the systematic review, only two accounted for baseline mental health. A prospective cohort study by Kaman et al. (2021), for instance, measured baseline emotional problems using the Strengths and Difficulties Questionnaire (SDQ) and controlled for socio-economic status using a composite index of parental education, income, and occupation and found

that school-related stress predicted depressive symptoms five years later, particularly among boys.[9] This allowed for clearer interpretation of the relationship between school-related stress and depressive symptoms over a five-year follow-up period. Similarly, Torsheim et al. (2003) conducted a three-wave longitudinal study that examined the reciprocal relationship between school stress, social support, and distress among adolescents.[12] They controlled for baseline distress levels to assess how initial mental health status influenced subsequent outcomes.

Some longitudinal studies controlled for other key confounding factors. For example, Blackburn et al. (2021) included demographic covariates, such as age, gender, ethnic group, and area-level deprivation, in their analysis of stress-related hospital presentations during school terms versus holidays, enhancing the robustness of their findings.[10] Similarly, Fu et al. (2022) also controlled for poverty status in their analysis, enhancing the reliability of their findings regarding the impact of perceived academic stress on depressive symptoms.[13]

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Not that we are aware of.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

Not that we are aware of.

Q11: Does the evidence indicate that there is a strong association?

No. Across the studies identified in the systematic review, effect sizes tended to be small, with some studies reporting moderate effects, although these were from cross-sectional studies. Evidence from longitudinal studies reported small effect sizes. For example, Kaman et al. (2021) reported small effect sizes for the relationship between academic pressure and depressive symptoms (standardised coefficient < .20) over a 5-year follow-up.[9] Torsheim et al. (2003) reported that school-related stress at baseline was positively associated with psychosomatic symptoms at 6-month (standardised coefficient = .09, $p < 0.01$), and at 12-month (standardised coefficient = .11, $p < 0.01$) follow-up.[12] Additionally, the review notes that effect sizes often decrease after controlling for confounding variables, such as socio-economic status and baseline mental health, further supporting the conclusion that the association is not strong across all contexts.[1]

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

No. So far, we have not identified any research that employs a design capable of suggesting a dose-response relationship between academic pressure and young people's mental health outcomes.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

In part. While we have not yet found clear evidence suggesting differences among ethnic groups, existing evidence largely indicates that the rise in perceived academic pressure is most evident among girls compared to boys. For England and Scotland, girls consistently reported higher levels of academic pressure in survey data from 2002, 2006, 2010, 2014, and 2018.[7]

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Across four identified high-quality studies (i.e. longitudinal studies that controlled for key confounders), there was mixed evidence on whether academic pressure had a larger effect on girls, and no evidence regarding ethnicity. Blackburn et al. (2021), using UK national administrative hospital data, reported that stress-related hospital admissions were more common among girls during school terms.[10] The authors interpreted this pattern as indicative of a school-related mechanism driving emotional distress in girls. In contrast, Kaman et al. (2021) found that school stress significantly predicted depressive symptoms in boys but not in girls.[9] This discrepancy may be explained by the inclusion of a broader set of risk factors in the Kaman et al. study, such as mother–child relationship quality and emotion-focused coping, which may have mitigated the observed effects of academic pressure on girls relative to boys. These findings highlight the importance of considering broader contextual and interpersonal factors when assessing gender-specific impacts of academic stress.

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

Based on the four reviewed studies examining academic pressure and emotional symptoms, only one study investigated the impact of other relevant groups. In Torsheim et al. (2003), while SES did not significantly predict emotional distress directly, lower SES was associated with less support from peers and teachers.[12] Since low perceived support was also associated with increased emotional distress, this may mean a greater effect of school-related stress on those in lower SES groups. However, no interaction terms were included to formally test whether the effect of academic stress on distress was stronger for lower SES students.

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

A key strength of the literature is that studies use a range of measures of academic pressure, including self-reported stress levels and stress-related hospital presentations during school terms versus holidays. Using these different measures helps to triangulate findings across different types of measurement error.

Yet there are several methodological concerns. While a range of proxy indicators have been used, the majority of the studies still use self-report measures. While self-report measures directly capture respondents' mental content, such as thoughts and feelings, and can be argued to better reflect perceived academic pressure,[14] the heavy reliance on self-reported measures may be subject to reporting biases, such as social desirability or recall bias. These biases may lead to either overestimation or underestimation of the true associations.

Additionally, a large proportion of studies are based in countries whose context is less comparable to the UK (e.g. 26 of the 52 studies identified in the systematic review were conducted in Asia), and only three longitudinal studies are based in the UK.[2-4] This may further raise concerns about the generalisability of the findings to currently observed trends in the UK.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable about the theory or evidence base that might inform our evaluation of causality?

One study used Swedish data to explicitly model the impact that changes in academic stress accounted for secular mental health trends. They found that it only explained a small proportion of the overall trend in symptoms, but evidence that it explained a growing gender gap.[4]

References

1. Steare T, Gutiérrez Muñoz C, Sullivan A, Lewis G. The association between academic pressure and adolescent mental health problems: A systematic review. Journal of Affective Disorders. 2023;339:302-17.

2. Högberg B. Educational stressors and secular trends in school stress and mental health problems in adolescents. Social Science & Medicine. 2021;270:113616-.

3. The Lancet C, Adolescent H. Time to take academic pressure seriously. The Lancet Child & Adolescent Health. 2023;7(10):671-.

4. Sweeting H, West P, Young R, Der G. Can we explain increases in young people's psychological distress over time? Social Science & Medicine. 2010;71(10):1819-30.

5. Balloo K, Hosein A, Byrom N, Essau C, editors. Academic pressures and mental distress during adolescence: associations with participation in higher education. Society for Research into Higher Education (SRHE) International Conference; 2021 2021/12//.

6. Högberg B, Strandh M, Hagquist C. Gender and secular trends in adolescent mental health over 24 years – The role of school-related stress. Social Science & Medicine. 2020;250:112890-.

7. Löfstedt P, García-Moya I, Corell M, Paniagua C, Samdal O, Välimaa R, et al. School Satisfaction and School Pressure in the WHO European Region and North America: An Analysis of Time Trends (2002–2018) and Patterns of Co-occurrence in 32 Countries. Journal of Adolescent Health. 2020;66(6):S59-S69.

8. Jerrim J, Allen R, Sims S. High Stakes Assessments in Primary Schools and Teachers' Anxiety About Work. Educational Assessment. 2024;29(2):59-74.

9. Kaman A, Otto C, Klasen F, Westenhöfer J, Reiss F, Hölling H, et al. Risk and resource factors for depressive symptoms during adolescence and emerging adulthood – A 5-year follow-up using population-based data of the BELLA study. Journal of Affective Disorders. 2021;280:258-66.

10. Blackburn R, Ajetunmobi O, McGrath-Lone L, Hardelid P, Shafran R, Gilbert R, et al. Hospital admissions for stress-related presentations among school-aged adolescents during term time versus holidays in England: weekly time series and retrospective cross-sectional analysis. BJPsych Open. 2021;7(6):e215-e.

11. Slaunwhite AK, Ronis ST, Peters PA, Miller D. Seasonal variations in psychiatric admissions to hospital. Canadian Psychology / Psychologie 26nstagram26. 2019;60(3):155-64.

12. Torsheim T, Aaroe LE, Wold B. School - related stress, social support, and distress: Prospective analysis of reciprocal and multilevel relationships. Scandinavian Journal of Psychology. 2003;44(2):153-9.

13. Fu Y, Ren W, Liang Z. Perceived academic stress and depressive symptoms among Chinese adolescents: A moderated mediation analysis of overweight status. Journal of Affective Disorders. 2022;296:224-32.

14. Corneille O, Gawronski B. Self-reports are better measurement instruments than implicit measures. Nature Reviews Psychology. 2024;3(12):835-46.

2. Changing Economic Conditions

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

Econom*
OR Unemploy* OR workless* OR Poverty OR depriv*
OR "financial hardship" OR "economic hardship"
OR "cost of living" OR cost-of-living OR "living costs" OR Inflation
OR "Universal credit" OR "two-child limit" OR "two child limit" OR "benefit sanctions"
OR "economic decline" OR "recession" OR "financial crisis" OR "financial crash" "economic instability" OR Austerity
OR "income 27nstagram27*" OR "economic 27nstagram27*" OR "wealth 27nstagram27*"
OR "socioeconomic status" OR SES
OR "family investment" OR "family stress" OR "family strain" OR "parent* investment" OR "parental stress" OR "parental strain"

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

Several mechanisms have been suggested that tie economic changes since 2010 to worsening mental health outcomes in young people:

A. *Economic stagnation and increases in cost of housing*

Young people in work and their parents have seen weak growth in wages since the great recession of 2008, which, alongside increases in the cost-of-living, has led to a lowering or stagnation in living standards. This squeeze is theorised to heighten financial-related stress in young people.[1] Not being able to move out from the family home due to higher house prices compared to wage ratios may lead to hopelessness, with more and more young people believing that they will never own a home.[2, 3] Moreover, an inability to maintain a decent living standard can foster feelings of hopelessness or depression: for example, living in cold, damp, or overcrowded conditions because one cannot afford better housing can affect the well-being of young people.[4] Many youths

also report social withdrawal when they lack money for leisure or social activities, isolating themselves due to shame or fear of embarrassment.[5]

A. *Child poverty*

Child poverty is theorised to harm mental health through several developmental mechanisms.[6] Experiencing poverty in childhood exposes young people to a spectrum of chronic stressors and adversities that can undercut their emotional resilience. For instance, children in poverty often face material insecurity – uncertainty about having enough food, clothing, or heating, which can instil constant worry from an early age.[7] They may also perceive and internalise their family's financial strain; hearing parents argue about bills or experiencing the humiliation of going without necessities can create feelings of anxiety, shame, or social inferiority during formative years. Social exclusion is another pathway: poorer children might be unable to participate in school trips, extracurricular activities, or social events, leading to peer isolation or bullying that damages self-esteem.[8]

A. *Changes in the youth labour market and career uncertainty*

Young people have increasingly found themselves in temporary jobs, zero-hours contracts, gig economy roles, or positions offering limited progression, exacerbating instability and a lack of control. Weak wage growth and uncertain career pathways compound these issues.[6] This labour market instability is theorised to harm mental health by increasing stress and depriving young people of the normal psychosocial benefits of work,[7] such as routine, purpose, social interaction, and financial predictability.

A. *Increased income inequality*

Income inequality can create a social environment with more pronounced gaps between the "haves" and "have-nots." Several theoretical mechanisms link a high-inequality environment to worse mental health among young people. One prominent idea is the social comparison (or status anxiety) hypothesis, which posits that wide economic disparities intensify the psychological impact of comparing oneself to others. Adolescence and young adulthood are periods when individuals are acutely sensitive to peer comparison and status. In an unequal society, young people with fewer resources are constantly confronted, in real life or on social media, with peers who are much better off. This can breed feelings of inferiority, inadequacy, or "social defeat" if they perceive themselves as falling behind the standards of success around them.[8]

Q2: Does it also predict deterioration in outcomes that are not increasing over time?

It has been suggested that socioeconomic factors influence both young people's internalising symptoms and externalising behaviours. For example, one systematic review suggests that socioeconomic status (e.g. household income, parental education and employment, socioeconomic conditions of the area) predicts externalising behaviours such as conduct problems, antisocial behaviours, and substance use among adolescents.[1] These risk factors can operate through pathways like parental mental health, parenting practices, and exposure to adverse neighbourhood conditions.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. The theory accounts for key factors across multiple levels, from young people's individual circumstances to household dynamics and systemic issues like economic inequality and welfare changes.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

Cost of living

The cost-of-living crisis in the UK has intensified in recent years, with its roots traceable to the mid-2010s. The 2010s saw stagnating wages, with small increases to median incomes and increasing housing costs. The cost-of-living crisis, which began in late 2022, led to rapid inflation, particularly affecting energy costs and costs of basic goods like food, which placed significant pressure on household finances. By 2022, the inflation rate in the UK peaked at 11.1%.[9]

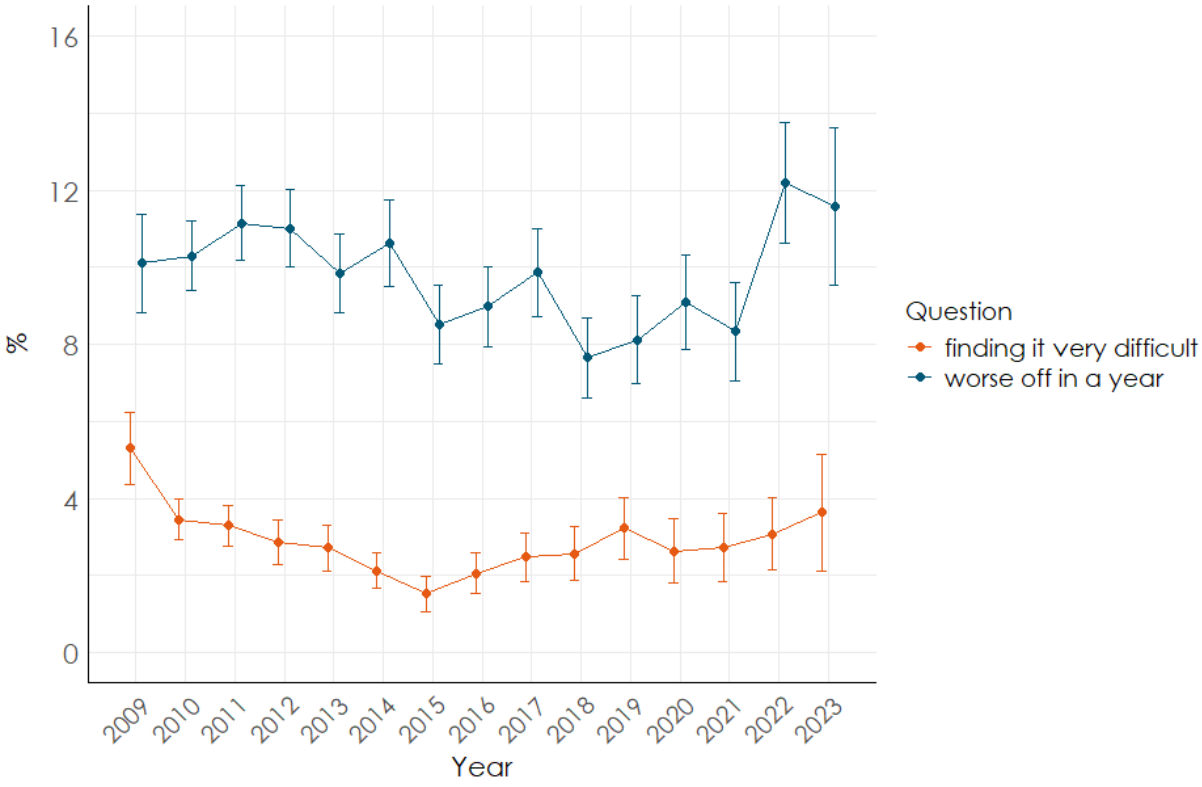
Evidence from the ONS showed that the proportion of adult offspring still living at home with their parents rose at every age over 19 from 2011 to 2021.[10] The home ownership rate amongst those in their 20s has declined since around 2003, with a sharper drop-off since 2008, and house prices (relative to income) have increased dramatically over the same period.[2] There has also been a sharp increase in student debt, which went from ~£15k in 2010 to ~£45k in 2022.

We examined respondents to the UKHLS, aged 16-24, for two questions (Figure T5):

1. "Looking ahead, how do you think you will be financially a year from now, will you be..." and examined the proportion who responded "Worse off than now"
2. "How well would you say you yourself are managing financially these days?" and the proportion responding "quite or very difficult"

Figure T5: Trends in the proportion who reported financial stress

Young people aged 16 to 24 years, England, 2009 to 2023



Source: Understanding Society

These two questions show a general improvement in hopes for future finances between 2010 and 2020, but then a significant worsening since 2022, and for the current financial situation, it declined up to 2015, then declined up to 2023.

Child poverty

The proportion of children living in relative poverty, defined as being under 19 years old and living in a household with incomes less than 60% below the median, after housing costs, rose from 27% in 2010–11 to 31% in 2023–24. However, relative poverty rates were

higher (at least in early childhood), for those born in 1995, where, for example, child poverty rates were 33.4% in 1999.[9]

Income inequality

Income inequality, as measured by the Gini coefficient, increased rapidly in the 1980s but has remained relatively stable since then, indicating persistent disparities in income distribution. However, the stability in overall inequality masks underlying issues. For instance, while the gap between middle and lower earners has narrowed due to faster wage growth for the lowest earners, the disparity between top and middle earners has grown, contributing to a perceived decline in the societal position of the middle class.

Changes in the youth labour market and employment instability

Youth unemployment generally fell over the period where mental health increased. It peaked at 22.5% in 2011 and then declined to nearly half, reaching 12.4% in early 2020, just before the onset of the COVID-19 pandemic.[11]However, the pandemic led to an increase in youth unemployment, rising to 15.3% in 2020. Youth unemployment then steadily declined until mid-2022, after which it began gradually increasing.

The 2010s saw a clear shift towards more precarious and insecure forms of work taken up by youth, including part-time roles, self-employment, temporary posts and zero-hours contracts.[10] This shift towards more insecure forms of work also appears to be reflected in the wider UK job market. According to the Office for National Statistics, the number of people reporting that they are on zero-hours contracts has increased significantly since 2012[12]. Young people have been over-represented in these flexible or insecure jobs. For example, analysis of Labour Force Survey data shows the prevalence of zero-hours contracts is highest among 16–24-year-olds: an estimated 37% of all workers on zero-hours contracts are aged 16–24, even though this age group makes up only about 12% of the overall workforce. These flexible jobs can provide experience and income, but they also come with uncertain hours, few benefits and limited security, contributing to a sense of career instability.

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

N/A

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

We evaluated evidence across four domains: youth employment, household socioeconomic position, local area socioeconomic status, and macroeconomic factors. Evidence across the four domains supports an association between socioeconomic risks and young people's mental health.

Youth employment

Two recent systematic reviews provide evidence that youth unemployment is negatively associated with mental health, particularly depression and anxiety.[13, 14] Vigolino et al. (2022) reviewed 294 articles.[14] Of these, 91.4% reported a significant association between increased unemployment rates and negative mental health outcomes, including anxiety and mood disorders. However, only 52.8% of the reviewed articles included young people under 25 years as the lower age limit or baseline age, limiting the applicability of the findings in explaining the mental health crisis among young people. Bartelink et al. (2019) conducted a more detailed review of 17 articles (5 cross-sectional and 12 cohort studies) and reported a significant association between unemployment among young people and worse mental health.[13] This association diminished once confounders were accounted for – but remained significant.

Household Socioeconomic Position

Three recent systematic reviews suggest that lower socioeconomic status, or changes in socioeconomic status, are negatively associated with young people's mental health.[15-17] Mac-Ginty et al. (2024) reported that socioeconomic position indicators, such as maternal education, household income, and maternal employment, were consistently linked with young people's depressive and anxiety symptoms.[16] Findings indicated a significant link between income and mental health. They highlighted geographic differences, with US studies showing that income reductions generally predicted adolescent mental health declines, while UK and European studies reported that persistently low income had a more consistent association with mental health problems.

Local Area Socioeconomic Status

We identified two systematic reviews that link neighbourhood-level socioeconomic factors with adolescent mental health.[18, 19] Ghadipasha et al. (2024) identified studies associating higher youth suicide rates with higher local unemployment rates, area deprivation, and lower neighbourhood socioeconomic status (SES).[18] Visser et al. (2021) reported that 21 out of 30 studies found associations between neighbourhood deprivation and poor youth mental health.[19]

Macroeconomic Factors

One identified systematic review connected macroeconomic shocks to adolescent mental health. Hiilamo et al. (2021) found that 11 out of 17 identified studies reported negative relationships between recession-related factors (e.g. unemployment rates, stock market fluctuations) and adolescent mental health (although others found null results).[20] For example, job losses during the Great Recession were linked with increased suicide-related behaviour, particularly among girls and non-Hispanic Black young people.[21] Several other longitudinal studies investigating macroeconomic shocks were identified. Dierckens et al. (2020) found that national income inequality was associated with worse psychological symptoms in young people across 17 European countries.[22] Similarly, austerity measures and welfare reforms in the UK following the 2008 financial crisis were linked to declines in adolescent mental health.

Q7: Is there evidence that comes from longitudinal studies where the risk factor is measured before mental health?

Yes. Evidence across the four domains shows that many studies employed longitudinal designs, providing a relatively strong basis for assessing the temporal relationship between the risk factors and mental health outcomes.

Youth employment

A significant proportion of the evidence identified by Virgolino et al. (2022)[14] and Bartelink et al. (2019)[13] comes from longitudinal studies, the vast majority of which indicate a relationship between youth unemployment rates and subsequent mental health. For example, 43.5% of the 294 articles reviewed by Virgolino et al. (2022) were longitudinal or cohort studies. Similarly, Bartelink et al. (2019) noted that 12 of their 17 included studies were cohort studies.

Household Socioeconomic Position

All studies included in the systematic reviews by Levesque et al. (2021) employed longitudinal designs.[15] While there is inconsistency regarding whether persistent low SES or changes in SES have a stronger impact, these studies suggest an association between exposure to lower socioeconomic status, particularly poverty, and poorer mental health outcomes.

Local Area Socioeconomic Status

Evidence at the local area level is more limited but still includes some longitudinal studies, and results are mixed. Astell-Burt et al. (2020) used panel data to demonstrate that area-level deprivation is linked to subsequent worse mental health in adolescents.[23]

Similarly, Brazil and Clark (2017) found an association between local area poverty reduction and subsequent decreased depressive symptoms in male adolescents, although these results became statistically insignificant when controlling for concurrent life-course transitions.[24] However, another study using panel data found no significant effect of neighbourhood disadvantage on depression trajectories.[25]

Macroeconomic Factors

A good base of longitudinal evidence is available for macroeconomic factors. For example, one study used panel data to link prior unemployment rates and stock market fluctuations with subsequent emotional difficulties in adolescents.[26] Another demonstrated an association between state-wide job losses and adolescent mental health using longitudinal data.[21] Other studies used time-period comparisons, with one finding that adolescents who experienced the Great Recession during puberty had higher levels of mental health hospitalisations than those in other cohorts.[27]

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

Yes, but inconsistently. While many longitudinal studies account for confounders, the inclusion of key confounders, such as baseline mental health, remains limited across the four domains. This variation affects the strength and reliability of the observed associations between socioeconomic risk factors and young people's mental health. Moreover, once confounders are controlled, the reported effects across the four domains often diminishes.

Youth employment

Among six longitudinal cohort studies reviewed by Bartelink et al. (2019) focusing on young people under 25, only three reported an effect after accounting for confounders.[13] Two studies found that unemployment lasting more than six months among Swedish youth aged 16–21 significantly increased psychological problems (e.g. nervousness, depression, and sleep issues), after adjusting for gender and parental socioeconomic factors. Conversely, another found no significant effect of non-employment on depression in a cohort of Swiss young men (aged 18 to 25) after controlling for demographic and socioeconomic factors.[28]

When baseline mental health was included as a confounder, evidence became less consistent. Strandh et al. (2015) reported that Swedish youths not in Education, Employment, or Training (NEET), but actively seeking work, exhibited more internalising

symptoms than their employed peers, after accounting for prior mental health.[29] However, Fergusson et al. (2001)[30] and Fergusson et al. (2014)[31] found no significant effects of unemployment on subsequent major depression or anxiety when baseline mental health was included.

Additional support comes from Thern et al. (2023), a study identified through hand search, which followed a large Swedish register-based cohort of 339,403 individuals (mean baseline age 23) over an average of 17.8 years. After adjusting for key confounders, including prior mental health and socioeconomic factors (e.g. education), the study found that individuals in precarious employment in early adulthood had a substantial risk of later mental health problems (HR = 1.51, 95% CI [1.42, 1.60]).

Household Socioeconomic Position

Nine longitudinal studies were identified (primarily from existing systematic reviews) that linked household socioeconomic position and internalising mental health in the UK or similar contexts (e.g. European countries). Of these, only one adjusted for baseline mental health, along with key covariates such as parental psychiatric history, education, and household structure.[32] Results suggested that persistently low-income trajectories increased the risk of emotional disorders (hazard ratio, HR = 2.0, 95% CI [1.90, 2.10]). This effect weakened after adjusting for confounders, but was still significant (HR = 1.20, 95% CI [1.10, 1.40]).

The other studies controlled for a varying range of confounders, from demographic variables to key factors beyond demographics. The effects of household socioeconomic factors generally remained significant, albeit with reduced effect sizes. For example, Lai et al. (2017) analysed poverty trajectories and children's emotional-behavioural problems (reflected by SDQ total score) using the Millennium Cohort Study.[33] They controlled for demographic variables, maternal education, and ethnicity. After adjusting for these covariates, persistent poverty was associated with an increased risk of emotional-behavioural problems (OR = 3.17, 95% CI [2.40, 4.19]).

Additional support comes from Aronsson et al. (2025), a study identified through a hand search, which followed a Swedish sample of 117,437 youths (baseline age 16) over four years. The study found that parental precarious employment was associated with an increased risk of adolescent mental health disorders, including depression, anxiety, stress-related conditions, and self-harm. After adjusting for key confounders, including parental mental health and other household level socioeconomic factors (e.g. parental education), both maternal and paternal precarious employment were associated with an increased risk of mental health disorders among young people, with HR = 1.12 (95% CI [1.02, 1.22]) and 1.17 (95% CI [1.06, 1.29]) respectively.

Local Area Socioeconomic Status

At the local level, the inclusion of confounders and baseline mental health varied across studies. For example, Astell-Burt et al. (2012)[23] and Barr (2018)[25] included individual and area-level confounders, such as parental education and area ethnicity, while also incorporating baseline mental health measures. The latter of these did not find significant associations with depression trajectories. Brazil and Clark (2017) also found that associations between local poverty reductions and decreased depressive symptoms in male adolescents became insignificant after adjusting for concurrent life-course transitions (e.g. education milestones).[24] This suggests that local area studies often lack consistency in controlling for confounders, which limits the robustness of their findings.

Macroeconomic Factors

Longitudinal studies on macroeconomic factors frequently controlled for confounders, but their inclusion of baseline mental health varied. For instance, McKenna et al. (2017) included household-level covariates like ethnicity, parental education, and lone parent status,[34] while Rathmann et al. (2016) incorporated national-level covariates such as GDP and demographic structure alongside baseline mental health.[35] Conversely, studies linking state-wide job losses[21] and stock market fluctuations[26] to adolescent mental health did not include prior mental health as a control, limiting causal inference.

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Evidence from natural experiments was identified only for household socioeconomic factors and macroeconomic changes, with no evidence found for youth unemployment or local area socioeconomic status.

Household Socioeconomic Position

Costello et al. (2003) conducted a natural experiment using the opening of a casino on an American Indian reservation, which provided income supplements to local families.[36] Young people's emotional symptoms showed a significant but small change because of this exogenous income increase (OR = 1.43, 95% CI [1.02, 2.03]).

Macroeconomic Factors

Several studies can be considered natural experiments due to the quasi-random nature of macroeconomic shocks such as the Great Recession. For example, an event-study design examined the mental health effects of austerity and welfare cutbacks following the recession, finding significant negative impacts on youth mental health even after

accounting for past mental health and other key confounders.[37] Another study analysed cohorts who experienced the Great Recession, demonstrating higher rates of subsequent mental health hospitalisations for those that experienced the recession during puberty versus at other ages.[27]

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

RCT evidence was only found for poverty and household socioeconomic status. No RCTs were identified for youth unemployment, local area socioeconomic status, or macroeconomic factors.

Zaneva et al. (2022) reviewed evidence from RCTs on poverty alleviation programs and their mental health impacts and found generally positive effects.[17] However, only one of their included studies was conducted in a comparable context (USA).[38] This study evaluated a conditional cash transfer programme, which aimed to reduce economic hardship among low-income families in the US. The trial included 511 adolescents in New York City who were randomly assigned to receive cash incentives tied to school attendance, healthcare, and parental employment, or a control group. While adolescents in the intervention group showed a significant reduction in their behavioural problems, with effect sizes ranging from 0.13 to 0.35, there were no significant effects on emotional disorders, including depression and anxiety.

This aligns with broader conclusions from Zaneva et al. (2022)'s review on poverty alleviation interventions, which suggests that while combining grants with social care components (e.g. family coaching on child treatment, household decision-making, and communication) has a positive effect on adolescent emotional health, economic interventions alone do not necessarily improve adolescent emotional health.[17] These findings suggest that although cash transfer programmes might be essential for families to address their basic needs, they appear insufficient for improving child emotional well-being or ensuring child protection.

Q11: Does the evidence indicate that there is a strong association?

Evidence suggests a generally moderate to strong association between socioeconomic factors and young people's mental health across all the domains examined. The strength of these associations often diminished when baseline mental health and other key confounders were controlled, but usually remained moderate to large and significant.

For example, one study reported that Swedish youths aged 18 to 21 who were considered NEET but actively seeking work exhibited significantly more internalising

symptoms at age 21 than those who had not experienced NEET status, even after baseline internalising symptoms and other confounders (e.g. socio-economic factors) were adjusted for (OR = 2.48, 95% CI = 1.57–3.60).[39] Similarly, another found that, after accounting for the working class of both the young people and their parents, long-term unemployment (6+ months) among Swedish youth aged 16–21 was strongly associated with poorer psychological health at age 21, with Ors of 4.79 for men and 2.71 for women.[40]

Also, as mentioned before, after controlling for demographic variables, maternal education, and ethnicity, Lai et al. (2017) still identified a strong association between persistent poverty and later emotional-behavioural problems (OR = 3.17, 95% CI [2.40, 4.19]).[33] Bjorkenstam et al. (2016) reported that a moderate association between persistently low income and emotional disorders (HR = 1.20, 95% CI [1.10, 1.40]) after adjusting for confounders.[32]

In terms of neighbourhood socioeconomic factors, Astell-Burt et al. (2012) found that living in an area of higher deprivation compared to lower was associated with a 1.0 point ($p<0.05$).[23] increase in SDQ total difficulties score. Jonsson et al. (2018) found that living in areas in the highest quintile for deprivation was associated with a 1.38 ($p<0.001$) difference in SDQ total difficulties compared to the lowest, and that there were significant differences between all quintiles.[41] These equate to around a 10% difference in total difficulties compared to the mean population SDQ score.

For wider macroeconomic factors, association sizes varied. Cui and Zack (2013) found that the financial crisis was associated with a 10% drop in the number of young people in low- and middle-income families experiencing 'zero mentally unhealthy days', and a doubling (5-10%) of the number of people experiencing 14-30 'mentally unhealthy days' per month (compared to 0 or 1-14) days.[42] Golberstein et al. (2019) found that a one standard deviation improvement in state-level economic conditions (unemployment/house prices) was associated with a 7.4-15.7% reduction in likely psychological problems in young people.[43] A one standard deviation improvement in unemployment or house prices was associated with a 4.8% improvement in mental health severity. A number of other studies also reported "small but significant" associations.[26,37]

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

Yes, there was evidence of a dose-response relationship for household socioeconomic position, local area socioeconomic factors, and macroeconomic factors. No such evidence was found for youth unemployment.

Household Socioeconomic Position

Lai et al. (2017) reported a dose-response relationship between cumulative poverty exposure and mental health outcomes in young people, finding that the odds of socioemotional behavioural problems increased as cumulative poverty exposure increased.[33] For example, compared to young people who were never in poverty, those experiencing poverty at one wave had an OR of 1.46 (95% CI [1.02, 2.09]), while those experiencing poverty across all six waves had an OR of 3.57 (95% CI [2.44, 5.21]). This finding provides evidence that greater chronic exposure to poverty leads to worse socioemotional outcomes in adolescence. However, the approach to coding poverty exposure overlooked potential effects of changes in poverty status, such as moving into or out of poverty, limiting the findings in fully capturing the dynamics of poverty over time.

Local Area Socioeconomic Factors

Jonsson et al. (2018) found evidence that suggests a dose-response relationship between higher area-level deprivation and worse mental health.[41] Their results showed that each quintile of deprivation (measured via the Index of Multiple Deprivation) was associated with progressively worse SDQ scores when compared to the least deprived quintile, from 0.62 ($p<0.05$) points higher for the second quintile to 1.38 ($p<0.001$) points higher for the fifth quintile (~10% change compared to the mean).

Macroeconomic Factors

Lower levels of stock market indices were associated with increased emotional difficulties in girls, while higher unemployment rates were linked to emotional difficulties in all adolescents.[26] State-level unemployment rates and lower house prices were found to monotonically correlate with worse adolescent mental health outcomes.[43] More intense household experiences of recession were associated with poorer adolescent mental health outcomes.[44]

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

This does not appear to be the case. Studies highlight that ethnic minority groups, particularly African-Caribbean individuals in the UK, are disproportionately exposed to socioeconomic disadvantages, including poverty, unemployment, and systemic discrimination.[45, 46] The intersection of gender and ethnicity further compounds vulnerabilities. Women from ethnic minority backgrounds often face dual disadvantages due to systemic discrimination, cultural expectations, and economic hardship. This intersectional exposure significantly increases their risk of internalising symptoms, such as anxiety and depression.[46]

Poverty rates are consistently higher for ethnic minorities (particularly Bangladeshi and Pakistani families) than for other groups. Rates in these groups have been decreasing over the last 20 years (although are still higher than in white households), whereas white households in poverty are the only ethnic group significantly more likely to be in very deep poverty in 2020/21–2022/23 (40%) than they had been in 2001/02–2003/04 (35%).[47]

There is some evidence that child poverty rates increased slightly in boys and decreased in girls between the 2000s and 2010s, but changes were fairly small.[33]

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Devenish et al. (2017) indicate that girls are more likely to experience internalising symptoms, such as anxiety and depression, in response to socioeconomic stressors.[1] In contrast, boys are more prone to externalising behaviours like aggression and delinquency. One study indicated that the relationship between state-wide job losses and subsequent suicidal behaviour was only significant for girls and non-Hispanic black adolescents.[21] Another found a link between community-level unemployment shocks and girls' mental health, but not boys.[48] A systematic review on neighbourhood characteristics and mental health found three studies that found no moderating effect of gender, but four studies that did.[19] For example, Brazil and Clark (2017) found that moving from an area of high poverty to low poverty was associated with improved mental health for girls, but not boys.[24]

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

A large challenge to these economic theories is that the increases in mental health problems are observed almost equally in higher and lower socio-economic positions, and studies tend to find worse effects of economic factors down the income and SES distribution. These groups are more vulnerable to the impacts of economic downturns, unemployment rates, insecure employment and recessions.[49] However, wider societal

factors such as increased income inequality have been linked to poorer mental health for those across the income spectrum, not just at the bottom.[50]

Overall Strengths and Limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

The evidence base surrounding the relationship between economic uncertainty and young people's mental health is large, including many systematic reviews. Negative associations are (fairly) consistent across study designs (longitudinal studies, RCTs, quasi-experimental designs) as well as across different socioeconomic stressors (youth unemployment, household socioeconomic status, neighbourhood socioeconomic factors, macroeconomic shocks), and countries. Natural experiments generated by shocks such as the 2008 financial crash allow for strong causal interpretation of results.

However, the quality of evidence across socioeconomic factors is diminished by frequent reliance on self-reported measures for both exposures and mental health outcomes. For instance, studies on youth unemployment utilised self-reported questionnaires to assess unemployment status and depressive symptoms.[28, 40] This introduces the possibility of bias, as individuals with poorer mental health might overreport the psychological impact of unemployment, potentially inflating observed associations. While some studies on macroeconomic factors have incorporated objective measures, such as hospitalisation rates, self-reporting remains a significant limitation in capturing accurate exposure and outcome data.

There may be issues in generalising findings across countries. Policies and welfare systems targeting young people and families in lower socio-economic status vary significantly across countries, even within high-income nations. This means that young people in different countries may face distinct challenges and needs, even if they all come from low socioeconomic backgrounds. For instance, studies conducted in Sweden, where robust social safety nets may mitigate the psychological impacts of unemployment or poverty, may not generalise to countries with weaker welfare systems. Similarly, studies on macroeconomic shocks, such as the Great Recession, often draw heavily on US-based evidence.[20] While the US context is moderately comparable to the UK, differences in economic policies and recovery trajectories reduce the applicability of findings.

Another key issue is the narrow focus on singular socioeconomic indicators, such as household income or poverty, without considering the multidimensional nature of

socioeconomic conditions. For example, the RCT we reviewed suggests that cash grants for low-income families in the US do not improve young people's emotional well-being. Yet, studies on poverty consistently highlight the harmful impact of exposure to poverty on young people. The null findings from economic intervention programmes are likely due to the narrow focus on a single indicator. Evidence that incorporates the multidimensional nature of socioeconomic contexts is needed to provide clear insights into the best ways to support the younger generation.

Measurement inconsistencies across studies also affect the reliability of evidence. Discrepancies in how factors like neighbourhood deprivation or mental health outcomes are measured lead to variable findings. For instance, studies on local area socioeconomic status often lack multi-level designs, which could better capture nested data structures such as individuals within neighbourhoods.

Finally, while many longitudinal studies in the economic context attempt to control for confounders, the exclusion of key variables like baseline mental health or parental mental health often undermines their validity. For instance, studies on household SES indicators frequently miss these confounders, despite their strong influence on both socioeconomic status and mental health outcomes. This omission raises concerns about whether observed associations truly reflect causal relationships.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable about the theory or evidence base that might inform our evaluation of causality?

No.

References

1. Devenish B, Hooley M, Mellor D. The Pathways Between Socioeconomic Status and Adolescent Outcomes: A Systematic Review. American Journal of Community Psychology. 2017;59(1-2):219-38.

2. Cribb J, Hood, A., Hoyle, J. The decline of home ownership among young adults. London: Institute for Fiscal Studies; 2018. Contract No.: BN224.

3. Tawfick E. Research suggests 'dire picture of homeownership in the UK' for young2024. Available from: https://todaysconveyancer.co.uk/research-suggests-dire-picture-of-homeownership-in-the-uk-for-young/

4. Zhang Y. The role of socioeconomic status and parental investment in adolescent outcomes. Children and Youth Services Review. 2021.

5. Baumberg BEN. The stigma of claiming benefits: a quantitative study. Journal of Social Policy. 2016;45(2):181-99.

6. Hughes M, Tucker W. Poverty as an Adverse Childhood Experience. North Carolina Medical Journal. 2018;79(2):124-6.

7. Roberts J, Donkin A, Marmot M. Opportunities for reducing socioeconomic inequalities in the mental health of children and young people – reducing adversity and increasing resilience. Journal of Public Mental Health. 2016;15(1):4-18.

8. Bidmead E, El Zerbi C, Cheetham M, Frost S. A rapid review of children and young people's views of poverty and welfare in the context of Universal Credit. Children & Society. 2023;37(6):2047-65.

9. CPIH ANNUAL RATE 00: ALL ITEMS 2015=100: Office for National Statistics; 2025 [Available from: https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/l55o/mm23.

10. More adults living with their parents2023 25 Apr 2025. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/moreadultslivingwiththeirparents/2023-05-10.

11. Powell AM, A; Francis-Devine, B. Youth Unemployment Statistics. House of Commons Library; 2025.

12. Brione PC, S; Zaidi, K. Zero-hours contracts. House of Commons Library; 2024.

13. Bartelink VHM, Zay Ya K, Guldbrandsson K, Bremberg S. Unemployment among young people and mental health: A systematic review. Scandinavian Journal of Public Health. 2020;48(5):544-58.

14. Virgolino A, Costa J, Santos O, Pereira ME, Antunes R, Ambrósio S, et al. Lost in transition: a systematic review of the association between unemployment and mental health. Journal of Mental Health. 2022;31(3):432-44.

15. Levesque AR, MacDonald S, Berg SA, Reka R. Assessing the Impact of Changes in Household Socioeconomic Status on the Health of Children and Adolescents: A Systematic Review. Adolescent Research Review. 2021;6(2):91-123.

16. Mac-Ginty S, Lira D, Lillo I, Moraga E, Cáceres C, Araya R, et al. Association Between Socioeconomic Position and Depression, Anxiety and Eating Disorders in University Students: A Systematic Review. Adolescent Research Review. 2024;9(3):435-51.

17. Zaneva M, Guzman-Holst C, Reeves A, Bowes L. The Impact of Monetary Poverty Alleviation Programs on Children's and Adolescents' Mental Health: A Systematic Review and Meta-Analysis Across Low-, Middle-, and High-Income Countries. Journal of Adolescent Health. 2022;71(2):147-56.

18. Ghadipasha M, Talaie R, Mahmoodi Z, Karimi SE, Forouzesh M, Morsalpour M, et al. Spatial, geographic, and demographic factors associated with adolescent and youth suicide: a systematic review study. Frontiers in Psychiatry. 2024;15.

19. Visser K, Bolt G, Finkenauer C, Jonker M, Weinberg D, Stevens GWJM. Neighbourhood deprivation effects on young people's mental health and well-being: A systematic review of the literature. Social Science & Medicine. 2021;270:113542-.

20. Hiilamo A, Hiilamo H, Ristikari T, Virtanen P. Impact of the Great Recession on mental health, substance use and violence in families with children: A systematic review of the evidence. Children and Youth Services Review. 2021;121:105772-.

21. Gassman-Pines A, Ananat EO, Gibson-Davis CM. Effects of Statewide Job Losses on Adolescent Suicide-Related Behaviors. American Journal of Public Health. 2014;104(10):1964-70.

22. Dierckens M, Weinberg D, Huang Y, Elgar F, Moor I, Augustine L, et al. National-Level Wealth Inequality and Socioeconomic Inequality in Adolescent Mental Well-Being: A Time Series Analysis of 17 Countries. Journal of Adolescent Health. 2020;66(6):S21-S8.

23. Astell-Burt T, Maynard MJ, Lenguerrand E, Harding S. Racism, ethnic density and psychological well-being through adolescence: evidence from the Determinants of Adolescent Social well-being and Health longitudinal study. Ethnicity & Health. 2012;17(1-2):71-87.

24. Brazil N, Clark WAV. Individual mental health, life course events and dynamic neighbourhood change during the transition to adulthood. Health & Place. 2017;45:99-109.

25. Barr PB. Neighborhood conditions and trajectories of alcohol use and misuse across the early life course. Health & Place. 2018;51:36-44.

26. Cotti C, Simon D. THE IMPACT OF STOCK MARKET FLUCTUATIONS ON THE MENTAL AND PHYSICAL WELL-BEING OF CHILDREN. Economic Inquiry. 2018;56(2):1007-27.

27. Liu SY, Lim S. Collective Trauma and Mental Health Hospitalization Rates Among Children in New York State, 1999–2013: Age, Period, and Cohort Effects. Journal of Traumatic Stress. 2020;33(5):824-34.

28. Baggio S, Iglesias K, Deline S, Studer J, Henchoz Y, Mohler-Kuo M, et al. Not in Education, Employment, or Training Status Among Young Swiss Men. Longitudinal Associations With Mental Health and Substance Use. Journal of Adolescent Health. 2015;56(2):238-43.

29. Strandh M, Winefield A, Nilsson K, Hammarstrom A. Unemployment and mental health scarring during the life course. The European Journal of Public Health. 2014;24(3):440-5.

30. Fergusson DM, John Horwood L, Woodward LJ. Unemployment and psychosocial adjustment in young adults: causation or selection? Social Science & Medicine. 2001;53(3):305-20.

31. Fergusson DM, McLeod GF, Horwood LJ. Unemployment and psychosocial outcomes to age 30: A fixed-effects regression analysis. Australian & New Zealand Journal of Psychiatry. 2014;48(8):735-42.

32. Björkenstam E, Cheng S, Burström B, Pebley AR, Björkenstam C, Kosidou K. Association between income trajectories in childhood and psychiatric disorder: a Swedish population-based study. Journal of Epidemiology and Community Health. 2017;71(7):648-54.

33. Lai ETC, Wickham S, Law C, Whitehead M, Barr B, Taylor-Robinson D. Poverty dynamics and health in late childhood in the UK: evidence from the Millennium Cohort Study. Archives of Disease in Childhood. 2019;104(11):1049-55.

34. McKenna C, Law C, Pearce A. Increased household financial strain, the Great Recession and child health—findings from the UK Millennium Cohort Study. BMJ Open. 2017;7(3):e015559-e.

35. Rathmann K, Pförtner T-K, Osorio AM, Hurrelmann K, Elgar FJ, Bosakova L, et al. Adolescents' psychological health during the economic recession: does public spending buffer health inequalities among young people? BMC Public Health. 2016;16(1):860-.

36. Costello EJ, Compton SN, Keeler G, Angold A. Relationships Between Poverty and Psychopathology. JAMA. 2003;290(15):2023-.

37. Mari G, Keizer R. Families of austerity: benefit cutbacks and family stress in the UK. Social Forces. 2025;103(3):970-91.

38. Morris PA, Aber JL, Wolf S, Berg J. Impacts of Family Rewards on Adolescents' Mental Health and Problem Behavior: Understanding the Full Range of Effects of a Conditional Cash Transfer Program. Prevention Science. 2017;18(3):326-36.

39. Strandh M, Nilsson K, Nordlund M, Hammarström A. Do open youth unemployment and youth programs leave the same mental health scars? – Evidence from a Swedish 27-year cohort study. BMC Public Health. 2015;15(1):1151-.

40. Reine I, Novo M, Hammarström A. Does the association between ill health and unemployment differ between young people and adults? Results from a 14-year follow-up study with a focus on psychological health and smoking. Public Health. 2004;118(5):337-45.

41. Jonsson KR, Vartanova I, Södergren M. Ethnic variations in mental health among 10–15-year-olds living in England and Wales: The impact of neighbourhood characteristics and parental behaviour. Health & Place. 2018;51:189-99.

42. Cui W, Zack MM. Trends in Health-Related Quality of Life Among Adolescents in the United States, 2001–2010. Preventing Chronic Disease. 2013;10:120334-.

43. Golberstein E, Gonzales G, Meara E. How do economic downturns affect the mental health of children? Evidence from the National Health Interview Survey. Health Economics. 2019;28(8):955-70.

44. Layte R, McCrory C. Fiscal crises and personal troubles: the great recession in Ireland and family processes. Social Psychiatry and Psychiatric Epidemiology. 2018;53(9):987-1001.

45. Fryers T, Melzer D, Jenkins R, Brugha T. The distribution of the common mental disorders: social inequalities in Europe. Clinical Practice and Epidemiology in Mental Health. 2005;1(1):14-.

46. Myers HF. Ethnicity- and socio-economic status-related stresses in context: an integrative review and conceptual model. Journal of Behavioral Medicine. 2009;32(1):9-19.

47. UK Poverty 2025. 2025.

48. Bubonya M, Cobb-Clark DA, Christensen D, Johnson SE, Zubrick SR. The Great Recession and Children's Mental Health in Australia. International Journal of Environmental Research and Public Health. 2019;16(4):537-.

49. Whelan CT, Maître B. The Great Recession and the changing distribution of economic vulnerability by social class: The Irish case. Journal of European Social Policy. 2014;24(5):470-85.

50. Wilkinson R, Pickett K. The Spirit Level. London: Penguin; 2010.

3. COVID-19 Pandemic

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

COVID-19 OR COVID OR coronavirus OR "SARS CoV-2" pandemic OR lockdown OR "lock down"

Theoretical Considerations

Q1: How is the theory described and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

During the pandemic, there were widespread concerns about the impacts on young people and their mental health. Interpretations of what these impacts might be fall within three groups. First, it could be conceived that changes during the pandemic represent a normal and healthy negative response to a stressful event, rather than genuine mental health difficulties. For example, it is natural for people to worry during a crisis, and this does not necessarily reflect changes in mental health. Second, it could be that mental health was affected with impacts on a range of mental health symptoms, but this may only be temporary and subsided along with returns to 'usual' routines. Lastly, the pandemic may have resulted in a structural shift to young people's mental health, with potential reverberations for youth mental health beyond pandemic disruptions. We attend to various perspectives in reviewing various mechanisms, noting where such perspectives have been delineated in relation to specific processes.

School closures

It has been suggested that repeated school closures during the pandemic affected young people's mental health by disrupting their routines, resulting in more irregular sleep patterns, less balanced diets, increased screen time, and increased sedentary time. Fewer developmentally beneficial activities, such as socialisation, activities that support executive function (e.g. strategy-based activities), and future goal-setting- might also be important alongside reduced access to support provided in schools, for example, special educational needs and mental health provision.[1–4] School closures added additional components of stress for parents and carers, suddenly facing added childcare (especially for primary caregivers/women) and educational support responsibilities on top of their wider commitments and additional pandemic stressors.[1, 2]

Economic impact and strain on families and young people

Financial strain among many families during the pandemic (e.g. due to income loss, job loss, financial uncertainty), and the stress that this incurred, was suggested by some to be a key driver of poor mental health in the pandemic.[3, 4] Concerns were also noted about the short-term, medium-term, and long-term impact of the disruption in the economy on youth unemployment.[3, 5]

Children and youth services and provision impact

From the onset of the pandemic, many service and community provisions, such as CAMHS, social services, youth clubs, sports groups and more experienced periods where either they were closed, operating under reduced capacity, or facing unique pressures. Furthermore, they underwent periods of financial instability, requiring reductions in services and staffing, which is suggested to have further impacted upon capacity to support young people and meet mental health needs during and after the main restriction periods of the pandemic.[5] This means young people were less likely to engage with activities that are considered beneficial for mental health (e.g. engagement with community, engagement with arts, music, sports, and culture) over a sustained time period, and that services directly intending to provide mental health support were also struggling to meet demand.

Peer relationship disruptions

COVID-19 brought significant disruption to peer relationships, with periods when there was limited opportunity to interact face-to-face with friends, which may have resulted in lower peer support, and increased loneliness, though this will have varied among young people depending on factors including family context, social bubbles, and the nature of contact with peers over social media. These are key protective factors for internalising difficulties and wider mental health and wellbeing.[6, 7]

Family dynamics, stress and domestic violence

Increased stress and worsened mental health among parents and carers during the pandemic may have increased due to financial and health concerns, and school closures may have had a knock-on impact on young people. There was also some indication that alcohol consumption increased during the pandemic, as well as domestic violence.[11] Parent-child conflict may have increased due to increases in time together.[12]

Stress

The sudden and dramatic changes experienced in the first waves of the pandemic are considered to have created stress,[8] both psychological and physiological. It has been suggested that extensive coverage of COVID-19 within news media may have been stressful in exacerbating concerns, and that for young people engaging with more of this content, this may have been particularly the case.

Uncertainty

The pandemic may also have provoked an acute sense of uncertainty and lack of control for young people over an extended time frame.[7, 9, 10] Some of this uncertainty was likely to have been linked to the immediate disruption to young people's routines and not knowing how long this would last. However, there was also uncertainty about their futures (e.g. how exams would work, career prospects, changes to anticipated milestones), health uncertainty for themselves and others around them, and economic uncertainty.[10] It is argued that this sudden and acute sense of societal and personal uncertainty was particularly problematic for adolescents in the process of developing greater autonomy and independence, which already involves considerable future orienting, [9, 10] which might be particularly challenging for those with greater social sensitivity.

COVID-19 health concerns

COVID-19 brought new health concerns, and early in the pandemic, it was unclear the extent to which young people were affected by the illness, although it rapidly became clear that the risk was low, except for those with chronic conditions.[11] Haig-Ferguson et al. (2020) framed this health anxiety as a natural response to the pandemic, which for many may have been proportionate and transitory, but noted that, for a minority, this could escalate and become more distressing.[12]

Changes to behaviours

Given many of the varied changes above, young people's health behaviours that are risk factors for mental health were likely to be negatively affected during periods of government restrictions, including more irregular sleep patterns, less balanced diets, increased screen time and social media use, lower levels of physical activity, and increased sedentary time.[7, 13]

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

Yes, the potential impact of COVID-19 extends beyond internalising symptoms and may also affect young people's externalising behaviours. Levante et al. (2023) reported that

children exhibited increased externalising symptoms, such as aggression, during the pandemic.[14] These behaviours were particularly linked to disruptions in daily routines, excessive screen time, and reduced opportunities for social interaction. Similarly, Bera et al. (2022) highlighted that adolescents with pre-existing neurodevelopmental disorders, such as ADHD or autism spectrum disorder, were at risk of exhibiting behavioural disorders during the lockdown period.[15] These findings suggest that pandemic-related stressors, while often discussed in relation to internalising symptoms, also play a role in shaping externalising behaviours in young people.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. The theory considers key social and contextual factors affecting young people in England, including school closures, financial strain, disrupted peer relationships, and family stress. It also accounts for psychological mechanisms like heightened uncertainty and stress responses, which are particularly relevant during adolescence.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

No. Increases in mental health problems among young people, particularly in emotional symptoms, predates the COVID-19 pandemic. The pandemic, which reached the UK in early 2020, introduced significant disruptions, but these occurred against a backdrop of already worsening youth mental health. The relevant question then is whether the pandemic exacerbated these pre-existing trends.

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

N/A

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Yes. Five umbrella reviews were identified.[16-20] Evidence consistently suggests that the COVID-19 pandemic was associated with worsening mental health among young people, particularly in relation to internalising symptoms such as depression and anxiety.

Harrison et al. (2022) included 18 systematic reviews from 366 primary studies, covering data from early 2020 to June 2021.[19] 48.8% of the primary studies in this review were conducted in China. This review found a pooled prevalence of 32% for both depression and anxiety among young people following COVID-19 mitigation measures. The study also highlighted regional differences, with a notable burden in the Eastern Mediterranean region. However, it relied primarily on cross-sectional data.

Three umbrella reviews capture the effects of the pandemic up to 2022. Bevilacqua et al. (2022) reviewed 24 systematic reviews with the majority of studies again coming from China.[16] Again, most of these were cross-sectional. The review found a high prevalence of anxiety and depression, with older adolescents and females being the most affected. School closures and lockdown measures were identified as key correlates of worsening mental health.

Bower et al. (2023) conducted an umbrella review of 338 systematic reviews covering up to March 2022 from North America, Europe, Asia, and Australia.[17] They attempted to evaluate the longitudinal impacts of the pandemic, finding a significant increase in the prevalence of depression during the pandemic (standard mean differences, SMD = 0.20, 95% CI = 0.07–0.33) and anxiety (SMD = 0.29, 95% CI = 0.12–0.45) compared to pre-pandemic levels. The review also mentioned that mental health symptoms declined once restrictions were lifted, though adolescents and females experienced more persistent effects.

Similarly, Witteveen et al. (2023) reviewed 123 systematic reviews, covering research from December 2019 to August 2022.[20] Most studies that included in the review were conducted in China, the United States, and Europe. Seven reviews focused on longitudinal studies, and reported that depression (SMD = 0.16–0.23) and anxiety (SMD = 0.12–0.18) symptoms increased during the pandemic. Additionally, females exhibited a larger increase in anxiety symptoms than males (SMD = 0.15). Mental health symptoms peaked during periods of strict social restrictions, suggesting that pandemic-related measures played a role in worsening mental health.

One umbrella review reviewed 124 systematic reviews, analysing data from December 2019 to February 2023.[18] The majority of studies came from Asia, particularly China. The study identified 17 meta-analyses and reported declines in young people's mental

health after the start of the pandemic and some showed increases in depressive and anxiety symptoms during lockdown periods. Studies indicated that older adolescents exhibited a steeper increase in mental health difficulties compared to younger children, suggesting that school closures and social disruptions had a greater psychological impact on adolescents. However, the majority of the reviews (84.7%) included in this umbrella review are considered to be of critically low quality according to the A Measurement Tool to Assess Systematic Reviews 2 (AMSTAR-2).

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

Yes, necessarily the evidence comes from studies where the pandemic began before mental health was measured.

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

As COVID-19 is an exogenous event that affected everyone simultaneously, normal confounding structures do not fully apply. There are two main considerations when estimating the pandemic's impact on mental health. First, young people's mental health naturally changes as they grow up, so any analysis must account for age-related changes in cohorts before and after the pandemic. This may not be possible if the cohort that is examined are all of the same age. Second, there were clear secular trends in young people's mental health before the pandemic. Therefore, analyses should consider these pre-existing trends to accurately isolate the pandemic's effects.

Seven longitudinal studies were identified that examined the effects of the pandemic on young people's internalising symptoms in the UK. Only one study attempted to control for developmental trajectories and secular trends. The longitudinal study by Mansfield et al. (2022) offers robust evidence on the mental health impact of the COVID-19 pandemic on adolescents.[21] The study draws on data from two phases of national cluster-randomised controlled trials conducted in England, involving a total of 11,450 pupils (aged 11–15 years at baseline) from 178 UK secondary schools. Phase 1 participants (N = 6,419 from 90 schools) completed assessments before the pandemic (baseline: Sept–Oct 2018; follow-up: Jan–Mar 2020), serving as the control group. Phase 2 participants (N = 5,031 from 88 schools) were assessed at a similar developmental stage but experienced the COVID-19 pandemic between baseline and follow-up (baseline: Sept–Oct 2019; follow-up: Feb–Apr 2021). The findings showed that adolescents exposed to the pandemic had significantly higher depressive symptoms at

follow-up than those in the control group, after adjusting for a comprehensive set of confounders, including demographic variables (e.g. age, gender, ethnicity), socioeconomic indicators (e.g. school-level deprivation, free school meal eligibility), baseline mental health, and other factors such as special educational needs and prior mental health provision. The adjusted regression coefficient for depressive symptoms was 0.77, 95% CI [0.50, 1.10], corresponding to a standardised effect size of 0.14. The odds of meeting the threshold for high depressive symptoms (SMFQ ≥12) were 26% higher in the COVID-19 cohort compared to controls (OR = 1.26, 95% CI [1.14, 1.39]). No significant effect was found for externalising difficulties (regression coefficient = 0.01, 95% CI [–0.11, 0.14]). The authors also estimated a population attributable fraction of 0.06 for high depressive symptoms, indicating that 6% of cases might have been avoided in the absence of the pandemic.

Another study also attempted to control for secular trends in young people's mental health before the pandemic. Chen et al. (2020) conducted a controlled interrupted time series study examining the impact of the COVID-19 lockdown on mental health service referrals in the UK.[22] The study compared the changes in daily referrals number in physical and mental health services between pre-lockdown and post-lockdown, to a historical control period (corresponding dates in 2019). Results showed an immediate decline in mental health referrals following lockdown. Among children and adolescents (0–19 years), referrals dropped significantly (mean reduction = -17.34, 95% CI [-23.66, -11.03]). However, unlike adults, young people did not show a significant post-lockdown acceleration in referrals, possibly suggesting that youth mental health needs were underrepresented in care services post-lockdown.

Four studies controlled for age, but findings were mixed. Bignardi et al. (2020) quantified mental health changes in 168 children aged 7.6–11.6 years, with pre-pandemic assessments occurring up to 2 years before the pandemic and follow-up during the first UK lockdown.[23] Demographic variables (e.g. age, gender) and SES factors (e.g. household income, homeownership, parental education) were included as confounders. Findings were mixed: here was an increase in depressive symptoms (β = 0.74, 95% CI [0.46, 1.01]), but no change in anxiety (β = -0.06, 95% CI [-0.34, 0.23]) and borderline evidence of an improvement in emotional problems (measured by SDQ, β = -0.25, 95% CI [-0.54, 0.05]). However, Hu et al. (2021) reported an increase in young people's symptoms measured by SDQ.[24] They examined 886 adolescents aged 10–15 years using data from the Understanding Society COVID-19 survey, with pre-pandemic assessments and follow-up during the pandemic in July 2020. Fixed-effects regression models assessed within-person changes thereby controlling for time-invariant confounders. This study also controlled for pre-pandemic SDQ scores. The findings suggested a small increase in emotional problems (B = 0.23, 95% CI [0.09, 0.38]). One study focused on school closures. Widnall et al. (2022) examined 603 adolescents aged 13–14 years from 17 secondary schools in south-west England, using data from pre-

pandemic, first lockdown, and after school reopening.[25] Demographic variables (e.g. age, gender, ethnicity), SES (e.g. family affluence), and long-term illness were included as confounders. Findings showed a significant decrease in anxiety symptoms from pre-pandemic to lockdown ($z = -7.061$, $p < .001$) and a significant increase post-lockdown ($z = 6.983$, $p < .001$), with no significant change in depressive symptoms (pre-pandemic to lockdown: $z = -0.319$, $p = .750$; lockdown to reopening: $z = 1.614$, $p = .107$).

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Whilst, as noted above, normal confounding structures do not apply to COVID-19 studies, so it may be considered a 'natural experiment' in many regards. However secular mental health changes and developmental changes need accounting for. Mansfield et al. (2022) utilised data from a two multi-phase cluster randomised controlled trials, one assessed pre-pandemic and one during the COVID-19 pandemic, to isolate the pandemic's impact on mental health whilst controlling for both secular and developmental changes. They found that adolescents exposed to the pandemic exhibited significantly higher depressive symptoms and lower life satisfaction compared to those assessed pre-pandemic.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

N/A

Q11: Does the evidence indicate that there is a strong association?

As mentioned earlier, while mixed findings were reported in studies that controlled for age, we identified a longitudinal study with a robust design that accounted for both developmental trajectories and secular trends. The findings suggest that adolescents exposed to the pandemic had significantly higher depressive symptoms at follow-up than those who were not exposed.[21] The authors estimated that if the COVID-19 pandemic had not occurred, there would have been 6% fewer adolescents with high depressive symptoms. This evidence suggests that the pandemic led to a deterioration in mental health among adolescents beyond what would have been expected based on existing trends.

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

One identified systematic review examined 20 longitudinal studies and found that anxiety and depressive symptoms increased noticeably from April to May 2020, declined in mid-2020, but showed a small resurgence during the second wave (November–December 2020).[26] These trends aligned with the pandemic waves, indicating a dose-response relationship with momentary distress.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls). Specifically:

A. Was there a steeper increase in the risk factor for these groups?

National statistics suggest that COVID-19 infection rates varied by gender and ethnicity among young people in the UK or England. For the 15 to 24 age group, girls consistently showed a higher number of COVID infections compared to boys as of July 2020 in England.[27] In terms of ethnicity, Platt and Warwick (2020) draw on COVID-related mortality and case data in England and Wales.[28] After accounting for differences in population structure and regional concentration, they reported that most minority groups suffered excess mortality compared with the white British majority group, which might suggest that certain ethnic groups experienced higher infection rates or more severe outcomes.

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Across six identified high-quality studies (i.e. longitudinal studies that controlled for key confounders), there is evidence suggesting that COVID-19 has differential effects on emotional symptoms across gender groups, though there is limited evidence regarding ethnic groups.

Subgroup interaction analyses in study of Mansfield et al. (2022) showed that girls in the COVID-19 cohort experienced significantly worse outcomes in depressive symptoms, externalising difficulties, and life satisfaction compared to girls in the pre-COVID-19 cohort, whereas the impact was smaller for boys.[21] Hu and Qian (2021), similarly, reported that girls had a significantly greater increase in emotional problems than boys, while boys showed a greater decline in prosocial behaviour.[24] Knowles et al. (2022) also found a gender interaction effect, where girls showed a small increase in distress but boys a small decrease.[29] Waite et al. (2021) observed greater increases in emotional and

conduct problem among younger girls (aged 4–10), but no significant gender differences among adolescents.[30] In contrast, Bignardi et al. (2020) found no statistically significant gender or age moderation effects, suggesting that symptom increases were broadly similar across these subgroups in their sample.[23]

Regarding ethnicity, none of the studies found clear evidence that white British young people were more affected. Hu and Qian (2021) noted that UK ethnic minority adolescents showed slightly smaller increases in peer relationship problems compared to white peers,[24] while Knowles et al. (2022) reported no significant differences in emotional symptoms by ethnic group.[29] Similarly, Mansfield et al. (2022) did not report evidence of stronger effects for white adolescents compared to ethnic minority groups.[21] In fact, ethnic group interactions for most outcomes were either non-significant or weaker, and no specific ethnic group stood out as being disproportionately affected by the pandemic.

C. Were there greater increase in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example those in lower socio-economic groups?

Several studies reported differential effects of the COVID-19 pandemic on youth mental health across socioeconomic groups, though findings are mixed. Knowles et al. (2022) found that adolescents from lower-income households experienced a small reduction in distress (B = −1.12, 95% CI [−1.89, −0.36]).[29] In contrast, Hu and Qian (2021) suggested that adolescents in one-parent households and those from lower-income backgrounds experienced greater deterioration in mental health.[24] This is consistent with findings from Waite et al. (2021), who also reported that young people from low-income households had markedly elevated emotional symptoms across time points compared to their peers from high-income families.[30] However, changes in symptoms over time did not significantly differ by household income category. Mansfield et al. (2022) reported adolescents from lower SES backgrounds, operationalised through free school meal eligibility, had lower life satisfaction than their peers at both timepoints.[21] However, the pandemic did not appear to widen this gap, as the interaction between pandemic exposure and FSM eligibility was not statistically significant for most outcomes. Interestingly, adolescents from higher SES backgrounds experienced a greater decline in life satisfaction during the pandemic, bringing their levels closer to those of FSM-eligible peers.

Interestingly, there is evidence suggesting that young people with pre-pandemic mental health problems showed an improvement in their emotional well-being during the pandemic. Hu and Qian (2021) reported that adolescents with better-than-median mental health before the pandemic experienced a notable increase in emotional problems (B = 1.05, 95% CI [0.88, 1.22]) and became less prosocial (B = −0.89, 95% CI

[−1.03, −0.75]).[24] In contrast, adolescents with worse-than-median mental health before the pandemic showed a marked decrease in emotional problems (B = −0.49, 95% CI [−0.70, −0.28]) and an increase in prosocial behaviour (B = 0.42, 95% CI [0.26, 0.59]). These findings suggest that while adolescents with better mental health before the pandemic were more negatively influenced, those with worse pre-pandemic mental health experienced an improvement in emotional well-being. Similar results were also reported by Knowles et al. (2022), who found that adolescents with prior mental health difficulties (SDQ ⩾18) experienced a modest decrease in distress (B = −1.04, 95% CI [−1.88, −0.20]).[29]

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

The quality of evidence regarding the impact of COVID-19 on youth mental health is affected by several methodological concerns.

First, the nature of the pandemic means there were no contemporaneous controls group because the pandemic happened to everyone. Although many studies report an increase in mental health problems by comparing data from before the pandemic to during, they rarely account for the secular trends in youth mental health symptoms which were becoming more common for up to 10 years before the pandemic. This makes it hard to determine whether the observed rise is a continuation of pre-pandemic trends or a consequence of COVID-19.

Moreover, sampling issues can affect the reliability of findings. Many studies relied on convenience samples, often recruited through social media and spread via friendship networks. These samples may have had very different experiences of the pandemic compared to those who were not engaged in such platforms. Comparison of international studies and sub-national samples might affect their applicability to the UK context. For example, a large proportion of studies in umbrella reviews comes from China, where lockdown measures were generally more stringent and long-lasting. Also, Knowles et al. (2022) focused on an inner-London adolescent cohort,[29] and Bignardi et al. (2020)[23] used a small sample from the East of England, that might not be relevant to other areas of the UK. This issue is particularly relevant in the context of COVID-19. The impact of COVID-19 on young people's mental health is not limited to a single factor but instead involves multiple overlapping influences, such as the risk of infection, school closures, social distancing policies, quarantine measures, shortages of essential supplies

in the early stages of the pandemic, and even the loss of family members. These complex experiences have been handled differently across nations, with pandemic-related policies and public health measures varying significantly across regions and countries. As a result, the effects on young people's mental health have depended heavily on their specific social and environmental contexts.

Another issue is the timeline of mental health trends. As mentioned earlier, the rise in mental health problems among young people predates the COVID-19 pandemic and has been an ongoing trend for over a decade. This suggests that the pandemic cannot be the sole causal factor behind the observed increases in mental health issues. While it is possible that the pandemic has exacerbated an existing mental health crisis, current evidence is insufficient to determine whether this impact is short-term or has lasting effects. For example, most UK studies only cover data up to 2020, a time when the pandemic was still ongoing, making it difficult to assess its long-term psychological consequences.

Finally, inconsistencies in measurement tools across studies—such as differences in how anxiety, depression, or stress were assessed—make it difficult to accurately capture and compare effects across studies. For example, the systematic review and meta-analysis by Newlove-Delgado et al. (2022) reported variations in results across different mental health measures.[31]

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable in relation to the theory or evidence base that might inform our evaluation of causality?

Not that we are aware of.

References

1. Almeida M, Challa M, Ribeiro M, Harrison AM, Castro MC. Editorial Perspective: The mental health impact of school closures during the COVID - 19 pandemic. Journal of Child Psychology and Psychiatry. 2022;63(5):608-12.

2. Mazrekaj D, De Witte K. The Impact of School Closures on Learning and Mental Health of Children: Lessons From the COVID-19 Pandemic. Perspectives on Psychological Science. 2024;19(4):686-93.

3. Power E, Hughes S, Cotter D, Cannon M. Youth mental health in the time of COVID-19. Irish Journal of Psychological Medicine. 2020;37(4):301-5.

4. Rodrigues M, Silva R, Franco M. COVID-19: Financial Stress and Well-Being in Families. Journal of Family Issues. 2023;44(5):1254-75.

5. Reynolds A, Ní Charraighe A. Post-Covid Youth Work and Mental Wellbeing of Young People Across Scotland and England. Concept (The Journal of Contemporary Community Education Practice Theory). 2022;13:1-10.

6. Branje S. The impact of the COVID-19 pandemic on adolescent mental health across the world. Current Opinion in Psychology. 2023;53:101665-.

7. Dewa LH, Roberts L, Choong E, Crandell C, Demkowicz O, Ashworth E, et al. The impact of COVID-19 on young people's mental health, wellbeing and routine from a European perspective: A co-produced qualitative systematic review. PLOS ONE. 2024;19(3):e0299547-e.

8. Jost GM, Hang S, Shaikh U, Hostinar CE. Understanding adolescent stress during the COVID-19 pandemic. Current Opinion in Psychology. 2023;52:101646-.

9. Carey RL, Bailey MJ, Polanco CI. How the COVID-19 pandemic shaped adolescents' future orientations: Insights from a global scoping review. Current Opinion in Psychology. 2023;53:101655-.

10. Schweizer S, Lawson RP, Blakemore S-J. Uncertainty as a driver of the youth mental health crisis. Current Opinion in Psychology. 2023;53:101657-.

11. Preston LE, Chevinsky JR, Kompaniyets L, Lavery AM, Kimball A, Boehmer TK, et al. Characteristics and Disease Severity of US Children and Adolescents Diagnosed With COVID-19. JAMA Network Open. 2021;4(4):e215298-e.

12. Haig-Ferguson A, Cooper K, Cartwright E, Loades ME, Daniels J. Practitioner review: health anxiety in children and young people in the context of the COVID-19 pandemic. Behavioural and Cognitive Psychotherapy. 2021;49(2):129-43.

13. Pfefferbaum B, Van Horn RL. Physical Activity and Sedentary Behavior in Children During the COVID-19 Pandemic: Implications for Mental Health. Current Psychiatry Reports. 2022;24(10):493-501.

14. Levante A, Martis C, Bianco F, Castelli I, Petrocchi S, Lecciso F. Internalizing and externalizing symptoms in children during the COVID-19 pandemic: a systematic mixed studies review. Frontiers in Psychology. 2023;14.

15. Bera L, Souchon M, Ladsous A, Colin V, Lopez-Castroman J. Emotional and Behavioral Impact of the COVID-19 Epidemic in Adolescents. Current Psychiatry Reports. 2022;24(1):37-46.

16. Bevilacqua L, Fox-Smith L, Lewins A, Jetha P, Sideri A, Barton G, et al. Impact of COVID-19 on the mental health of children and young people: an umbrella review. Journal of Epidemiology and Community Health. 2023;77(11):704-9.

17. Bower M, Smout S, Donohoe-Bales A, O'Dean S, Teesson L, Boyle J, et al. A hidden pandemic? An umbrella review of global evidence on mental health in the time of COVID-19. Frontiers in Psychiatry. 2023;14.

18. Duan C, Liu L, Wang T, Wang G, Jiang Z, Li H, et al. Evidence linking COVID-19 and the health/well-being of children and adolescents: an umbrella review. BMC Medicine. 2024;22(1):116-.

19. Harrison L, Carducci B, Klein JD, Bhutta ZA. Indirect effects of COVID-19 on child and adolescent mental health: an overview of systematic reviews. BMJ Global Health. 2022;7(12):e010713-e.

20. Witteveen AB, Young SY, Cuijpers P, Ayuso-Mateos JL, Barbui C, Bertolini F, et al. COVID-19 and common mental health symptoms in the early phase of the pandemic: An umbrella review of the evidence. PLOS Medicine. 2023;20(4):e1004206-e.

21. Mansfield R, Santos J, Deighton J, Hayes D, Velikonja T, Boehnke JR, et al. The impact of the COVID-19 pandemic on adolescent mental health: a natural experiment. Royal Society Open Science. 2022;9(4).

22. Chen S, She R, Qin P, Kershenbaum A, Fernandez-Egea E, Nelder JR, et al. The Medium-Term Impact of COVID-19 Lockdown on Referrals to Secondary Care Mental Health Services: A Controlled Interrupted Time Series Study. Frontiers in Psychiatry. 2020;11.

23. Bignardi G, Dalmaijer ES, Anwyl-Irvine AL, Smith TA, Siugzdaite R, Uh S, et al. Longitudinal increases in childhood depression symptoms during the COVID-19 lockdown. Archives of Disease in Childhood. 2021;106(8):791-7.

24. Hu Y, Qian Y. COVID-19 and Adolescent Mental Health in the United Kingdom. Journal of Adolescent Health. 2021;69(1):26-32.

25. Widnall E, Winstone L, Plackett R, Adams EA, Haworth CMA, Mars B, et al. Impact of School and Peer Connectedness on Adolescent Mental Health and Well-Being Outcomes during the COVID-19 Pandemic: A Longitudinal Panel Survey. International Journal of Environmental Research and Public Health. 2022;19(11):6768-.

26. Miao R, Liu C, Zhang J, Jin H. Impact of the COVID-19 pandemic on the mental health of children and adolescents: A systematic review and meta-analysis of longitudinal studies. Journal of Affective Disorders. 2023;340:914-22.

27. Number of coronavirus (COVID-19) cases in England as of July 30, 2020, by age and gender. Statista2023.

28. Platt L, Warwick R. COVID - 19 and Ethnic Inequalities in England and Wales [*]. Fiscal Studies. 2020;41(2):259-89.

29. Knowles G, Gayer - Anderson C, Turner A, Dorn L, Lam J, Davis S, et al. Covid - 19, social restrictions, and mental distress among young people: a UK longitudinal, population - based study. Journal of Child Psychology and Psychiatry. 2022;63(11):1392-404.

30. Waite P, Pearcey S, Shum A, Raw JAL, Patalay P, Creswell C. How did the mental health symptoms of children and adolescents change over early lockdown during the COVID - 19 pandemic in the UK? JCPP Advances. 2021;1(1).

31. Newlove - Delgado T, Russell AE, Mathews F, Cross L, Bryant E, Gudka R, et al. Annual Research Review: The impact of Covid - 19 on psychopathology in children and young people worldwide: systematic review of studies with pre - and within - pandemic data. Journal of Child Psychology and Psychiatry. 2023;64(4):611-40.

4. Discriminatory experiences

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

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Discrimin* OR
"perceived discrim*" OR "identity-based" OR "minority stress" OR "vicarious discrim*" OR
racis* OR sexis* OR misogin* OR Xenophob* OR Ableis* OR disableis* OR
("violen*" AND against AND (women OR girl*)) OR
"hate crime*"
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Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

A list of potential mechanisms that may underpin how discrimination can influence young people's mental health is summarised in the seven themes below.

Stress and trauma

It is suggested that perceived discrimination – and anticipation of such discrimination – functions as a social stressor, which can be experienced chronically and unpredictably across an individual's lifetime, thus impacting upon psychological, emotional, behavioural, and physiological functioning, and thereby increasing susceptibility for poor mental health[1]. This is articulated within minority stress theory, which hypothesises that health disparities among marginalised groups are the result of excess exposure to stress as a result of their marginalised status.[2, 3] This can encompass discriminatory policies and systems, acute life events, exposure to chronic stressors, and everyday forms of discrimination.[2] Some have conceptualised some forms of discrimination (e.g. racism) as a trauma that people navigate on an ongoing basis.[4, 5] It is noted that coping with feeling one is being discriminated against is a persistent stressor across the life course, but that adolescents in particular may find it especially difficult to adaptively cope with discrimination as their skills here are still developing.[5]

Embodiment and embodying injustice

Embodiment refers to the ways that we biologically incorporate (i.e. embody) our societal and ecological context.[6] The range of pathways includes the social and biophysical and leads to the distributions of health and disease observed in the

population, including mental health. For groups who experience systemic injustice, it is therefore proposed that this injustice becomes embodied through cumulative intertwining processes of exposure, susceptibility, and resistance (including through intergenerational impacts).[6]

Beliefs about fairness and justice

It has been suggested that experiencing perceived discrimination can compromise a young person's belief in fairness and justice, and that this can, in turn, impact their psychological wellbeing in a manner that may be problematic for their mental health.[7]

Sense of self

It has been suggested that marginalised young people's exposure to identity-based discrimination and stereotypes during adolescence coincides with a critical period of identity development, which can challenge their self-concept and self-esteem without appropriate support and affirmation.[2, 8, 9]

Unequal access to mental health support

Evidence points to complex disparities in access to mental health support and services, which vary across marginalised groups. In terms of racially minoritised young people, a scoping review attributed lower access to services (including school and community-based support as well as dedicated services) to a range of factors, including issues around mistrust and fear,[10] understood to be grounded in historical systemic injustices and negative experiences.[11] Indeed, where young people from racially minoritised groups are seen in CAMHS, they are more likely to be referred through compulsory routes (e.g. through social care) than through primary care routes, in contrast to white young people.[12] It is suggested that girls face discrimination in gaining access to mental health support, with their expressions of distress being viewed as an attribute of their gender and therefore dismissed in school and community settings as well as healthcare interactions.[13, 14]

Intersectionality and multiple forms of discrimination

It has been noted that disadvantaged and marginalised groups, especially those who are multiply disadvantaged and marginalised (for instance, belonging to a UK ethnic minority group, immigrant status, growing up in poverty) face greater exposure to multiple forms of discrimination, and that this may have a cumulative impact upon mental health outcomes.[15, 16]

Vicarious discrimination experiences

It is also noted that discrimination does not need to be experienced firsthand to impact mental health and wellbeing,[17]and that experiencing such discrimination vicariously can also impact such outcomes, perhaps especially for young people.[18] That is, where a young person becomes aware that another individual, whether a peer, relative, or stranger, has experienced discrimination, this can be distressing and may impact their mental health outcomes.

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

Discrimination is associated with deterioration in youth outcomes, including but not limited to internalising symptoms, such as externalising behaviours, delinquency, and academic difficulties. Experiences of discrimination have been linked to increased levels of externalising behaviours, including violence and substance use, particularly in the absence of protective socialisation processes like racial and ethnic socialisation (RES) and the development of critical consciousness.[4, 5, 8] Bernard et al. (2020), for example, argue that racism should be recognised as a culturally-informed adverse childhood experience, and show how racial trauma contributes to emotional dysregulation and maladaptive behavioural outcomes in Black youth.[5] Similarly, Denise (2012) found that exposure to multiple forms of discrimination (e.g. based on race, gender, sexuality) was associated not only with depression but also with delinquent behaviour.[7]

Additionally, discrimination has been associated with poorer academic outcomes among marginalised youth, including reduced engagement and achievement in school.[7, 8] Godfrey et al. (2019), for example, observed that critically reflective youth who do not feel empowered to enact change may disengage from school, potentially increasing behavioural risk, whereas those who combine critical reflection with sociopolitical efficacy tend to show better academic and behavioural outcomes.[19]

Further, evidence from youth mental health and public health perspectives suggests that racism and bias in school and service settings may lead to the misdiagnosis or overdiagnosis of behavioural problems in marginalised youth, such as disruptive behaviour or ADHD.[5] These diagnostic disparities reflect how systemic discrimination shapes not only subjective well-being but also the institutional labelling of youth behaviours.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. The theory considers key psychological, social, and structural factors relevant to young people's mental health, including chronic stress, trauma, and the cumulative

impact of multiple forms of discrimination. It incorporates intersectionality, critical consciousness, and systemic barriers to care, while also acknowledging contextual influences such as institutional racism, unequal access to services, and identity development during adolescence. These components make the theory broadly relevant and plausible for explaining the experiences of marginalised youth in the UK.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

Not really. Comprehensive data on trends in discrimination experienced specifically by children and young people is limited. However, UK government reports offer some insight into broader national patterns.

The UK Home Office's 2024 report on Hate Crime in England and Wales indicates that police-recorded hate crime incidents have increased considerably over the last decade.[20] This includes the five centrally monitored strands of hate crime: race or ethnicity, religion, sexual orientation, disability, and transgender identity. However, between 2022 and 2024, the total number of hate crimes fell by 10%, with declines across most strands except for religion. Race-related hate crimes remained the most common type, comprising 70% of all hate crimes (98,799 offences in 2023/24), although they also declined by 5% over the last year.

In contrast, when comparing the 2014/16[21] and 2024[22] government reports on workplace equality, a decrease in reported experiences of workplace discrimination is observed. In 2015/16, 12% of employees reported experiencing discrimination, while by 2023, this had decreased to 7%. Gender representation remained relatively stable, with women consistently making up around 56–57% of the workforce across the decade. Nonetheless, women remained concentrated in lower-grade positions, while men continued to dominate higher pay bands. Between 2014 and 2024, there were gradual improvements in the representation of marginalised groups in UK public sector employment, particularly among ethnic minorities and LGBTQ+ individuals. For example, the proportion of employees identifying as from UK ethnic minority groups (e.g. Black, Asian) increased from 14.3% in 2016 to 20.6% in 2024. However, disparities remained, as UK ethnic minority employees continued to be underrepresented in senior roles and reported disproportionately high turnover. Sexuality-related diversity also improved. In 2016, 1.7% of employees identified as lesbian, gay, or bisexual, rising to 5.5% in 2024, reflecting greater visibility and possibly more inclusive workplace cultures.

It is interesting to note that the Emerging Tensions (2024) report by King's College London reveals growing awareness and polarisation around concepts such as toxic masculinity and feminism.[23] The report highlights that public perceptions of gender inequality are shifting. While 48% of people still believe it is harder to be a woman today, this figure is down from 69% who held the same view two decades ago. Looking ahead, only 27% believe women will have it harder in 20 years, while a growing number of young men (30%) believe it will be harder to be a man. Although the report does not offer direct evidence of gender-based discrimination, it points to a cultural shift in how gender roles and inequalities are perceived across age and social groups.

While these patterns suggest an overall increase in hate crime over the past decade and improvements in workplace representation, two youth-focused reports highlight the persistence of discrimination experiences among ethnic minority young people and girls in the UK. The YMCA's Young and Black (2020) report highlights how young Black people in the UK experience systemic racism across education, employment, policing, health, and finance.[24] Nearly all respondents (95%) had encountered racist language in school, and many reported low teacher expectations and biased treatment. In the workplace, 86% had witnessed racism, with over half experiencing discrimination during recruitment. Disproportionate stop and search, lack of trust in the NHS, and cultural incompetence in mental health services were also mentioned. The Plan International UK's State of Girls' Rights in the UK 2020 report focuses on how girls, particularly those facing intersecting inequalities related to race, class, sexuality, or disability, experience discrimination in schools, public spaces, and online.[25] Black and minoritised girls are disproportionately excluded from school and often face racist and sexist stereotypes. Many do not feel safe in public, and LGBTQ+ girls report isolation and a lack of support in school environments.

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

Not really. While direct longitudinal data on changes in discrimination experienced by young people are limited, UK national reports suggest that workplace discrimination figures have declined over the past decade.[20, 21] However, it is important to note that youth-focused reports highlight widespread and persistent experiences of racism and exclusion in education, policing, and public life.[24, 25]

While not directly related to group differences in the mental health trends analysis, it is noteworthy that Robinson et al. (2013) conducted a longitudinal study using data from the Longitudinal Study of Young People in England, including 4,135 white British participants aged 13–20 years (Waves 1 to 7; 2004–2010).[26] The study found that although peer victimisation decreased in absolute terms across adolescence for all groups, gay/bisexual boys showed increasing odds of victimisation relative to

heterosexual boys, from an odds ratio (OR) of 1.78 at Wave 1 to OR = 3.95 at Wave 7. In contrast, the disparity in victimisation between lesbian/bisexual and heterosexual girls declined over time and was no longer statistically significant by Wave 7.

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Yes. We acknowledge that experiences of discrimination are inherently varied, spanning different groups, settings, and forms. For this evaluation, and to remain consistent with the trends observed in our analysis, we have evaluated the effect of discrimination through examples of racial and gender-related discrimination, with some reference to LGBTQ+ groups.

Regarding racial discrimination, one umbrella review was identified. Williams et al. (2019) conducted an umbrella review of 29 reviews published between January 2013 and 2019, examining the health effects of self-reported racial discrimination, including on mental health.[27] The review drew from both cross-sectional and longitudinal studies, primarily from the US. The authors concluded that discrimination was consistently associated with poorer mental health outcomes. For instance, a meta-analysis mentioned in the review (Paradies et al., 2015) reported significant associations between racial discrimination and mental health ($r = -.23$), physical health ($r = -.09$), and health behaviours ($r = -.16$). The paper also highlights subgroup differences. For example, one cited study found stronger associations between discrimination and psychological distress among Black women ($\beta = .30$) compared to Black men ($\beta = .19$), indicating differential vulnerability. The authors conclude that racial discrimination operates as a significant psychosocial stressor, affecting mental health from an early age and accumulating across the life course.

Two reviews focused on gender-related discrimination, specifically sexual and partner violence. Klencakova et al. (2021) conducted a systematic review of 10 studies investigating the impact of intimate partner violence (IPV) on young women aged 10 to 24, using data primarily from the US.[28] The review found consistent evidence that IPV during adolescence was associated with mental health decline, including depression, anxiety, post-traumatic stress, and in some cases substance use and behavioural issues. It also highlighted coercive control and emotional abuse as key drivers of distress. However, the majority of the studies included in the review were cross-sectional (7 out of 10). Similarly, Barbara et al. (2022) conducted a narrative review on the impact of sexual violence on the mental health of adolescent girls and adult women. The review reports

consistent links between sexual violence and depression, anxiety, PTSD, and sexual dysfunction, with particularly severe and long-lasting impacts when the violence occurred during adolescence.[29]

Three reviews focused on sexual and gender minority populations. Dürrbaum and Sattler (2020) conducted a meta-analysis of seven studies investigating the impact of minority stress—including discrimination, rejection, stigma, and internalised homonegativity—on mental health among lesbian, gay, and bisexual adolescents aged 12 to 22.[30] All studies were cross-sectional and mostly conducted in the US. The aggregate effect size for the association between minority stress and internalising symptoms was r = .25, 95% CI [.10, .38], d = .52, indicating a medium-sized effect. Similarly, Argyriou et al. (2020) conducted a systematic review of 40 studies examining mediators of depression disparities between sexual minority and heterosexual individuals.[31] Most studies, again, are from the US and cross-sectional (28 studies). Discrimination experiences (e.g. victimisation, abuse, peer rejection, and internalised homophobia) are associated with increased depressive symptoms, often mediated by low self-esteem, increased rumination, reduced social support, and internalised stigma. Finally, Tankersley et al. (2021) reviewed 44 studies on transgender and gender non-conforming (TGNC) youth, aged 3 to 24.[32] All studies were cross-sectional, with most of them conducted in the US. Transphobic discrimination (e.g. verbal abuse, physical violence, bullying, social exclusion, and misgendering) is associated with internalising symptoms, including depression, anxiety, PTSD, and suicidality.

Q7: Is there evidence comes from longitudinal studies where the risk factor is measured before mental health?

Yes, a substantial number of longitudinal studies have examined the impact of racial-related discrimination, while four studies were identified for gender-related discrimination, and five for LGBTQ+ groups.

Cave (2020) conducted a systematic review of 46 longitudinal studies investigating the effects of racial discrimination experienced before age 18 on child and adolescent health outcomes.[33] The majority of studies were conducted in the US (86%), with participants primarily aged 11–18, and smaller proportions focusing on ages 5–10 (20%) and 0–4 (3%). Most studies included two or three timepoints, typically spaced over intervals longer than 12 months. Among the 134 associations between racial discrimination and internalising symptoms (e.g. depression, anxiety, emotional distress), 61% (n = 82) were statistically significant and indicated a negative effect, while 37% were null and 2% reported reverse associations. However, the review does not report effect size estimates. Subgroup analyses suggested the effects were more pronounced among low-income youth and might vary across developmental stages, while gender-specific effects were less consistently reported.

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

Yes, key confounders were largely accounted for in longitudinal studies examining the impact of racial, gender, and LGBTQ+ related discrimination experience.

Among the 25 studies identified that focused on racial-related discrimination, four studies controlled for demographic variables,[34-37] 11 included socioeconomic indicators,[38-48] and three controlled for baseline mental health conditions. For example, Kim (2011) followed 444 Chinese American adolescents (239 girls and 205 boys, with a mean age of 13.0 years at Wave 1 and 17.0 years at Wave 2) living in major metropolitan areas of Northern California.[49] The analysis controlled for family income, place of birth, and baseline depressive symptoms. Structural equation modelling indicated gender-specific pathways. For girls, perceptions of being viewed as a perpetual foreigner were associated with both chronic daily discrimination and discriminatory victimisation, but only chronic daily discrimination was significantly related to increased depressive symptoms (path coefficient = .347, 95% CI [.214, .479]). This model explained 28.3% of the variance in girls' depressive symptoms. For boys, the perpetual foreigner stereotype was also linked to both types of discrimination, but only discriminatory victimisation was significantly associated with increased depressive symptoms (path coefficient = .291, 95% CI [.111, .470]). This model accounted for 25.8% of the variance in boys' depressive symptoms.

All four studies focusing on gender-related discrimination attempted to control for key confounders, including baseline mental health. For example, Bentivegna and Patalay (2022) conducted a high-quality longitudinal study using data from 5,119 adolescent girls and 4,852 boys in the UK Millennium Cohort Study.[50] The study examined the impact of sexual violence experienced in mid-adolescence on mental health outcomes at age 17. The analyses controlled for a comprehensive set of confounding variables, including baseline mental health, socio-demographic indicators (e.g. ethnicity, sexual identity, parental education, and household income), puberty-related factors, interpersonal variables (e.g. peer relationships and bullying), and health-related behaviours (e.g. BMI, substance use, school attendance, and life satisfaction). In the fully adjusted model, compared to those who had not experienced sexual violence, those who had experienced it showed greater mean psychological distress (measured by the Kessler Psychological Distress Scale, K6) in girls (mean difference 2.09 [95% CI 1.51–2.68]) and boys (2.56 [1.59–3.53]), as well as higher risk of high psychological distress in girls (risk ratio [RR] 1.65 [95% CI 1.37–2.00]) and boys (1.55 [1.00–2.40]). Population attributable fraction estimates suggest that, in a hypothetical scenario with no sexual violence, the

prevalence of adverse mental health outcomes at age 17 years would be 3.7–10.5% lower in boys and 14.0–18.7% lower in girls than the prevalence in this cohort (i.e. children born between 2000 and 2002). Similar findings were reported in Rinehart et al. (2017) and Rogers et al. (2022), which also identified a significant negative impact of gendered discrimination or harassment on internalising symptoms and substance use, after adjusting for confounders, including baseline mental health.[51, 52] Another study, Foshee et al. (2013)[47] focused on the impact of dating abuse victimisation based on 3,328 adolescents (grades 8–12) in the US over four waves across 2.5 years. Demographic variables (i.e. ethnicity and sex) and socioeconomic indicators (i.e. parent education and single-parent household) were controlled. Mental health outcomes in prior measurement occasions were also considered through the estimation of lagged effects. The findings suggest that psychological (e.g. insulting, controlling, monitoring behaviour), but not physical, victimisation predicted later internalising symptoms. The lagged effect of psychological victimisation on internalising symptoms varied by sex of the adolescent, such that effects were significant for girls (b = .18, p < .001) but only marginally significant for boys (b = .08, p = .07).

Among five identified studies examining discrimination experiences among LGBTQ+ groups, four of them controlled for key confounders and consistently suggest a negative effect of discrimination.[53-57] For example, one large-scale study, Luk et al. (2018), analysed data from the NEXT Generation Health Study, a longitudinal cohort of 2,396 US adolescents aged 17–2.[57] Using data from Waves 2–6, they assessed the impact of sexual minority status on depressive symptoms. Sexual minority adolescents (6.3% of the sample) consistently reported higher depressive symptoms than heterosexual peers across all five waves. Mediators, including family satisfaction, cyberbullying victimisation, and unmet medical needs, explained 49.5% of the total effect among males and 45.3% among females. These results remained after controlling for ethnicity and family affluence. Similar findings can also be found in la Roi et al. (2016) and Birkett et al. (2015).[53, 56] One study controlled for baseline mental health. Burton et al. (2013) investigated 197 adolescents aged 14–19 (29% sexual minority youth) from the US using a two-wave, six-month longitudinal design.[54] Mediation analysis revealed that victimisation significantly mediated the effect of minority status on both depression and suicidality. After controlling for gender, age, ethnicity, and depressive symptoms at Wave 1, sexual minority-specific victimisation at Wave 2 still significantly mediated the effect of sexual minority status on depressive symptoms (B = .05, 95% CI [.01, .15]).

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Not that we are aware of.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

Not that we are aware of.

Q11: Does the evidence indicate that there is a strong association?

While statistical indicators varied across studies and standardised effect sizes were not consistently reported, the current evidence seems to suggest a consistent negative, though small, effect of discrimination experiences, based on the statistical estimators reported in studies that controlled for key confounders.

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

Not that we are aware of.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

This theory directly articulates differential distribution of exposure for groups, though it is notable that this corresponds to our findings that girls are experiencing worsening mental health but diverges from our evidence that young white British people are reporting worsening mental health more steeply, given that it is UK ethnic minority groups who are likely to experience racial discrimination.

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

We are not aware of any studies that have compared the effect of discrimination experiences on different groups, however we note that the kind of discrimination is

anticipated to be very different according to different groups, therefore any such study would need to account for this.

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

We note that this theory inherently articulates LGBT+phobia as a critical issue facing young people, though we have not analysed trends by sexuality or gender diversity. We noticed national differences in experiences of discrimination. The Migrants and Discrimination in the UK report (2024) suggests that, while migrants in Britain were slightly less likely to perceive discrimination against their group compared to those in some other European countries, perceived discrimination was higher among UK-born individuals with migrant parents.[58] In Great Britain, 35% of this group reported experiencing discrimination, compared to 26% in France and 27% in Germany. Furthermore, individuals with only one migrant parent were also more likely to perceive discrimination in Britain (19%) than in EU-14 countries (7%).

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

However, based on currently available data on discrimination, it is difficult to conclude that discrimination has worsened in the UK over the past two decades. UK workplace equality data suggests gradual improvements. Even if the evidence did suggest a worsening trend, the direction of this change does not align with youth mental health trends among UK ethnic groups, as we observed that UK ethnic minority youth have shown a slower increase in internalising symptoms compared to their white peers.

Furthermore, we are aiming to explain the rise in mental health problems at a population level. While it is reasonable to argue that discrimination can affect young people even when they are not directly targeted (e.g. through vicarious or systemic exposure), much of the existing evidence focuses on more extreme forms of discrimination, such as abuse. This may limit the explanatory capacity of the theory when applied to broader population-level trends.

Several methodological concerns also warrant attention. First, the majority of the evidence comes from the US, which is a different socio-political context from the UK. This

raises questions about the generalisability of the findings in explaining UK-specific trends, especially for ethnicity-related findings. Second, the issue of confounding needs more careful consideration. In this theory, socioeconomic indicators are particularly relevant, as evidence suggests, for example, that migrants from lower socioeconomic backgrounds tend to be impacted more by discrimination. However, among the three studies on racial-related discrimination that controlled for baseline mental health, only one study accounted for both baseline mental health and socioeconomic status.

Notwithstanding the likely effects of discrimination on mental health, our trend analyses show that mental health problems have increased more slowly among UK ethnic minority groups compared to white British youth. This apparent contradiction raises an important question: why do UK ethnic minority youth show a slower increase in mental health problems despite potentially facing more adverse life experiences, such as discrimination? This paradox deserves further exploration in future research.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable about the theory or evidence base that might inform our evaluation of causality?

Not that we are aware of.

References

1. Vines AI, Ward JB, Cordoba E, Black KZ. Perceived Racial/Ethnic Discrimination and Mental Health: A Review and Future Directions for Social Epidemiology. Current Epidemiology Reports. 2017;4(2):156-65.
2. Frost DM, Meyer IH. Minority stress theory: Application, critique, and continued relevance. Current Opinion in Psychology. 2023;51:101579-.

3. Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. Psychological Bulletin. 2003;129(5):674-97.

4. Ayodeji E, Dubicka B, Abuah O, Odebiyi B, Sultana R, Ani C. Editorial Perspective: Mental health needs of children and young people of Black ethnicity. ¹ Is it time to 72nstagram7272lize racism as a traumatic experience? Child and Adolescent Mental Health. 2021;26(3):265-6.

5. Bernard DL, Calhoun CD, Banks DE, Halliday CA, Hughes-Halbert C, Danielson CK. Making the "C-ACE" for a Culturally-Informed Adverse Childhood Experiences Framework to Understand the Pervasive Mental Health Impact of Racism on Black Youth. Journal of Child & Adolescent Trauma. 2021;14(2):233-47.

6. Krieger N. Embodiment: a conceptual glossary for epidemiology. Journal of Epidemiology & Community Health. 2005;59(5).

7. Denise E. Multiple Forms of Perceived Discrimination and Health among Adolescents and Young Adults. Journal of Health and Social Behavior. 2012;53(2).

8. Coyne-Beasley T, Miller E, Svetaz MV. Racism, Identity-Based Discrimination, and Intersectionality in Adolescence. Academic Pediatrics. 2024;24(7):S152-S60.

9. Demkowicz O, Jefferson R, Nanda P, Foulkes L, Lam J, Pryjmachuk S, et al. Adolescent girls' explanations of high rates of low mood and anxiety in their population: a co-produced qualitative study. BMC Women's Health. 2025;25(1):49-.

10. Coelho H, Price A, Kiff F, Trigg L, Robinson S, Thompson Coon J, et al. Experiences of children and young people from ethnic minorities in accessing mental health care and support: rapid scoping review. Health and Social Care Delivery Research. 2022;10(22):1-74.

11. Jackson K. How do we understand the underrepresentation of Black children and families accessing Child and Adolescent Mental Health Services (CAMHS)? A mixed methods qualitative research with professionals and service users. 2022.

12. Edbrooke-Childs J, Patalay P. Ethnic Differences in Referral Routes to Youth Mental Health Services. Journal of the American Academy of Child & Adolescent Psychiatry. 2019;58(3):368-75.e1.

13. Stentiford L, Koutsouris G, Allan A. Girls, mental health and academic achievement: a qualitative systematic review. Educational Review. 2023;75(6):1224-54.

14. Tinner L, Alonso Curbelo A. Intersectional discrimination and mental health inequalities: a qualitative study of young women's experiences in Scotland. International Journal for Equity in Health. 2024;23(1):45-.

15. Denise EJ. Multiple Forms of Perceived Discrimination and Health among Adolescents and Young Adults. Journal of Health and Social Behavior. 2012;53(2):199-214.

16. Prince DM, Rocha A, Nurius PS. Multiple Disadvantage and Discrimination: Implications for Adolescent Health and Education. Social Work Research. 2018;42(3):169-79.

17. Hennein RP, R; Gorman, H; Lowe, S R. Gender Discrimination and Mental Health Among Health Care Workers: Findings from a Mixed Methods Study. Journal of Women's Health. 2023;32(1).

18. Heald-Garris NC, M; Camaj, L; Hamati, MC; Domionguez, TP. Transmitting Trauma: A systematic review of vicarious racism and child health. Social Science & Medicine. 2018;199:230-40.

19. Godfrey EB, Burson EL, Yanisch TM, Hughes D, Way N. A bitter pill to swallow? Patterns of critical consciousness and socioemotional and academic well-being in early adolescence. Developmental Psychology. 2019;55(3):525-37.

20. Hate crime, England and Wales, year ending March 2024 GOV.UK: UK Home Office; 2024 [Available from: https://www.gov.uk/government/statistics/hate-crime-england-and-wales-year-ending-march-2024/hate-crime-england-and-wales-year-ending-march-2024.

21. Equality Data Report 2014 – 2016. GOV.UK: The Insolvency Service; 2017.

22. Equality data Report 2024. GOV.UK: The Insolvency Service; 2025.

23. Campbell RD, B; Gottfried, G; Hewlett, K; May, G; Skinner, G. Emerging tensions? How younger generations are dividing on masculinity and gender equality. IPSOS: King's College London; 2024.

24. Young and Black: The Young Black Experience of Institutional Racism in the UK. London: YMCA; 2020 2020/10//.

25. THE STATE OF GIRLS' RIGHTS IN THE UK 2024. London; 2024 2024/7//.

26. Robinson JP, Espelage DL, Rivers I. Developmental Trends in Peer Victimization and Emotional Distress in LGB and Heterosexual Youth. Pediatrics. 2013;131(3):423-30.

27. Williams DR, Lawrence JA, Davis BA, Vu C. Understanding how discrimination can affect health. Health Services Research. 2019;54(S2):1374-88.

28. Klencakova LE, Pentaraki M, McManus C. The Impact of Intimate Partner Violence on Young Women's Educational Well-Being: A Systematic Review of Literature. Trauma, Violence, & Abuse. 2023;24(2):1172-87.

29. Barbara G, Buggio L, Micci L, Spinelli G, Paiocchi C, Dridi D, et al. Sexual violence in adult women and adolescents. Minerva Obstetrics and Gynecology. 2022;74(3).

30. Dürrbaum T, Sattler FA. Minority stress and mental health in lesbian, gay male, and bisexual youths: A meta-analysis. Journal of LGBT Youth. 2020;17(3):298-314.

31. Argyriou A, Goldsmith KA, Rimes KA. Mediators of the Disparities in Depression Between Sexual Minority and Heterosexual Individuals: A Systematic Review. Archives of Sexual Behavior. 2021;50(3):925-59.

32. Tankersley AG, EL; Dike, J; Jones, RT. Risk and Resilience Factors for Mental Health among Transgender and Gender Nonconforming (TGNC) Youth: A Systematic Review. Clinical Child and Family Psychology Review. 2021;24(2):183-206.

33. Cave L, Cooper MN, Zubrick SR, Shepherd CCJ. Racial discrimination and child and adolescent health in longitudinal studies: A systematic review. Social Science & Medicine. 2020;250:112864-.

34. Correa-Velez I, Gifford SM, Barnett AG. Longing to belong: Social inclusion and wellbeing among youth with refugee backgrounds in the first three years in Melbourne, Australia. Social Science & Medicine. 2010;71(8):1399-408.

35. Ford KR, Hurd NM, Jagers RJ, Sellers RM. Caregiver Experiences of Discrimination and African American Adolescents' Psychological Health Over Time. Child Development. 2013;84(2):485-99.

36. Ying Y-W, Han M. The Effect of Intergenerational Conflict and School-Based Racial Discrimination on Depression and Academic Achievement in Filipino American Adolescents. Journal of Immigrant & Refugee Studies. 2007;4(4):19-35.

37. Niwa EW, N; Hughes, DL. Trajectories of ethnic-racial discrimination among ethnically diverse early adolescents: associations with psychological and social adjustment. Child Development. 2014;85(6).

38. Anderson RE, Hussain SB, Wilson MN, Shaw DS, Dishion TJ, Williams JL. Pathways to Pain. Journal of Black Psychology. 2015;41(6):491-512.

39. Astell-Burt T, Maynard MJ, Lenguerrand E, Harding S. Racism, ethnic density and psychological well-being through adolescence: evidence from the Determinants of Adolescent Social well-being and Health longitudinal study. Ethnicity & Health. 2012;17(1-2):71-87.

40. Benner AD, Kim SY. Experiences of discrimination among Chinese American adolescents and the consequences for socioemotional and academic development. Developmental Psychology. 2009;45(6):1682-94.

41. Cano MÁ, Schwartz SJ, Castillo LG, Romero AJ, Huang S, Lorenzo - Blanco EI, et al. Depressive symptoms and externalizing behaviors among Hispanic immigrant adolescents: Examining longitudinal effects of cultural stress. Journal of Adolescence. 2015;42(1):31-9.

42. Espinosa A. Discrimination, Self-Esteem, and Mental Health Across Ethnic Groups of Second-Generation Immigrant Adolescents. Journal of Racial and Ethnic Health Disparities. 2021;8(6):1539-50.

43. Gibbons FX, Gerrard M, Cleveland MJ, Wills TA, Brody G. Perceived Discrimination and Substance Use in African American Parents and Their Children: A Panel Study. Journal of Personality and Social Psychology. 2004;86(4):517-29.

44. Hou Y, Kim SY, Hazen N, Benner AD. Parents' Perceived Discrimination and Adolescent Adjustment in Chinese American Families: Mediating Family Processes. Child Development. 2017;88(1):317-31.

45. Juang LP, Cookston JT. Acculturation, Discrimination, and Depressive Symptoms among Chinese American Adolescents: A Longitudinal Study. The Journal of Primary Prevention. 2009;30(3-4):475-96.

46. Nair RL, White RMB, Roche KM, Zhao C. Discrimination in Latinx families' linked lives: Examining the roles of family process and youth worries. Journal of Family Psychology. 2022;36(4):523-33.

47. Roche KM, White RMB, Lambert SF, Schulenberg J, Calzada EJ, Kuperminc GP, et al. Association of Family Member Detention or Deportation With Latino or Latina Adolescents' Later Risks of Suicidal Ideation, Alcohol Use, and Externalizing Problems. JAMA Pediatrics. 2020;174(5):478-.

48. Walls MW, L; Armenta, B. A Cautionary Tale: Examining the Interplay of Culturally Specific Risk and Resilience Factors in Indigenous Communities. Clinical Psychological Science. 2017;4(4).

49. Kim SY, Wang Y, Deng S, Alvarez R, Li J. Accent, perpetual foreigner stereotype, and perceived discrimination as indirect links between English proficiency and depressive symptoms in Chinese American adolescents. Developmental Psychology. 2011;47(1):289-301.

50. Bentivegna F, Patalay P. The impact of sexual violence in mid-adolescence on mental health: a UK population-based longitudinal study. The Lancet Psychiatry. 2022;9(11):874-83.

51. Rinehart SJ, Espelage DL, Bub KL. Longitudinal Effects of Gendered Harassment Perpetration and Victimization on Mental Health Outcomes in Adolescence. Journal of Interpersonal Violence. 2020;35(23-24):5997-6016.

52. Rogers AA, Cook RE, Guerrero K. Is My Femininity a Liability? Longitudinal Associations between Girls' Experiences of Gender Discrimination, Internalizing Symptoms, and Gender Identity. Journal of Youth and Adolescence. 2022;51(2):335-47.

53. Birkett M, Newcomb ME, Mustanski B. Does It Get Better? A Longitudinal Analysis of Psychological Distress and Victimization in Lesbian, Gay, Bisexual, Transgender, and Questioning Youth. Journal of Adolescent Health. 2015;56(3):280-5.

54. Burton CM, Marshal MP, Chisolm DJ, Sucato GS, Friedman MS. Sexual Minority-Related Victimization as a Mediator of Mental Health Disparities in Sexual Minority Youth: A Longitudinal Analysis. Journal of Youth and Adolescence. 2013;42(3):394-402.

55. Chodzen G, Hidalgo MA, Chen D, Garofalo R. Minority Stress Factors Associated With Depression and Anxiety Among Transgender and Gender-Nonconforming Youth. Journal of Adolescent Health. 2019;64(4):467-71.

56. la Roi C, Kretschmer T, Dijkstra JK, Veenstra R, Oldehinkel AJ. Disparities in Depressive Symptoms Between Heterosexual and Lesbian, Gay, and Bisexual Youth in a Dutch Cohort: The TRAILS Study. Journal of Youth and Adolescence. 2016;45(3):440-56.

57. Luk JW, Gilman SE, Haynie DL, Simons-Morton BG. Sexual Orientation and Depressive Symptoms in Adolescents. Pediatrics. 2018;141(5):e20173309-e.

58. Fernandez-Reino M, Cuibus M. Migrants and Discrimination in the UK. Oxford; 2024.

5. Environmental Worry

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

(eco OR ecological OR climate OR planet*) AND (anxiety OR distress OR grief OR doom OR worry)
OR "global warming" OR "climate change" OR "climate crisis"

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

The impact of climate change on youth can be delineated into two broad pathways: through direct and indirect effects via acute and chronic climate events, or through anxiety and worries about the future due to climate collapse. As extreme climate change events are not widespread in the UK, and young people in the UK are generally unlikely to experience major effects of climate change, at least in the short-term to medium-term, we focus on environmental worry as the primary mechanism in a UK context. The theory aligns with the rising trends in depression and anxiety among young people.

Worry about the future

A key theorised mechanism is that young people can be affected by the awareness of climate breakdown and its global consequences.[1] Most young people learn about climate change through school, family discussions, and in the media,[2] and such public discussions have grown in recent years.[3] It is suggested that the current generation of children and young people may feel expected to bear a greater burden in the impact of climate change, that their emotional resources to cope with this as a complex societal issue is still developing, and that it may affect their thinking around major life decisions like career options, where to live, and plans to have children.[3, 4] For some, worry about this may become more sustained, and can approach a more intense experience conceptualised by some as 'eco-anxiety' (also referred to by other terms including 'climate anxiety'). This is broadly defined as a chronic sense of environmental doom but is recognised as a multifaceted and complex response encompassing fear, anger, powerlessness, stress, sadness, guilt, shame, and grief, tied to current or anticipated shifts.[4] This is not generally conceptualised as a pathological response, but a normative response to a stressful global issue. However, it is suggested that some may experience very strong feelings or struggle to cope with these stresses, and this may become

overwhelming or distressing to a degree that results in obsessive thinking, panic, and impact for daily activities (e.g. sleep), which may lead to worsened mental health including depressive and anxious symptoms.

'Practical worry', controllability, and climate inaction

As noted above, environmental worry is not considered pathological but a normative response to a stressful global context. Such feelings may serve as constructive, encouraging motivation towards individual change (e.g. eating less meat) and activism for wider change (e.g. participation in movements like 'Fridays for Future').[3] But worry might lead to stress and anxiety if the situation is seen as uncontrollable and hopeless[1, 5] – given the complexity of the climate crisis itself and of potential solutions, such concerns can easily feel intense.[6] However young people can report feeling that their concerns are not taken seriously by adults, that governments are failing to adequately respond, and that they have little control over those in power; such perceptions appear to prompt feelings of betrayal of young people and future generations, and are upsetting.[2, 3, 6-8]

At an individual level, the nature of discussions around climate change can influence children and young people's responses, with narratives that focus on meaning-focused coping (i.e. with a focus on trust, positive reappraisal, realistic hope) potentially more positive mental health than problem-focused and emotion-focused coping.[2] However, several studies note a need for further research into how to educate and discuss such issues with young people,[1, 2, 8] and that training is needed for those working with young people,[9] which perhaps raises a question about whether such practices are widespread in shaping how we approach this currently.

Q2: Does it also hypothetically predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

We do not expect environmental worry to affect outcomes that have not been observed to worsen over time (e.g. externalising behaviours) among young people. Indeed, no evidence has yet been found to suggest an association between environmental worry and externalising behaviours.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. Whilst different effects may be present in countries that are more acutely vulnerable to climate change, environmental worry is recognised as a distinct mechanism understood to be present among young people in England.

Trend Considerations

Q4: Is there direct evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

One study we found compared two cohorts using a convenience sample of high school students in Sweden, finding that the 2019/2020 cohort reported significantly higher levels of climate worry compared to the 2010 cohort.[10]

Therefore, while more empirical evidence specifically demonstrating growth in environmental worry over the past two decades in the UK context would be valuable, there is some evidence suggesting an increase in environmental worry levels and awareness in the UK and other comparable contexts.

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

Yes, it is highly plausible that the prevalence of environmental worry has increased over the relevant period. Factors such as increased media coverage of climate change, more frequent extreme weather events internationally, the rise of youth climate activism, and reforms to the UK National Curriculum have amplified public awareness and emotional responses to the ecological crisis. The terms 'climate change' and 'global warming' have been used since the 1980s; however, their usage became increasingly more common in the 2000s.[11] Climate change has been part of the UK National Curriculum since its inception in 1991, primarily within science and geography subjects. In 2013, the curriculum was updated to include more explicit references to climate change. For instance, the Key Stage 3 science curriculum for 11- to 14-year-olds specifies that students should learn about the "production of carbon dioxide by human activity and the impact on climate."[12]

According to Pihkala (2020), deliberations about environmental worry began to gain attention after 2007, with significant growth in research and media coverage during the 2010s.[13] By 2017, key reports, such as the American Psychological Association's Mental Health and Our Changing Climate, introduced definitions and amplified discussions around environmental worry.[14] The emergence of climate psychology as a subfield, along with the increasing presence of climate anxiety in public discourse—especially among youth activists like Greta Thunberg, who started the wide-reaching Fridays for

Future movement in August 2018, inspiring students worldwide to participate in regular climate strikes—underscores the growing relevance of this phenomenon.

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Yes. Systematic reviews we identified largely support a significant association between environmental worry and young people's emotional symptoms (e.g. anxiety, depression, stress in daily lives), with moderate associations reported.[15, 16] For example, Boluda-Verdu et al. (2022) reported that eight out of 12 studies they reviewed regarding health problems found a positive association between negative emotions related to climate change and internalising symptoms, including depression, anxiety, stress, and insomnia.[16] For example, a population-based study in a Canadian province suggests that worry about climate change was significantly associated with higher concurrent symptoms of anxiety, depression, and self-harm, adjusting for family socioeconomic status, young people's cognitive ability, and parental depression.[17]

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

Only one study was identified that examined the longitudinal relationship between climate-related negative emotions and mental health outcomes, though not in a UK context. Sciberras et al. (2022) investigated patterns of climate change-related worry in Australian adolescents (n = 2,244) over eight years, from ages 10–11 to 18–19, using data from the Longitudinal Study of Australian Children.[18] Through latent profile analysis, they identified trajectories of young people's climate-related worry. Although the largest group (24.9%) were classified as having moderate worry or increasing worry (24.3%) over time, those with high persistent worry (12.9%) exhibited the highest levels of depressive symptoms at age 18–19.

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

No. As mentioned in Q7, only one longitudinal study was identified, and this study did not account for any confounding factors, including pre-existed mental health conditions and socio-economic factors.

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Not that we are aware of.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

Not that we are aware of.

Q11: Does the evidence indicate that there is a strong association?

No. According to the two identified systematic reviews[15, 16] and the longitudinal study[18], for studies where an effect size has been reported, the strength of the association between environmental worry and mental health tends to range from small to moderate.

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

No. So far, we have not identified any research that employs a design capable of suggesting a dose-response relationship between environmental worry and young people's mental health outcomes.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

Several studies highlight that environmental worry is more prevalent among girls and young women, but this does not necessarily indicate that the trend has been steeper.[13]

Women often report greater concerns about climate change, potentially due to heightened emotional and empathetic engagement with environmental issues.

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Differences in impact by gender or ethnicity were not investigated in the one longitudinal study we identified.

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

Again, no group differences were reported in the one longitudinal study we identified.

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

Evidence has been identified to evaluate the effect of environmental worry, including systematic reviews, providing a foundation for assessing its impact on young people's mental health. However, significant methodological concerns remain. One major concern is the conceptual overlap between the exposure, "environmental worry," and the outcomes, internalising symptoms, which include both anxiety and depression. This means it is very difficult to ascertain whether one is causing the other or vice versa (or a complex interplay between them). Indeed, evidence from longitudinal research suggests that those with anxiety symptoms are more likely to experience future climate-related worry.[17] One way to address this bias is to conduct a longitudinal study where important confounders (e.g. mental health measured before the exposure) can be accounted for in the analysis. However, unfortunately, no such study has been identified. Other concerns, such as measurement bias (e.g. inconsistency in measurement questions) and self-report bias (e.g. due to social desirability), may also question the robustness of the observed effects of environmental worry and adolescent mental health.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable in relation to the theory or evidence base that might inform our evaluation of causality?

No.

References

1. Léger-Goodes T, Malboeuf-Hurtubise C, Mastine T, Généreux M, Paradis P-O, Camden C. Eco-anxiety in children: A scoping review of the mental health impacts of the awareness of climate change. Frontiers in Psychology. 2022;13.

2. Sanson AV, Van Hoorn J, Burke SEL. Responding to the Impacts of the Climate Crisis on Children and Youth. Child Development Perspectives. 2019;13(4):201-7.

3. McGorry PD, Mei C, Dalal N, Alvarez-Jimenez M, Blakemore S-J, Browne V, et al. The Lancet Psychiatry Commission on youth mental health. The Lancet Psychiatry. 2024;11(9):731-74.

4. Hickman C, Marks E, Pihkala P, Clayton S, Lewandowski RE, Mayall EE, et al. Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. The Lancet Planetary Health. 2021;5(12):e863-e73.

5. Leonhardt M, Granrud MD, Bonsaksen T, Lien L. Associations between Mental Health, Lifestyle Factors and Worries about Climate Change in Norwegian Adolescents. International Journal of Environmental Research and Public Health. 2022;19(19):12826-.

6. Thompson R, Fisher HL, Dewa LH, Hussain T, Kabba Z, Toledano MB. Adolescents' thoughts and feelings about the local and global environment: a qualitative interview study. Child and Adolescent Mental Health. 2022;27(1):4-13.

7. van Nieuwenhuizen A, Hudson K, Chen X, Hwong AR. The Effects of Climate Change on Child and Adolescent Mental Health: Clinical Considerations. Current Psychiatry Reports. 2021;23(12):88-.

8. Lawrence E, Thompson R, Fontana G, Jennings N. The impact of climate change on mental health and emotional wellbeing: current evidence and implications for policy and practice. 2021.

9. Clemens V, von Hirschhausen E, Fegert JM. Report of the intergovernmental panel on climate change: implications for the mental health policy of children and adolescents in Europe—a scoping review. European Child & Adolescent Psychiatry. 2022;31(5):701-13.

10. Wullenkord MC, Ojala M. Climate-change worry among two cohorts of late adolescents: Exploring macro and micro worries, coping, and relations to climate engagement, pessimism, and well-being. Journal of Environmental Psychology. 2023;90:102093-.

11. : Google Books Ngram Viewer; 2025 [Available from: https://books.google.com/ngrams/graph?content=climate+change%2Cglobal+warming&year_start=1980&year_end=2022&corpus=en&smoothing=3&case_insensitive=false.

12. Kulakiewicz AL, R; Robertys, N. Inclusion of sustainability and climate change in the national curriculum. House of Commons Library; 2021.

13. Pihkala P. Anxiety and the Ecological Crisis: An Analysis of Eco-Anxiety and Climate Anxiety. Sustainability. 2020;12(19):7836-.

14. Whitmore-Williams SCM, C; Krygsman, K; Speiser, M. MENTAL HEALTH AND OUR CHANGING CLIMATE: IMPACTS, IMPLICATIONS, AND GUIDANCE. American Psychological Association; 2017.

15. Martin G, Cosma A, Roswell T, Anderson M, Treble M, Leslie K, et al. Measuring negative emotional responses to climate change among young people in survey research: A systematic review. Social Science & Medicine. 2023;329:116008-.

16. Boluda-Verdú I, Senent-Valero M, Casas-Escolano M, Matijasevich A, Pastor-Valero M. Fear for the future: Eco-anxiety and health implications, a systematic review. Journal of Environmental Psychology. 2022 ;84 :101904-.

17. Vergunst F, Prentice CM, Orri M, Berry HL, Paquin V, Vitaro F, et al. Association of youth climate change worry with present and past mental health symptoms: a longitudinal population-based study. Climatic Change. 2024;177(10):153-.

18. Sciberras E, Fernando JW. Climate change - related worry among Australian adolescents: an eight - year longitudinal study. Child and Adolescent Mental Health. 2022;27(1):22-9.

6. Health behaviours

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

"health* behavio*" OR
Sleep OR "sleep difficulties" OR "late* night*" OR "sleep pattern*" OR
Sedentary OR "physical activit*" OR movement OR "sedentary behavio*" OR "movement behavio*" OR
Diet* OR nutrition* OR caffeine OR "energy drink*" OR
Weight OR overweight OR obes*

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

Yes. There are many theoretical links between health behaviours and indicators and mental health in young people. Here, we focus on four key factors: sleep, physical activity/sedentary behaviour, dietary patterns, and weight. These often co-occur. We recognise that weight is not a health behaviour and is influenced by many factors, including but not limited to health behaviours, but we wanted to include it as it is regularly discussed in mental health literature, so it is included as a health indicator alongside the behaviours discussed here. For example, children and young people who are more sedentary are more likely to eat a poorer diet, and these could be co-occurring behaviours, or it may be that diet acts as a link between sedentary behaviour and poorer mental health.[1] Some forms of physical activity can also improve engagement with nature and green spaces, which may have independent mental health benefits.[2]

Sleep

Multiple mechanisms, many intertwined, have been suggested to link sleep difficulties (including short duration, disturbance, and irregular sleeping patterns) with a greater risk of low mood and anxiety, though understanding of mechanisms remains insufficient.[3, 4] Adolescents are generally inclined towards later nights (resulting from factors including adolescent-specific shifts to bioregulatory processes, increased hobbies beyond school,

shifts in parental supervision, greater engagement with screens in the evening, and novel caffeine usage); this inclination may be out of sync with typical school hours.[4-7]

Various neurological processes may underpin this relationship (e.g. disturbed dopamine functioning may lower reward-seeking behaviours) alongside disruptions to the nervous system.[3]

Proposed psychological mechanisms include diminished executive functioning and emotion regulation, lowered overall positive affect, disrupted synaptic pruning, and greater attentional biases.[3-7] Regulatory disruptions may also be exacerbated through attempts to 'catch up' on sleep at the weekend.[5, 6] The extended time to fall asleep in adolescence may create more opportunities for ruminative thinking, which may become self-reinforcing.[3, 6] Social mechanisms are also proposed concerning social withdrawal and amotivation, and impaired social interactions.[3] Young people note the impacts of poor sleep on stress and emotional symptoms.[8]

Individual differences are also noted, with some individuals genetically disposed to be negatively affected by poorer sleep (e.g. 'night owls'); such individual vulnerabilities could interact with the changes in circadian rhythms that occur naturally in adolescence, as well as with environmental factors (e.g. evening light exposure, shifts in school routines).[4] Some family contexts may also create individual differences, for example, in families where parents experience and model worse sleep patterns and sleep hygiene.[3]

Physical activity and sedentary behaviour

Physical activity and sedentary behaviours are independent but related factors.[1] Generally, evidence indicates a positive relationship between more physical activity and better youth mental health,[2] though mechanisms remain less well-understood and often oversimplified, with the importance of quality and context frequently overlooked.[1, 9] For instance, negative experiences of physical activity (e.g. poorly designed school activities) could *lower* rather than improve perceptions of competence and body image.[2]

Physical activity might enhance cognitive and mental health by changing the brain structurally and functionally, and by increasing neurotransmitters relevant to mental health, such as endorphins.[1, 2] This may improve cognition, including executive§ functioning and offer benefits for development and mental health.[9]

Psychological mechanisms, whereby physical activity might improve mental health, including through enhancement of self-perception, with regards to self-efficacy, autonomy, and appearance and body image; although the opposite could also be true for negative experiences of physical activity;[2, 9] by contrast, some sedentary

behaviours may lower self-esteem.[1] Better emotional self-regulation and coping skills may also result from more physical activity.[2, 10] Physical activity may improve sleep duration and efficacy, while some sedentary behaviours, e.g. screen time, may displace sleep.[1, 2] Greater levels of sedentary behaviour in the daily routine may be associated with lower satisfaction with life and happiness overall.[1]

Dietary patterns

Healthy dietary patterns may offer specific and general benefits that could promote mental health (e.g. the benefit of fatty acids for cognition, lowering secretion of cortisol) and gut microbiota functioning with impacts for brain health.[11, 12] Unhealthy diets have been associated with more inflammatory markers, which are potential risk factors for poor mental health, disrupting neuronal and microbiotic functioning, and increasing weight.

Poor diet often coincides with wider indices of deprivation, including food insecurity and greater life stress[12], making it hard to untangle from broader relevant risk factors for poor mental health.

Energy drinks, which are high in caffeine, have been increasingly marketed to and consumed by young people, particularly young men, and there is concern that these may influence youth mental health by increasing stress, restlessness and nervousness. Ingredients apart from caffeine, such as guarana, are similarly stimulating and are linked to insomnia and anxiety, while other ingredients can lower serotonin. Collectively, there is concern that the stimulating nature of these drinks is problematic for young people with depression and anxiety.[13]

Weight

Psychological factors such as body dissatisfaction and low self-esteem have been proposed as mechanisms linking overweight and obesity to increased internalising symptoms in young people.[14] These might include weight-based teasing and stigma,[15] and both have been recommended as factors for intervention,[14-16] as worsening mental health coincides with an increase in weight stigma.[15] Some young people with obesity describe "constant" teasing and bullying "day after day."[17] Wider wellness factors may also be relevant, including lowered quality of life[14] and are likely to interact. Those who use more maladaptive coping strategies (e.g. negative self-talk, self-isolation) may be more affected by weight stigma perceptions,[16] and self-criticism is common in young people with experiences of obesity.[17]

Girls may experience greater adverse mental health effects in relation to being overweight or obese.[15, 16] The same review also suggested that weight stigma may be

more pronounced in minoritised ethnic groups and those from lower socioeconomic backgrounds,[15] but more work is needed.

Q2: Does it also predict deterioration in outcomes that are not increasing over time?

Yes. Several studies included in a systematic review by Sun et al. (2019) link weekday-weekend sleep discrepancies to increased behavioural problems and substance use.[18] One study suggested that the incidence of externalising disorders was lower in adolescents who undertook physical activity weekly than those who did not, as well as in those who spent less time engaged in sedentary activities.[19] Another reported that meeting the '24h movement guidelines' (combinations of physical activity, sedentary behaviour, and sleep) was associated with reduced incidence of externalising behaviours in adolescence.[20] Bacaro et al.'s (2024) meta-analysis also suggests that better sleep (longer duration, higher quality, and lower insomnia symptoms) is associated with fewer externalising symptoms.[21]

Silva-Maldonado et al. (2021) suggested that energy drink consumption is linked to behavioural problems and substance use.[22] Yang et al. (2024) found a link between higher dietary fibre intake and reduced attention problems.[23] Trapp et al. (2016) found that adolescents who consumed a 'healthy' diet (high in whole grains, fruit, vegetables, and fish) had lower subsequent externalising symptoms than those that consumed a more 'western' diet (high in processed foods, red meat, confectionary, and soft drinks).[24] One study found a higher prevalence of externalising symptoms amongst obese children than healthy-weight children, but this was only the case when considering mother-reported symptoms and not self-reported.[25]

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

There is mixed evidence on trends across the different health behaviours and indicators examined here. Physical activity and diet both appear to be improving,[26, 27] whilst there is evidence that sleep and obesity are worsening.[28, 29] More broadly, there is the suggestion that young people (specifically those from 'Gen-Z'; born 1996-2010) may be more health-conscious than previous generations, [30, 31] but it is unclear whether this is borne out in their health behaviours. Health behaviour questions underpinning the data we used from Understanding Society, as discussed below, are shown as a footnote.[1]

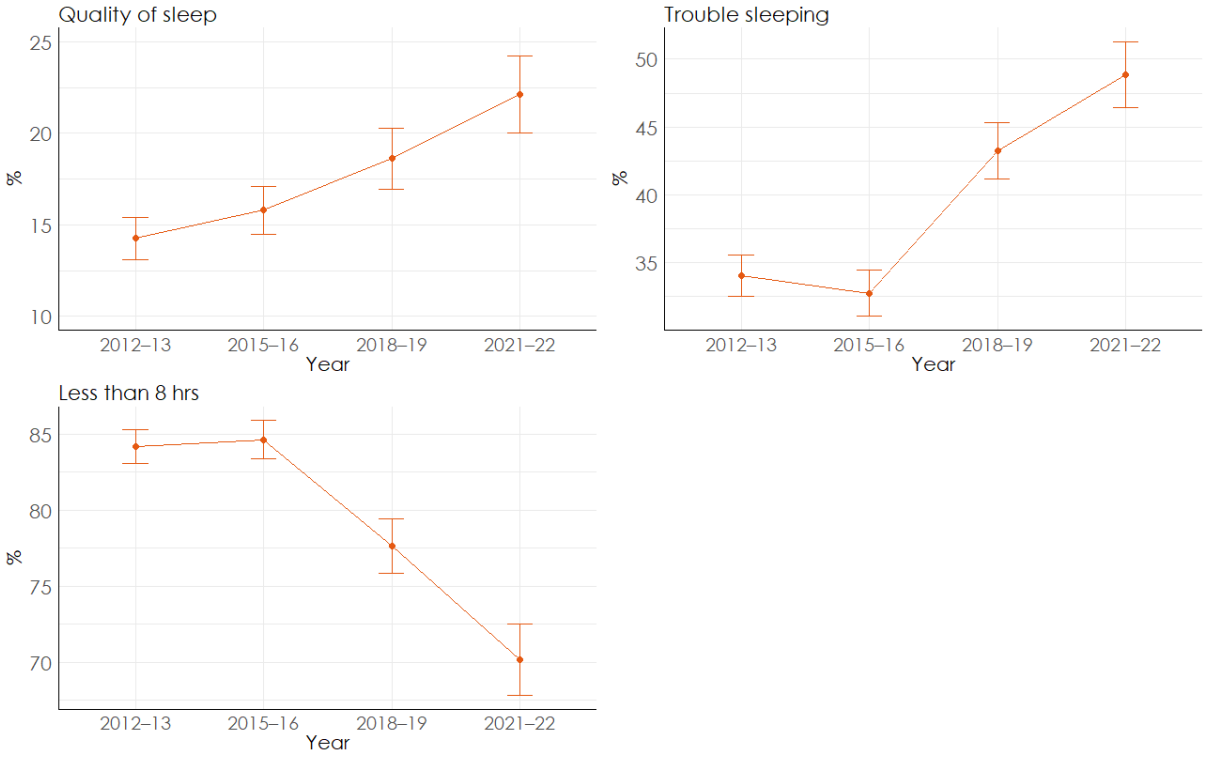
Sleep

We have examined data from Understanding Society that showed that, between 2012 and 2021, the proportion reporting poor quality sleep has been increasing, and an increasing number of young people have trouble falling to sleep. However, there were improving trends in getting less than the recommended 8 hrs of sleep (Figure T6).

[1] How many portions of fresh fruit or vegetables do you eat on a typical day? One portion is one piece of fruit or one serving of a vegetable or salad item; How many days in a usual week do you play sports or do some other physical activity? Think about activities which take moderate physical effort that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. Do not include walking. Again, think only about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities? Hours of actual sleep (mins); During the past month, how would you rate your sleep quality overall*?

Figure T6: Changes in sleep variables

Young people aged 16 to 24, England, 2012 to 2022



Source: Understanding Society

Another study suggested that the proportion of adolescents getting <8h of sleep per night was higher in 2015 than in 2005, and that later school night bedtimes were also more common.[28] There is some evidence from the USA that adolescent sleep was generally declining throughout 1991-2012[32] and from 2009-2015.[33] There is also evidence of an increase in difficulties in getting to sleep in Scandinavian 10-17-year-olds from 2002-2018;[34] and of fewer 17-18-year-olds in Canada meeting sleep recommendation guidelines from 2013-2019.[35]

Physical activity and sedentary behaviour

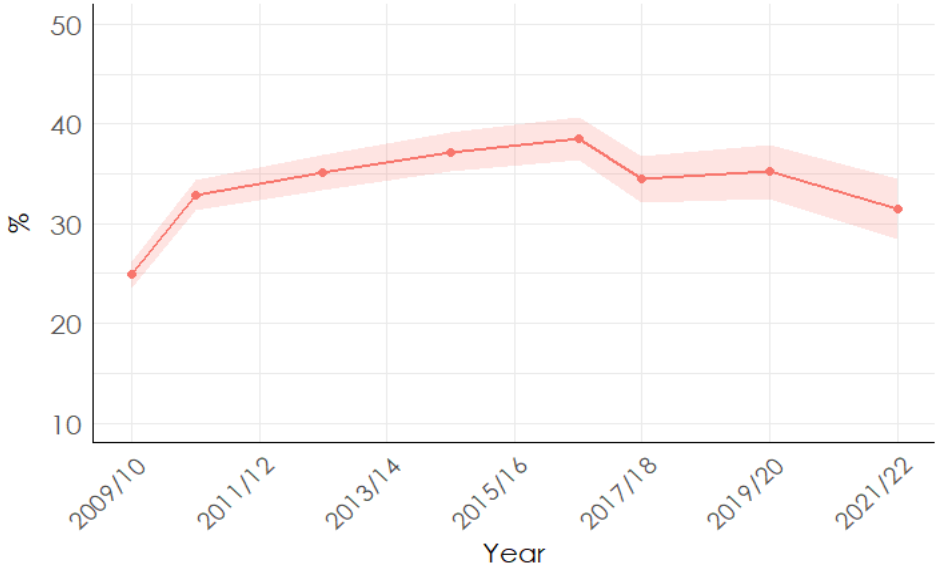
The findings with regard to physical activity and sedentary behaviour are very mixed. Up to 2012, there was a decline in the proportion of adolescents meeting minimum physical activity recommendations for their health in the UK.[36] Following that, the Health Survey for England suggests that physical activity and sedentary behaviour levels in 16-24 year-olds were largely unchanged between 2008 and 2016.[29] There is evidence of moderate, steady growth in activity levels among secondary-school-aged young people in the UK in recent years, particularly those aged 13-16, with a dip during the COVID-19

pandemic. [37] There was also evidence of a moderate uptick in sedentary behaviour between 2002 and 2017,[38] although this is based on very small sample sizes.

Our own analysis of Understanding Society shows an increase in the number of young people, aged 10-15, who report playing sports less than three days a week.

Figure T7: Proportion of respondents reporting that they play sports less than 3 days a week

Young people aged 10 to 15, England, 2009 to 2022

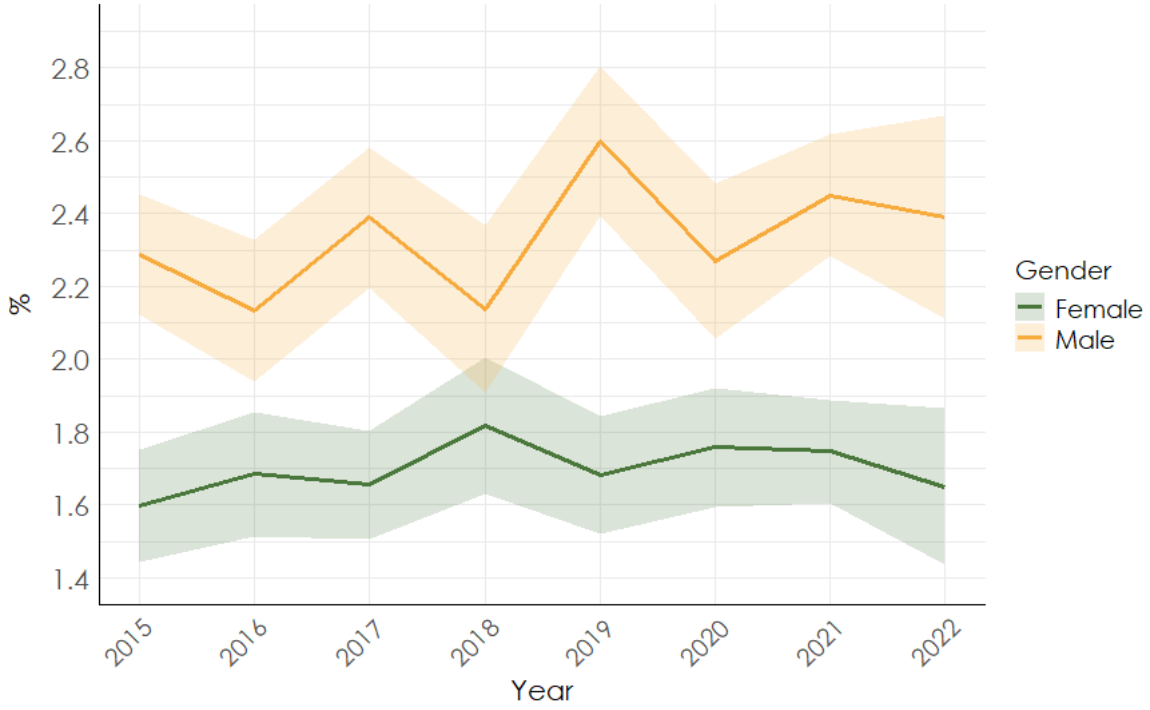


Source: Understanding Society

However, when we examine the older young people, aged 16-24, we see a general increase since 2015 in the mean number of days a week in response to "During the last 7 days, on how many days did you do moderate physical activities?", particularly among boys.

Figure T8: Average number of days spent during the last week doing moderate physical activity among young people, by gender and year.

Young people aged 16 to 24, England, 2015 to 2022



Source: Understanding Society

Dietary Patterns

There is some evidence that adolescent dietary patterns have been getting healthier. Findings from the National Diet and Nutrition Survey (NDNS) suggest that in the UK, between 2008 and 2017, there was an increase in consumption of oily fish, and a reduction in red and processed meat, sugar-sweetened soft drinks and free sugars, and salt for those aged 11-18.[39] However, there was no change in the consumption of fruit and vegetables or dietary fibre, and a reduction in fruit juice and most vitamins and minerals. Other evidence suggests a slight decline in fruit and vegetable intake, as well as dietary fibre and other key vitamins and minerals, such as vitamin A, iron, calcium and iodine.[26] There was also a significant decline in the consumption of ultra-processed foods in adolescents (11-18y) from 2008 to 2019.[40] However, it is notable that many of these trends are similar to those in the wider population and are not unique to adolescents.

NDNS data also suggests that overall energy drink consumption by young people declined between 2008 and 2016.[41]

Weight

There is some evidence of an increase in obesity, but not overweight, in adolescents (particularly aged 10-15) since around 2006, with a decrease in very recent years.[42] This trend is seen in all young people, but is stronger in boys. The prevalence of overweight and obesity grew faster in the late 1990s and early 2000s than in recent years.[43]

Q5: If there is evidence that the level/prevalence of the risk factor has changed, does the apparent timing of that change align to changes in young people's mental health trends as observed in our analyses?

Whilst there is evidence that these factors have changed over parts of the period in question, the trends that do exist often predate the observed changes in mental health trends. Furthermore, several of these trends indicate an improvement (physical activity, dietary patterns), and where levels are still worsening (obesity), this is at a slower rate than before the period in question.

Q6: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

N/A.

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Again, we acknowledge that these behaviours do not occur in isolation. However, for ease of evaluation, we consider them separately here. All four factors we have investigated are related to young people's mental health, with findings being slightly more inconsistent for diet.

Sleep

Yes. One systematic review and meta-analysis examined the relationship between weekday-to-weekend sleep differences (differences in bedtime/rise time, social jetlag, and differences in sleep duration) and a number of health outcomes.[18] They included evidence from both cross-sectional and longitudinal studies from many countries (although it is notable that none of their included studies were conducted in the UK). 26 of their included studies investigated links with mood disturbance. Pooled effects from

five of these studies showed that larger weekday-weekend bedtime differences were significantly correlated with increased depressive symptoms in secondary school-aged children. Three studies assessed the association between social jetlag (weekday-weekend differences in mid-point of sleep) and depressive symptoms, with only one finding a significant association,[44] and the others finding null effects. Ten included studies looked specifically at weekday-weekend differences in sleep duration. Pooled estimates from seven of these indicated a positive association with depressive symptoms, even after sensitivity analysis. Three studies assessed a link with anxiety, without consistent findings.

Another systematic review and meta-analysis examined longitudinal research on the interplay between sleep (duration, quality, and insomnia symptoms) and mental health in adolescents.[21] Their pooled estimates, based on 26 studies, suggested a significant relationship between better sleep and reduced internalising symptoms. Only one of these studies was conducted in the UK, which reported that later sleep onset (measured via devices rather than self-report, as most studies do) was associated with decreased depressive symptoms over time.[45] The authors note that this unexpected result concurs with older research in the UK.[46]

Physical activity and sedentary behaviour

Yes, four umbrella reviews evaluated the body of evidence, all of which consistently concluded that increased physical activity is associated with improvements in mental health (predominantly depression).

Dale et al. (2019) reviewed systematic reviews on physical activity and mental health in children and youth (5-17y).[47] Their identified reviews included longitudinal and cross-sectional studies, as well as a number that only included RCTs. They included 16 reviews investigating depression, 12 of which showed a negative association between activity levels and levels of depression. They found two reviews on anxiety, both of which found a relationship between increased sport participation and reduced anxiety. Another umbrella review) found that physical activity interventions for reducing depression and anxiety were generally effective.[9] Purgato et al. (2024) reviewed meta-analyses of randomised and quasi-randomised studies of physical activity interventions.[48] They found that these interventions were effective at reducing psychological symptoms across a wide variety of population groups. However, they concluded that the strength of their associations was weak, and the evidence was often of low credibility (particularly because they only evaluated follow-up over the short term). Cai et al. (2025) reviewed meta-analyses of RCTs of physical activity interventions and found significant pooled effects for preventing depressive symptoms.[49]

There was also evidence relating specifically to sedentary behaviours. A systematic review and meta-analysis) analysed 58 longitudinal studies in children and adolescents (2-19y) and reported that higher sedentary time was significantly associated with increased subsequent depression, anxiety and other mental health problems.[50] Another meta-analysis also reported significant, but small, pooled associations between levels of sedentary behaviour and levels of anxiety.[51]

Lu et al. (2024) also investigated both sedentary behaviour and physical activity.[52] They identified 16 studies, but did not find a significant pooled estimate for the relationship between sedentary behaviour and depression (however, they note that a number of the results also controlled for physical activity levels, which may impact significance). They also found no significant pooled estimate for the association between light physical activity and depression, but results for moderate and vigorous activity were significant.

Dietary Patterns

Yes. We found four systematic reviews linking aspects of diet to young people's mental health.[12, 22, 23, 53]

A systematic review and meta-analysis by Orlando et al. (2022) examined the associations between dietary patterns and mental health.[12] They included both cross-sectional and longitudinal cohort studies, including four in the UK. Across 39 included studies, their analysis found significant associations between 'healthy' diet patterns and reduced internalising symptoms and depressive symptoms. 'Unhealthy' diet patterns were also found to be associated with increased internalising and depressive symptoms. These dietary characteristics were defined differently across different studies, but 'healthy' generally included high fruit and veg intake, eating breakfast, and elements of the 'Mediterranean' diet. 'Unhealthy' diets generally included high intake of convenience/junk food, sugary snacks and beverages, and high-fat processed foods. Wang et al. (2022) investigated many elements of diet, including 32 studies in their review.[53] They found four studies linking increased dietary magnesium intake with reduced depressive symptoms, and one study that linked increased red meat consumption with increased depressive symptoms. They found one longitudinal study which linked "healthy" dietary patterns (involving a high consumption of fruits, vegetables, fish, and whole grains) at age 14 with reduced depressive symptoms at age 17, and two studies which found that higher consumption of processed and refined foods and sugar-sweetened beverages was associated with increased risk of depressive symptoms. They found either null or inconsistent results across a wide range of other aspects of diet. Yang et al. (2024) conducted a systematic review and meta-analysis on the effect of dietary fibre on child (0-18y) and adolescent (10-24y) mental health.[23] Across 15 studies, they found 'low certainty' evidence that higher dietary fibre consumption was associated with a reduced risk of depression, but not anxiety.

However, they note that the observational nature of the included studies limits their causal conclusions.

One systematic review examined adolescent energy drink consumption and its effects on mental health.[22] They found that, across studies, consumption of energy drinks was associated with a higher probability of anxiety and depression compared to those who do not drink them.

Weight

Yes. Several systematic reviews and meta-analyses were identified that linked weight (particularly overweight/obesity) and young people's mental health.

Three meta-analyses found statistically significant pooled estimates for the relationship between adolescent obesity and depression.[54-56] They broadly did not find associations between being overweight and depression. Moradi et al. (2022), however, found no significant association.[57]

Warnick et al. (2022) systematically reviewed the literature linking weight-based stigma and mental health in children and adolescents and also found a significant negative pooled estimate of the association.[58]

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

There was longitudinal evidence for all four factors that we evaluated, but considerably less for sleep than the other factors.

Sleep

Yes. Bacaro et al. (2024) examined exclusively longitudinal evidence and found significant pooled estimates for the relationship between sleep quality measures and subsequent mental health measures.[21]

Physical activity and sedentary behaviour

In Dale et al.'s (2019) umbrella review, they reported small effect sizes for longitudinal associations with subsequent depression.[47] They identified only one longitudinal study on anxiety, which found reduced anxiety over time for those who took part in team sports but not individual sports.[59] Biddle et al. (2019), however, concluded that there was little evidence for the temporal sequencing of associations in their included reviews.[9]

Zhang et al. (2022) included only longitudinal studies in their meta-analysis of sedentary behaviour (58 studies), and reported a significant pooled estimate for the relationship between higher sedentary behaviour and worse mental health.[50] Pooled results on sedentary behaviour and anxiety in Stanczykiewicz et al. (2019) were based primarily on cross-sectional studies, with included longitudinal studies often finding null results.[51]

Lu et al.'s (2024) meta-analysis on physical activity and sedentary behaviour included eight longitudinal studies, six of which reported significant results for the relationships with mental health.[52]

Dietary Patterns

Yes. A large number of studies included in Orlando et al.'s (2022) systematic review use longitudinal designs and measure diet-related factors before mental health.[12] The majority of these found evidence for a relationship. The same is true of the studies on specific food group intake in Wang et al. (2022; 10/32 longitudinal studies)[53] and on dietary fibre intake in Yang et al. (2024; 13/19 longitudinal or intervention studies).[23]

None of the studies that were summarised by Silva-Malodano et al. (2022) on energy drink consumption and internalising mental health used longitudinal designs.[22] There was some longitudinal evidence linking energy drink consumption and externalising mental health.

Weight

Yes, a large number of studies included in the systematic reviews and meta-analyses were longitudinal studies in which weight was measured before mental health. The vast majority of these reported associations are between weight (predominantly obesity) and worse adolescent mental health. For example, when separating their meta-analysis by study design, Sutaria et al. (2018) found a significant pooled estimate from longitudinal studies for the odds of subsequently developing depression in obese children versus normal-weight children.[56] However, Warnick et al. (2022) suggested that more longitudinal evidence is needed when considering the mental health effects of weight stigma.[58]

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

Studies on sleep, physical activity, and diet included key covariates and baseline mental health in their models and found significant results. This was not the case for weight.

Sleep

Many of the longitudinal studies included in Bacaro et al. (2024) include both baseline mental health and covariates.[21] We do not list them all here for ease, but provide several examples. Doane et al. (2015) found significant relationships over time between lower sleep duration and poorer quality of sleep and increased anxiety and depression symptoms, after controlling for sex, race, and parental education, as well as baseline anxiety and depression.[60] Kortesoja et al. (2020) and Nowakowski et al. (2014) both showed significant relationships between higher sleep duration and reduced subsequent emotional difficulties, controlling for prior difficulties and covariates such as socioeconomic status, gender, and ethnicity.[61, 62]

There is a small number of included studies which found null results after including baseline mental health and covariates.[63, 64] However, both of these are in a specific subgroup (Mexican-Americans) and do not appear to have a large impact on Bacaro et al.'s (2024) pooled estimates, given the relatively large number of positive results.[21]

Physical activity and sedentary behaviour

Four of the eight longitudinal studies included in Lu et al.'s (2024) meta-analysis on physical activity and sedentary behaviour controlled for baseline mental health and still found significant results.[52] Other studies controlled for background characteristics such as gender, age, socio-economic status, and lifestyle factors, with the majority still finding significant relationships. Booth et al. (2023), though, reported that the negative relationship between changes in moderate to vigorous physical activity and changes in depression lost significance in females when adjusting for confounders (but remained significant in males).[65]

Dietary Patterns

Yes, but inconsistently.

Many of the longitudinal studies included in Orlando et al.'s (2022) review controlled for both baseline mental health and other covariates in their models.[12] For example, Andersen et al. (2013) reported a significant association between eating fewer portions of fruit and vegetables and increased depressive symptoms, after controlling for baseline depressive symptoms as well as socio-economic status and other lifestyle factors.[66] Jacka et al. (2011) found that healthy diet scores predicted lower depression at follow-up (with corresponding result for unhealthy diet scores), after controlling for baseline depression and a number of background covariates (age, gender, socioeconomic status, physical activity, dieting behaviours, and BMI).[67] However, Winpenny et al. (2018) reported that significant associations reverted to the null when background covariates were included in models.[68]

Weight

Yes, although the majority of studies which satisfy this criterion and found significant results investigated only girls.[69-71] Two identified studies that included background covariates and past mental health in their models found no relationship between obesity and subsequent mental health.[72, 73]

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

None that we are aware of.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

There was mixed but generally positive RCT evidence for physical activity and diet, but not for sleep or weight.

Sleep

No. One RCT was identified that evaluated a school-based intervention for adolescent sleep problems in South Australia.[74] The intervention was reported to have no significant effects on sleep variables and no impact on depressed mood.

Physical activity and sedentary behaviour

Yes. Cai et al. (2025) reviewed meta-analyses of RCTs of physical activity interventions. They reported small but significant pooled effects of interventions for depressive symptoms among children and adolescents.[49] Three other reviews also included reviews of RCTs in their umbrella reviews, the vast majority of which found positive associations with mental health.[9, 47, 48]

Ayala et al. (2024) reviewed interventions to reduce sedentary behaviour and increase physical activity, with the majority of included studies being RCT or quasi-experimental studies.[75] They found reductions in anxiety and depression.

Dietary Patterns

One meta-analysis of RCTs of healthy dietary interventions) reported no significant pooled effect on depression. Some specific RCTs did find intervention effects.[76] For example, Murdoch et al. (2011) reported that a family-based behavioural management programme was successful in decreasing BMI, and also resulted in significant decreases in depression in children aged 7-14.[77] However, it is notable that some RCTs evaluated

programmes which also included a mental health promotion component, meaning that it is hard to parse out what might be the effect of the change in obesity, and what might be the effect of the intervention itself.

Weight

None that we are aware of.

Q11: Does the evidence indicate that there is a strong association?

Studies across all four factors generally found small-to-moderate-sized associations.

Sleep

Somewhat. Sun et al.'s (2019) meta-analysis found small yet significant pooled estimates for the association between weekday-weekend bedtime discrepancies and depressive symptoms (r=0.06,p<0.001), and between increased sleep duration discrepancies and depressive symptoms (r=0.06,p<0.001).[18] However, these pooled estimates come exclusively from cross-sectional studies. Bacaro et al. (2024) reported larger pooled estimates for the relationship between multiple domains of sleep quality and reduced subsequent internalising symptoms (r=-0.2 [CI –0.24,-0.16]).[21]

Physical activity and sedentary behaviour

Somewhat. Significant results at meta-analysis level predominantly linked to depression rather than anxiety. In their review of meta-analyses of RCTs, Cai et al. (2025) reported "weak but significant" effects of physical activity interventions on protecting against depression.[49] They found a pooled standardised mean difference of -0.21 (CI -0.31,-0.12). Dale et al. (2019) found "small-to-moderate" effect sizes in their included systematic reviews on physical activity and depression. Although there were some significant results from individual studies, they concluded that there was little evidence linking physical activity and anxiety. Biddle et al. (2019) concluded that the body of evidence provided moderate evidence for the strength of the association between physical activity and depression, but also found the evidence on anxiety to be lacking.[9] Zhang et al. (2022) reported a small but significant pooled OR for depression for those with a high level of sedentary behaviour (OR = 1.14, CI 1.08,1.20), with similar results for anxiety (OR = 1.23, CI 1.11,1.35) and more general poor mental health (OR = 1.27, CI 1.13,1.41).[50]

Dietary Patterns

Campisi et al. (2021, p.2503) found "small-to-medium" (g=-0.45; CI –0.64,-0.26) pooled effects of healthy behaviour interventions on depression in a meta-analysis of quasi-experimental pre-post studies, but found no significant pooled effects from RCT studies.[76]

Orlando et al. (2022) reported small but significant pooled estimates for the association between a healthy diet and internalising symptoms (r=-0.09, CI: -0.12,-0.07) and depressive symptoms (r=-0.13, CI: -0.18, -0.08).[12] They found similar-sized pooled estimates for unhealthy diets and internalising (r=0.10, CI: 0.06,0.14) and depressive symptoms (r=0.11, CI: 0.05,0.17).

Yang et al.'s (2024) meta-analysis of the association between higher dietary fibre and depression estimated a strong pooled odds ratio of 0.51 (CI: 0.38,0.69).

Weight

Yes, meta-analyses tended to find moderate-sized pooled estimates. Sutaria et al. (2018) found a pooled odds ratio of 1.32 (CI 1.17,1.50) for the odds of depression in obese children versus normal-weight children.[56] This rose to 1.51 (CI 1.21,1.88) when considering only longitudinal studies. Rao et al. (2020) estimated a pooled odds ratio of 1.85 (CI 1.41,2.43) for major depressive disorder in obese and overweight children versus healthy controls.[55] Chen et al. (2024) estimated a pooled RR of 1.32 (CI 1.09,1.60) of depression in obese groups, and of 1.16 (CI 1.00,1.35) for depressive symptoms.[54]

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

The evidence base for sleep and physical activity both suggests a dose-response relationship with young people's mental health. There is some evidence for certain aspects of diet, and little to no evidence for weight.

Sleep

Many of the studies summarised by both Sun et al. (2019) and Bacaro et al. (2024) suggested associations that could indicate a dose-response relationship.[18, 21] Liu et al. (2020), for example, found that over- or under-sleeping and weekend-weekday sleep differences were associated with depressive symptoms.[78] They found larger odds ratios for sleep times as they got further away from 8 hours, and for sleep differences as they got further away from 0 hours. Another study found that cumulative exposure to sleep deprivation was associated with a monotonic increase in depression scores, particularly in women.[79] Two other studies both found that as sleep duration increased, symptoms decreased.[61, 62]

Physical activity and sedentary behaviour

Somewhat. Both Dale et al. (2019) and Biddle et al. (2019) discussed the lack of evidence for dose-response conclusions when it comes to the relationship between physical activity and mental health, in terms of either time or intensity.[9, 47] However, Lu et al. (2024) found a dose-response relationship for the relationship between physical activity and depression at the meta-analysis level, with pooled estimates increasing from light to moderate to vigorous physical activity. Zhang et al. (2022) also found a dose-response relationship at the meta-analysis level between levels of sedentary behaviour and subsequent levels of depression, anxiety, and other mental health problems.[50]

Dietary Patterns

One study found that higher healthy diet scores predicted lower subsequent depressive symptoms, and higher unhealthy diet scores predicted higher subsequent depressive symptoms.[67] Many studies in Silva-Malonado et al. (2021)'s systematic review on energy drink consumption indicated that both increased frequency and volume of energy drink consumption were associated with a higher risk of mental health problems.[22] No other studies suggested a dose-response relationship between diet and adolescent mental health.

Weight

No. Identified studies predominantly used binary measures of weight (e.g. obesity) and of depression (e.g. clinical depression, thresholds for depressive symptoms), making it hard to draw any dose-response conclusions. One study found that (continuous) BMI at age 14 was associated with higher depressive symptom scores (Beck Depression Inventory) at age 17.[80]

Subgroup considerations

Q13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

There were some differences in trends in physical activity by gender and ethnicity. Whilst physical activity has been increasing in all groups of young people, girls are seeing stronger growth in activity levels than boys (from a lower level), thereby closing the gap. However, ethnicity gaps in young people's physical activity are growing.[27]

There is some evidence of racial disparities in dietary patterns, but not of differential trends,[81] and UK longitudinal cohort studies have shown that children and adolescents from Black and Black British backgrounds have higher BMI and body fat percentage, even after controlling for many other factors.[82] The prevalence of overweight and obesity has risen much more sharply in non-white children and young people than in their white counterparts.[43] There is little evidence of a gender difference in overweight or obesity levels or trends, for young people aged 10-15 or 16-24 (see Q3).

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Differences in effects by gender were found for most health behaviours and indicators. However, only studies on weight and mental health gave an indication of an ethnicity difference in mental health effects.

Sleep

A number of studies included in Sun et al. (2019) suggest gender differences in the relationship between sleep and mental health.[18] One study found significant associations between weekday-weekend bedtime differences and increased depressive symptoms only in girls.[59] Park (2016), though found that larger sleep duration differences were associated with more depressive symptoms in boys, but less in girls.[83]

Diet

Yes, but inconsistently. A number of the studies included in Wang et al.'s (2022) systematic review suggested gender differences in the relationship between specific dietary factors and adolescent mental health.[53] For example, one study found that inadequate intake of fruit and vegetables was only associated with elevated depressive symptoms in boys.[84] Orlando et al. (2022) found that their pooled estimate of the association between 'health' dietary patterns and decreased depression increased as the proportion of males in trials increased.[12]

Physical Activity and Sedentary Behaviour

Unclear. Biddle et al.'s (2019) umbrella review suggested that more research is needed into the differential gender effects of physical activity on adolescent mental health.[9]

Weight

Yes. The subgroup analysis in Sutaria et al.'s (2018) meta-analysis found that obesity was associated with depression only in female children and adolescents.[56] Some specific studies found the opposite, though. However, Roberts et al. (2013) found that obese

boys were more at risk of worse perceived mental health than girls, [85] and Mustillo et al. (2003) also found that chronic obesity was only associated with higher risk of subsequent depression in boys, but not girls.[86]

Anderson et al. (2011) specifically found that obesity was associated with subsequent depression only in white girls, but not in black or Hispanic girls.[69] BeLue et al. (2009) also found that both white and Hispanic youth who were overweight had higher odds of depression and anxiety than their non-overweight counterparts, but that this relationship was not found in black youth.[87] When investigating exclusively black adolescents, Assari and Caldwell (2015) found no overall relationship between obesity and depression. Upon further decomposition, they only found significant associations for Caribbean Black females.[88]

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

Yes. Energy drink consumption may have declined in the overall population between 2008 and 2016, but it increased in more deprived areas.[41] There is evidence of stronger diet trends in higher-income households.[39]

There is also evidence that the prevalence of overweight and obesity has decreased in young people from the least deprived areas, and in those with the highest household education level, but has marginally increased in areas with the highest deprivation, and households with the lowest levels of education.[43]

Young people's levels of physical activity have increased across all levels of socioeconomic status, but have increased faster among the least affluent households than the most.[27]

Overall Strengths and Limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

As mentioned, none of these behaviours occur in isolation. For example, children and young people who engage in more sedentary behaviours are also more likely to eat a poorer diet,[1] and sleep quality and duration affect both diet and exercise.[89] Therefore, more evidence is needed on the impact of clusters of health behaviours on adolescent

mental health, in addition to examining them individually. Generally speaking, each of these health behaviours had large amounts of evidence, including multiple systematic reviews, meta-analyses, and umbrella reviews. RCTs and intervention studies provided fairly robust evidence in support of the observed associations.

Sleep

Confounding and reverse causality make the literature on sleep more difficult to interpret, as well as a conflation of the exposure and outcome (sleep difficulties are often included as a mental health outcome). The fact that the majority of evidence comes from cross-sectional studies increases the risk of this, but several reciprocal and cross-lagged studies may help to account for this.

Physical activity and sedentary behaviour

This factor had the largest and most comprehensive evidence base, including multiple umbrella reviews and meta-analyses. However, as with the majority, there are issues with self-reporting of physical activity and sedentary behaviour, particularly because of social desirability bias, whereby respondents report in a way they deem more socially acceptable (e.g. doing more physical activity). Dale et al. (2019) found one systematic review which included only objectively measured levels of activity and found no significant association between physical activity and mental health, although they note that this is a low-quality review.[47]

There are also issues with the conflation of sedentary behaviour with screen time,[51] which may mean the effects of excessive screen time are being observed rather than the effects of sedentary behaviour.

Furthermore, the context of the physical activity is often not included in the evidence; for example, whether it involves group or individual activities. This may be of great importance when assessing the impact of physical activity on mental health.[9]

Dietary Patterns

Many studies examine the impact of specific micronutrients without the context of the wider diet. For example, Swann et al. (2021) reported that the mental health effects of dietary fibre became non-significant after controlling for other aspects of diet.[90]

Weight

Much of the included evidence comes from older studies. This may be important as there is evidence of links between social media usage and obesity,[91] and in particular,

social media may alter the extent to which weight *impacts* mental health, through increased social comparison, self-objectification, and shame.[92]

A large amount of the evidence comes from the USA. This is likely to limit generalisability to the UK because of the differences in overweight and obesity prevalence.[93] Furthermore, the only UK longitudinal study we identified showed no significant association between overweight/obesity and later psychological health.[72]

When considering weight stigma as a part of this impact, it is notable that Warnick et al. (2022) highlight the lack of existing validated measures for weight stigma.[58]

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable about the theory or evidence base that might inform our evaluation of causality?

Dietary Patterns

Despite the lack of epidemiological evidence about specific nutrients and mental health, there is biological evidence and well-understood pathways between various nutrients, e.g. vitamin D, cognition and mental health. Inflammatory biomarkers have also been associated with obesity and with mood disorders,[94] which may support the causal argument.

Weight

Given the growing evidence related to weight stigma and body image, it may be important to consider that there may be a causal link between the social consequences of being overweight/obese and mental health, as well as the physiological consequences For example, Roberts and Duong (2013) reported that *perceived* weight and body image were better predictors of adolescent depression than actual weight;[85] and Moradi et al. (2022) reported a link between weight, self-esteem and body dissatisfaction; but none with depression and anxiety.[57] This may also have implications for the targets of efforts to improve adolescent mental health.

References

1. Rodriguez-Ayllon M, Cadenas-Sánchez C, Estévez-López F, Muñoz NE, Mora-Gonzalez J, Migueles JH, et al. Role of Physical Activity and Sedentary Behavior in the Mental Health of Preschoolers, Children and Adolescents: A Systematic Review and Meta-Analysis. Sports Medicine. 2019;49(9):1383-410.

2. Lubans D, Richards J, Hillman C, Faulkner G, Beauchamp M, Nilsson M, et al. Physical Activity for Cognitive and Mental Health in Youth: A Systematic Review of Mechanisms. Pediatrics. 2016;138(3).

3. Blake MJ, Trinder JA, Allen NB. Mechanisms underlying the association between insomnia, anxiety, and depression in adolescence: Implications for behavioral sleep interventions. Clinical Psychology Review. 2018;63:25-40.

4. Crouse JJ. Circadian rhythm sleep–wake disturbances and depression in young people: Implications for prevention and early intervention. The Lancet Psychiatry. 2021;8(9):813-23.

5. Berger AT, Wahlstrom KL, Widome R. Relationships between sleep duration and adolescent depression: a conceptual replication. Sleep Health. 2019;5(2):175-9.

6. Gradisar M, Kahn M, Micic G, Short M, Reynolds C, Orchard F, et al. Sleep's role in the development and resolution of adolescent depression. Nature Reviews Psychology. 2022;1(9):512-23.

7. Owens J, Au R, Carskadon M, Millman R, Wolfson A, Braverman PK, et al. Insufficient Sleep in Adolescents and Young Adults: An Update on Causes and Consequences. Pediatrics. 2014;134(3):e921-e32.

8. Godsell S, White J. Adolescent perceptions of sleep and influences on sleep behaviour: A qualitative study. Journal of Adolescence. 2019;73(1):18-25.

9. Biddle SJH, Ciaccioni S, Thomas G, Vergeer I. Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. Psychology of Sport and Exercise. 2019;42:146-55.

10. Holt NL, Kingsley BC, Tink LN, Scherer J. Benefits and challenges associated with sport participation by children and parents from low-income families. Psychology of Sport and Exercise. 2011;12(5):490-9.

11. Marx W, Lane M, Hockey M, Aslam H, Berk M, Walder K, et al. Diet and depression: exploring the biological mechanisms of action. Molecular Psychiatry. 2021;26(1):134-50.

12. Orlando L, Savel KA, Madigan S, Colasanto M, Korczak DJ. Dietary patterns and internalizing symptoms in children and adolescents: A meta-analysis. Australian & New Zealand Journal of Psychiatry. 2022;56(6):617-41.

13. Kaur S, Christian H, Cooper MN, Francis J, Allen K, Trapp G. Consumption of energy drinks is associated with depression, anxiety, and stress in young adult males: Evidence from a longitudinal cohort study. Depression and Anxiety. 2020;37(11):1089-98.

14. Russell-Mayhew S, McVey G, Bardick A, Ireland A. Mental Health, Wellness, and Childhood Overweight/Obesity. Journal of Obesity. 2012;2012:1-9.

15. Lessard LM, Lawrence SE. Weight-Based Disparities in Youth Mental Health: Scope, Social Underpinnings, and Policy Implications. Policy Insights from the Behavioral and Brain Sciences. 2022;9(1):49-56.

16. Emmer C, Bosnjak M, Mata J. The association between weight stigma and mental health: A meta - analysis. Obesity Reviews. 2020;21(1).

17. Rees RW, Caird J, Dickson K, Vigurs C, Thomas J. 'It's on your conscience all the time': a systematic review of qualitative studies examining views on obesity among young people aged 12–18 years in the UK. BMJ Open. 2014;4(4):e004404-e.

18. Sun W, Ling J, Zhu X, Lee TM-C, Li SX. Associations of weekday-to-weekend sleep differences with academic performance and health-related outcomes in school-age children and youths. Sleep Medicine Reviews. 2019;46:27-53.

19. Wu X, Bastian K, Ohinmaa A, Veugelers P. Influence of physical activity, sedentary behavior, and diet quality in childhood on the incidence of internalizing and externalizing disorders during adolescence: a population-based cohort study. Annals of Epidemiology. 2018;28(2):86-94.

20. Sampasa-Kanyinga H, Colman I, Goldfield GS, Janssen I, Wang J, Tremblay MS, et al. 24-Hour Movement Behaviors and Internalizing and Externalizing Behaviors Among Youth. Journal of Adolescent Health. 2021;68(5):969-77.

21. Bacaro V, Miletic K, Crocetti E. A meta-analysis of longitudinal studies on the interplay between sleep, mental health, and positive well-being in adolescents. International Journal of Clinical and Health Psychology. 2024;24(1):100424-.

22. Silva-Maldonado P, Arias-Rico J, Romero-Palencia A, Román-Gutiérrez AD, Ojeda-Ramírez D, Ramírez-Moreno E. Consumption Patterns of Energy Drinks in Adolescents and Their Effects on Behavior and Mental Health: A Systematic Review. Journal of Psychosocial Nursing and Mental Health Services. 2022;60(2):41-7.

23. Yang M, Cai C, Yang Z, Wang X, Li G, Li J, et al. Effect of dietary fibre on cognitive function and mental health in children and adolescents: a systematic review and meta-analysis. Food & Function. 2024;15(17):8618-28.

24. Trapp GSA, Allen KL, Black LJ, Ambrosini GL, Jacoby P, Byrne S, et al. A prospective investigation of dietary patterns and internalizing and externalizing mental health problems in adolescents. Food Science & Nutrition. 2016;4(6):888-96.

25. Pervanidou P, Bastaki D, Chouliaras G, Papanikolaou K, Kanaka-Gantenbein C, Chrousos G. Internalizing and externalizing problems in obese children and adolescents: associations with daily salivary Cortisol concentrations. Hormones. 2015;14(4):623-31.

26. State of the Nation: Dietary Trends in the UK 20 Years On. 2019.

27. Active Lives Children and Young People Survey: Academic year 2022-23. 2023.

28. Patalay P, Gage SH. Changes in millennial adolescent mental health and health-related behaviours over 10 years: a population cohort comparison study. International Journal of Epidemiology. 2019;48(5):1650-64.

29. Health Survey for England, 2016. NHS Digital; 2016.

30. Forkes-Rees C. Agriculture and Horticulture Development Board. 2024. Available from: https://ahdb.org.uk/news/consumer-insight-gen-z-a-generation-of-health-conscious-consumers#:~:text=However%2C%20these%20younger%20consumers%20are,prioritising%20when%20making%20food%20choices.

31. Segel LH, H. McKinsey & Company. 2024. Available from: https://www.mckinsey.com/~/media/mckinsey/email/genz/2024/01/2024-01-23d.html#:~:text=It's%20also%20possible%20that%20the,attract%20more%20Gen%20Z%20employees. .

32. Keyes KM, Maslowsky J, Hamilton A, Schulenberg J. The Great Sleep Recession: Changes in Sleep Duration Among US Adolescents, 1991–2012. Pediatrics. 2015;135(3):460-8.

33. Twenge JM, Krizan Z, Hisler G. Decreases in self-reported sleep duration among U.S. adolescents 2009–2015 and association with new media screen time. Sleep Medicine. 2017;39:47-53.

34. Thorsteinsson EB, Fismen A-S, Arnarsson ÁM, Madsen KR, Eriksson C, Hagquist C, et al. Time trends and predictors of difficulties in getting to sleep among adolescents from six Nordic countries 2002–2018. Scandinavian Journal of Public Health. 2025.

35. Cole AG, Laxer RE, Patte KA, Leatherdale ST. Can We Reverse this Trend? Exploring Health and Risk Behaviours of Grade 12 Cohorts of Ontario Students from 2013–2019. International Journal of Environmental Research and Public Health. 2021;18(6):3109-.

36. Kumar B, Robinson R, Till S. Physical activity and health in adolescence. Clinical Medicine. 2015;15(3):267-72.

37. Active Lives Data Tables: Sport England; 2024 [Available from: https://www.sportengland.org/research-and-data/data/active-lives/active-lives-data-tables

38. López-Fernández J, López-Valenciano A, Mayo X, Liguori G, Lamb MA, Copeland RJ, et al. No changes in adolescent's sedentary behaviour across Europe between 2002 and 2017. BMC Public Health. 2021;21(1):784-.

39. National Diet and Nutrition Survey. Years 1 to 9 of the Rolling Programme (2008/2009 – 2016/2017): Time trend and income analyses. London; 2019 2019/1//.

40. Chavez-Ugalde IY, de Vocht F, Jago R, Adams J, Ong KK, Forouhi NG, et al. Ultra-processed food consumption in UK adolescents: distribution, trends, and sociodemographic correlates using the National Diet and Nutrition Survey 2008/09 to 2018/19. European Journal of Nutrition. 2024;63(7):2709-23.

41. Energy drink intake rising among teens in deprived areas amid widening inequality: University Hospital Southampton; 2023 [Available from: https://research.uhs.nhs.uk/news/energy-drink-intake-rising-among-teens-in-deprived-areas-amid-widening-inequality

42. Health Survey for England, 2022 Part 2. NHS Digital; 2024.

43. Broadbent P, Shen Y, Pearce A, Katikireddi SV. Trends in inequalities in childhood overweight and obesity prevalence: a repeat cross-sectional analysis of the Health Survey for England. Archives of Disease in Childhood. 2024;109(3):233-9.

44. Haynie DL, Lewin D, Luk JW, Lipsky LM, O'Brien F, Iannotti RJ, et al. Beyond Sleep Duration: Bidirectional Associations Among Chronotype, Social Jetlag, and Drinking Behaviors in a Longitudinal Sample of US High School Students. Sleep. 2018;41(2).

45. Thorburn-Winsor EA, Neufeld SAS, Rowthorn H, van Sluijs EMF, Brage S, Jones PB, et al. Device-measured sleep onset and duration in the development of depressive symptoms in adolescence. Journal of Affective Disorders. 2022;310:396-403.

46. Orchard FG, AM; Gradisar, M; Reynolds, S. Self - reported sleep patterns and quality amongst adolescents: cross - sectional and prospective associations with anxiety and depression. Journal of Child Psychology and Psychiatry. 2020;61(10):1126-37.

47. Dale LP, Vanderloo L, Moore S, Faulkner G. Physical activity and depression, anxiety, and self-esteem in children and youth: An umbrella systematic review. Mental Health and Physical Activity. 2019;16:66-79.

48. Purgato M, Cadorin C, Prina E, Cabral Ferreira M, Del Piccolo L, Gerber M, et al. Umbrella Systematic Review and Meta-Analysis: Physical Activity as an Effective Therapeutic Strategy for Improving Psychosocial Outcomes in Children and Adolescents. Journal of the American Academy of Child & Adolescent Psychiatry. 2024;63(2):172-83.

49. Cai S, Wang H, Zhang Y-H, Zhao T-M, Yuan X, Deng H-W, et al. Could physical activity promote indicators of physical and psychological health among children and adolescents? An umbrella review of meta-analyses of randomized controlled trials. World Journal of Pediatrics. 2025;21(2):159-73.

50. Zhang J, Yang SX, Wang L, Han LH, Wu XY. The influence of sedentary behaviour on mental health among children and adolescents: A systematic review and meta-analysis of longitudinal studies. Journal of Affective Disorders. 2022;306:90-114.

51. Stanczykiewicz B, Banik A, Knoll N, Keller J, Hohl DH, Rosińczuk J, et al. Sedentary behaviors and anxiety among children, adolescents and adults: a systematic review and meta-analysis. BMC Public Health. 2019;19(1):459-.

52. Lu S, Sun J, Guo Z, Yi M, Zhang Y, Wang J, et al. Instrumented measures of sedentary behavior and physical activity are associated with depression among children and adolescents: a systematic review and dose–response meta-analysis of observational studies. Frontiers in Psychology. 2024;15.

53. Wang Y, Liu J, Compher C, Kral TVE. Associations between dietary intake, diet quality and depressive symptoms in youth: A systematic review of observational studies. Health Promotion Perspectives. 2022;12(3):249-65.

54. Chen Y, Zhang J, Yuan L, Hu H, Li T, Zhao Y, et al. Obesity and risk of depressive disorder in children and adolescents: A meta - analysis of observational studies. Child: Care, Health and Development. 2024;50(2).

55. Rao W-W, Zong Q-Q, Zhang J-W, An F-R, Jackson T, Ungvari GS, et al. Obesity increases the risk of depression in children and adolescents: Results from a systematic review and meta-analysis. Journal of Affective Disorders. 2020;267:78-85.

56. Sutaria S, Devakumar D, Yasuda SS, Das S, Saxena S. Is obesity associated with depression in children? Systematic review and meta-analysis. Archives of Disease in Childhood. 2019;104(1):64-74.

57. Moradi M, Mozaffari H, Askari M, Azadbakht L. Association between overweight/obesity with depression, anxiety, low self-esteem, and body dissatisfaction in children and adolescents: a systematic review and meta-analysis of observational studies. Critical Reviews in Food Science and Nutrition. 2022;62(2):555-70.

58. Warnick JL, Darling KE, West CE, Jones L, Jelalian E. Weight Stigma and Mental Health in Youth: A Systematic Review and Meta-Analysis. Journal of Pediatric Psychology. 2022;47(3):237-55.

59. Wolfson AR, Carskadon MA. Sleep Schedules and Daytime Functioning in Adolescents. Child Development. 1998;69(4):875-87.

60. Doane LD, Gress-Smith JL, Breitenstein RS. Multi-method Assessments of Sleep over the Transition to College and the Associations with Depression and Anxiety Symptoms. Journal of Youth and Adolescence. 2015;44(2):389-404.

61. Kortesoja L, Vainikainen M-P, Hotulainen R, Rimpelä A, Dobewall H, Lindfors P, et al. Bidirectional Relationship of Sleep with Emotional and Behavioral Difficulties: A Five-year Follow-up of Finnish Adolescents. Journal of Youth and Adolescence. 2020;49(6):1277-91.

62. Nowakowski S, Choi HJ, Meers J, Temple JR. Inadequate Sleep as a Mediating Variable Between Exposure to Interparental Violence and Depression Severity in Adolescents. Journal of Child & Adolescent Trauma. 2016;9(2):109-14.

63. Kuo SIC, Updegraff KA, Zeiders KH, McHale SM, Umaña-Taylor AJ, De Jesús SAR. Mexican American Adolescents' Sleep Patterns: Contextual Correlates and Implications for Health and Adjustment in Young Adulthood. Journal of Youth and Adolescence. 2015;44(2):346-61.

64. Zeiders KH. Discrimination, daily stress, sleep, and Mexican-origin adolescents' internalizing symptoms. Cultural Diversity & Ethnic Minority Psychology. 2017;23(4):570-5.

65. Booth JN, Ness AR, Joinson C, Tomporowski PD, Boyle JME, Leary SD, et al. Associations between physical activity and mental health and behaviour in early adolescence. Mental Health and Physical Activity. 2023;24:100497-.

66. Andersen JH, Labriola M, Lund T, Hansen CD. Development of health and depressive symptoms among Danish adolescents—Socioeconomic differences and effects of life-style. Open Journal of Preventive Medicine. 2013;03(01):104-10.

67. Jacka FN, Kremer PJ, Berk M, de Silva-Sanigorski AM, Moodie M, Leslie ER, et al. A Prospective Study of Diet Quality and Mental Health in Adolescents. PLoS ONE. 2011;6(9):e24805-e.

68. Winpenny EM, van Harmelen A-L, White M, van Sluijs EMF, Goodyer IM. Diet quality and depressive symptoms in adolescence: no cross-sectional or prospective associations following adjustment for covariates. Public Health Nutrition. 2018;21(13):2376-84.

69. Anderson SE, Murray DM, Johnson CC, Elder JP, Lytle LA, Jobe JB, et al. Obesity and depressed mood associations differ by race/ethnicity in adolescent girls. International Journal of Pediatric Obesity. 2011;6(1):69-78.

70. Boutelle KN, Hannan P, Fulkerson JA, Crow SJ, Stice E. Obesity as a prospective predictor of depression in adolescent females. Health Psychology. 2010;29(3):293-8.

71. Frisco ML, Houle JN, Lippert AM. Weight Change and Depression Among US Young Women During the Transition to Adulthood. American Journal of Epidemiology. 2013;178(1):22-30.

72. Clark C, Haines MM, Head J, Klineberg E, Arephin M, Viner R, et al. Psychological symptoms and physical health and health behaviours in adolescents: a prospective 2 - year study in East London. Addiction. 2007;102(1):126-35.

73. Roberts RE, Hao DT. Obesity has few effects on future psychosocial functioning of adolescents. Eating Behaviors. 2013;14(2):128-36.

74. Moseley L, Gradisar M. Evaluation of a School-Based Intervention for Adolescent Sleep Problems. Sleep. 2009;32(3):334-41.

75. Contardo Ayala AM, Parker K, Mazzoli E, Lander N, Ridgers ND, Timperio A, et al. Effectiveness of Intervention Strategies to Increase Adolescents' Physical Activity and Reduce Sedentary Time in Secondary School Settings, Including Factors Related to Implementation: A Systematic Review and Meta-Analysis. Sports Medicine - Open. 2024;10(1):25-.

76. Campisi SC, Zasowski C, Shah S, Bradley-Ridout G, Madigan S, Szatmari P, et al. Do Healthy Dietary Interventions Improve Pediatric Depressive Symptoms? A Systematic Review and Meta-Analysis. Advances in Nutrition. 2021;12(6):2495-507.

77. Murdoch M, Payne N, Samani-Radia D, Rosen-Webb J, Walker L, Howe M, et al. Family-based behavioural management of childhood obesity: service evaluation of a group programme run in a community setting in the United Kingdom. European Journal of Clinical Nutrition. 2011;65(6):764-7.

78. Liu B-P, Wang X-T, Liu Z-Z, Wang Z-Y, An D, Wei Y-X, et al. Depressive symptoms are associated with short and long sleep duration: A longitudinal study of Chinese adolescents. Journal of Affective Disorders. 2020;263:267-73.

79. Conklin AI, Yao CA, Richardson CG. Chronic sleep deprivation and gender-specific risk of depression in adolescents: a prospective population-based study. BMC Public Health. 2018;18(1):724-.

80. Oddy WH, Allen KL, Trapp GSA, Ambrosini GL, Black LJ, Huang R-C, et al. Dietary patterns, body mass index and inflammation: Pathways to depression and mental health problems in adolescents. Brain, Behavior, and Immunity. 2018;69:428-39.

81. Healthy eating among 15 year olds. NHS Digital; 2024.

82. Libuy N, Bann D, Fitzsimons E. Inequalities in body mass index, diet and physical activity in the UK: Longitudinal evidence across childhood and adolescence. SSM - Population Health. 2021;16:100978-.

83. Park S. The Association Between Short Sleep Duration and Body Mass Index Among South Korean Children and Adolescents. The Journal of School Nursing. 2013;29(2):142-50.

84. Liu M-w, Chen Q-t, Towne SD, Zhang J, Yu H-j, Tang R, et al. Fruit and vegetable intake in relation to depressive and anxiety symptoms among adolescents in 25 low- and middle-income countries. Journal of Affective Disorders. 2020;261:172-80.

85. Roberts RE, Duong HT. Obese youths are not more likely to become depressed, but depressed youths are more likely to become obese. Psychological Medicine. 2013;43(10):2143-51.

86. Mustillo S, Worthman C, Erkanli A, Keeler G, Angold A, Costello EJ. Obesity and Psychiatric Disorder: Developmental Trajectories. Pediatrics. 2003;111(4):851-9.

87. BeLue R, Francis LA, Colaco B. Mental Health Problems and Overweight in a Nationally Representative Sample of Adolescents: Effects of Race and Ethnicity. Pediatrics. 2009;123(2):697-702.

88. Assari S, Caldwell CH. Gender and Ethnic Differences in the Association Between Obesity and Depression Among Black Adolescents. Journal of Racial and Ethnic Health Disparities. 2015;2(4):481-93.

89. Gariepy G, Danna S, Gobiņa I, Rasmussen M, Gaspar de Matos M, Tynjälä J, et al. How Are Adolescents Sleeping? Adolescent Sleep Patterns and Sociodemographic Differences in 24 European and North American Countries. Journal of Adolescent Health. 2020;66(6):S81-S8.

90. Swann OG, Breslin M, Kilpatrick M, O'Sullivan TA, Mori TA, Beilin LJ, et al. Dietary fibre intake and its association with inflammatory markers in adolescents. British Journal of Nutrition. 2021;125(3):329-36.

91. Li C, Ademiluyi A, Ge Y, Park A. Using Social Media to Understand Web-Based Social Factors Concerning Obesity: Systematic Review. JMIR Public Health and Surveillance. 2022;8(3):e25552-e.

92. Salomon I, Brown CS. The Selfie Generation: Examining the Relationship Between Social Media Use and Early Adolescent Body Image. The Journal of Early Adolescence. 2019;39(4):539-60.

93. Nørtoft E, Chubb B, Borglykke A. Obesity and healthcare resource utilization: comparative results from the UK and the USA. Obesity Science & Practice. 2018;4(1):41-5.

94. Khanna P, Chattu V, Aeri B. Nutritional aspects of depression in adolescents - A systematic review. International Journal of Preventive Medicine. 2019;10(1):42-.

7. Mental Health Awareness

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

"mental health" AND (Awareness OR literacy OR "help seeking"
OR "public health" OR (Reduc* OR 114nstagr* AND stigma) OR Destigmatis*)
AND (campaign* OR intervention* OR effort*)
OR Psychiatrisation OR pathologis* OR overinterpret*
OR "prevalence inflation"

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

Awareness of mental health issues among young people has significantly increased over recent decades, driven by public initiatives, school-based interventions, and widespread media coverage. We focus our review below on specific initiatives that have been used to promote mental health awareness, as the effects from other forms of awareness (e.g. media coverage) are harder to isolate. In England, several initiatives have sought to promote public awareness about mental health over the last two decades, to reduce stigma, improve recognition of symptoms and improve take-up of treatment. While mental health awareness efforts encompass a broad range of activities, we define them here as initiatives (e.g. campaigns and interventions) aimed at improving mental health awareness and reducing stigma, targeting the general public. A summary of the potential mechanisms underlying this is provided below.

Changes in reporting

Mental health awareness initiatives have been targeted towards reducing stigma and improving mental health help-seeking beliefs, enabling individuals to recognise and seek help for mental health symptoms that were previously overlooked. While this is a positive development, it has been theorised that this may artificially inflates reported prevalence without necessarily reflecting worsening overall population mental health[1] If these efforts worked as intended, and previously under recognised symptoms became more likely to be cognisant, than more symptoms will be reported in surveys and more people will seek medical help for mental disorder that needs treatment. A second mechanism is that public health initiatives may inadvertently promote the use of psychiatric terminology to describe 'normal' everyday struggles. Consequently, young people may interpret

normal emotional fluctuations, such as sadness or stress, as symptoms of mental disorders, and this would also increase the overall scores of people.[1, 2] Overall, this change in the way mental health symptoms will result in what is terms 'reporting bias' whereby different measures of mental health, for example in 2009 versus 2022 are not directly comparable, because they represent different levels of psychological distress.

Enhanced recognition and overinterpretation – unintentionally fostering distress

Universal interventions may unintentionally exacerbate distress by encouraging adolescents to focus and ruminate excessively on their negative emotions and thoughts.[2, 3] In the meta-aggregation and review of qualitative studies, it was highlighted that the school-based universal interventions might unintentionally emphasise depressive thoughts and symptoms and noted young people's preference for fostering positive thinking rather than focusing on negative thoughts.[4, 5] Increased distress was reflected in a longitudinal study, which observed an increase in internalising symptoms among young people who received universal mental health interventions compared to the control group after 6 and 12 months.[6]

As noted above, awareness efforts may lead young people to overinterpret their healthy, appropriate and normal emotional fluctuations as illness symptoms requiring treatment. This can encourage unnecessary self-labelling with psychiatric terms, which, in turn, may exacerbate symptoms over time through behavioural avoidance and changes in self-concept.[1]

Self-Fulfilling Prophecy

This theory suggests that calling normal psychological distress symptoms of a mental disorder can significantly alter an individual's self-concept and behaviour[1]. For example, identifying as 'an anxious person' can lead to avoidance of social or academic challenges, reinforcing anxiety and worsening symptoms over time. Such labelling may have a particularly powerful effect on adolescents, as it can 'reshape' their identity and foster avoidant behaviours, such as skipping social events or presentations. This cycle reinforces negative thought patterns, increasing the severity of their distress and creating a self-fulfilling prophecy.[1, 3]

Negative peer influence

It is proposed that mental health interventions, particularly those interventions implemented in schools, can inadvertently facilitate negative peer influence. Adolescents, who are particularly susceptible to peer dynamics, may reinforce each other's negative emotions and maladaptive behaviours through shared experiences of distress. For instance, discussions about negative emotions in group settings can

unintentionally validate and escalate these feelings, potentially leading to a spread or amplification of mental health symptoms through social learning.[3]

Culture shift: romanticisation of mental health struggles

Awareness efforts, particularly those amplified through social media, can inadvertently glamorise or romanticise mental health struggles. It is suggested that adolescents may adopt mental health labels not because they experience significant distress, but because these identities appear desirable or socially rewarding.[1]

Mismatch between awareness and resources

Mental health awareness efforts encourage help-seeking, but mental health systems are designed for people requiring treatment for medially recognisable disorders and therefore are unlikely to have the capacity to meet increased demand for support with milder forms of psychological distress. Potentially making it harder for those with more severe difficulties to access the specialised care they need. This could lead to frustration, prolonged distress, and a perception that help is unattainable.[1, 4] While not the primary concern, this dynamic is an important mechanism to consider when evaluating the broader impact of awareness initiatives.

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, i.e. conduct disorder?

Yes, while mental health awareness efforts primarily target internalising symptoms, evidence suggests they may affect the interpretation of externalising symptoms. Zachik et al. (2024) found that some school-based mental health literacy programmes heightened self-reported symptoms of impulsivity and emotional reactivity among adolescents, particularly when interventions emphasised distressing content[7]. Similarly, Guzman-Holst et al. (2025) highlight that increased self-identification with mental health labels may, in some cases, shape young people's behaviours in unexpected ways.[8] For example, some adolescents might adopt a mental health label as part of their identity, which could influence their peer dynamics or coping strategies, potentially leading to behaviours like disengagement from school or normalising risk-taking as part of that identity.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. The theory accounts for key social and cultural factors relevant to young people in England. For example, it considers adolescence as a period of heightened emotional

sensitivity, the influence of peer dynamics in reinforcing distress, and the role of social media in shaping self-perception and psychiatric labelling.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

The only direct evidence that we are aware of regarding mental health-related attitudes come from the Attitudes Towards Mental Illness survey. However, this was conducted in those aged 16+ and has not been conducted between 2019 and 2019. Population-level measures of stigma-related knowledge, attitudes towards mental illness, and desire for social distance all showed statistically significant improvements.[9] Specifically, between 2009 and 2019, mental health-related knowledge increased by 0.25 standard deviations (0.25 SD, 95% CI [0.19, 0.32]) and attitudes improved by 0.32 SD (95% CI [0.26, 0.39]).

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

Yes. The Time to Change campaign, launched in England in 2009 and evaluated through 2019, represents one of the largest and most sustained mental health awareness initiatives in the UK. There have also been efforts to integrate mental health awareness into schools, in part by including issues related to mental health into the relationships and sex education (RSE) and health education curriculum.[10] The expansion of mental health awareness initiatives, including school-based programs, social media advocacy, and public campaigns, suggests an increasing prevalence of exposure to mental health discourse.

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

As mentioned before, we define mental health awareness efforts as initiatives (e.g. campaigns and interventions) aimed at improving mental health awareness and

reducing stigma. To ensure our systematic search captures a more comprehensive range of evidence on its effects, terms such as 'overinterpret*' and 'prevalence inflation' were included in our search strategy.

Two systematic reviews were identified. Tam et al. (2024) identified 18 studies evaluating media-based mental health awareness initiatives targeting young people.[11] However, only two of these studies focused on mental health symptoms as outcomes, reporting reductions in depressive mood, anxiety, and stress following a mental health campaign. In a scoping review by Zachik et al. (2024), 31 studies on 24 school-based mental health literacy programmes were analysed.[7] Three studies focusing on outcomes including depressive mood and anxiety reported positive effects of the programmes, while two found no evidence of changes in symptoms.

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

One longitudinal study was identified. Szeto et al. (2024) conducted a pre-post study on a school-based mental health promotion programme.[12] Young people's resilience significantly improved after the program, with an average follow-up period of 8 to11 days.

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

Yes, Szeto et al. (2024) controlled for baseline mental health, demographic data, and school area in evaluating a school-based mental health promotion program and reported a significant increase in resilience after the program (effect size not reported).[12]

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Not that we are aware of.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

Six RCTs were identified. Findings are mixed. Three RCTs reported negative effects of mental health awareness programmes. One UK Department of Education-funded trial reported a negative effect of mental health awareness programmes in a longer time.[13] The AWARE trial, a large-scale cluster-randomised controlled trial of two school-based mental health awareness programmes, was conducted across 153 English secondary schools with 12,166 Year 9 pupils (aged 13–14). Designed to assess the effectiveness of interventions aimed at improving mental health literacy and help-seeking, the trial was carried out in three waves between 2018 and 2024. The two interventions tested were Youth Aware of Mental Health—a role-play-based programme delivered by external facilitators—and The Mental Health and High School Curriculum Guide (The Guide)—a teacher-led curriculum adapted from Canada. Youth Aware of Mental Health showed no significant impact on emotional difficulties at 3–6 months (effect size = 0.02, 95% CI [-0.05, 0.10]) but led to a statistically significant increase in emotional symptoms at 9-12 months (effect size = 0.08, 95% CI [0.02, 0.14]). Further subgroup analysis suggested that this programme was associated with increased emotional difficulties for young people in schools reporting no prior provision of universal mental health programmes. Similarly, by the second follow-up (9–12 months), pupils who received The Guide reported increased emotional difficulties (effect size = 0.09, 95% CI [0.03, 0.15]) and decreased life satisfaction (effect size = -0.08, 95% CI [-0.13, -0.02]) compared to controls. The negative effects of mental health programmes are also reported by Andrews et al. (2023).[6] They evaluated a CBT-based universal eHealth preventive mental health programme delivered across 37 schools in Australia, with participating youths having an average baseline age of around 13.5 years. Youths in the intervention group reported higher depressive symptoms than controls immediately post-intervention (*B* = 0.36, 95% CI [0.04, 0.68], *d* = 0.05) and at 18 months (*B* = 0.65, 95% CI [0.31, 0.99], *d* = 0.08). Those in the intervention group also had significantly higher anxiety scores than controls at 18 months (*B* = 0.64, 95% CI [0.34, 0.94], *d* = 0.09).

One possible explanation for the negative effect is the unintended impact of exposure to content on mental disorders. We noticed that another programme funded by the UK Department for Education, which focused on strategies for safety and wellbeing, reported a positive effect on help-seeking behaviour post-intervention but no impact on emotional difficulties. It is possible that exposure to material on common mental disorders and suicide may inadvertently increase distress among young people. For example, while the Youth Aware of Mental Health programme involved designs to improve understanding and reduce suicide, and 'The Guide' aimed to outline common mental disorders, the strategies-based programme instead focused on promoting safety skills and mental health self-management. This assumption is also reflected in findings from Chisholm et al. (2015), who ran a cluster-randomised controlled trial evaluating a school-based stigma reduction programme.[14] Compared to the intervention group, which received an education session combined with an additional interactive session

with a young person with lived experience of mental illness, the control group, which received education only, showed significantly greater improvements in emotional well-being (measured by the SDQ) in a two-week follow-up.

Three RCTs reported positive effects. Klim-Conforti et al. (2021) conducted a randomised controlled trial with 430 middle school students (aged 11–14) in Canada, testing a mental health literacy curriculum embedded in English classes.[15] The intervention group showed significantly greater reductions in depression and anxiety symptoms compared to controls ($t = 2.96$, $p = 0.01$). Similarly, Teesson et al. (2020) evaluated a combined online universal school-based preventive intervention targeting substance use, depression, and anxiety among Year 8 and 9 pupils (aged 13–14) from 88 schools in Australia.[16] The intervention led to a significant reduction in anxiety symptom growth over 30 months (SMD = -0.12, 95% CI [-0.22, -0.01]), although no significant effects were observed for depression symptoms or probable depression diagnoses. Finally, Niederkrotenthaler et al. (2020) conducted an RCT assessing the impact of watching online mental health prevention videos (i.e. media portrayals of depression and suicidality).[17] Depressed mood was significantly lower in the intervention group compared to the control group, measured immediately after exposure.

Q11: Does the evidence indicate that there is a strong association?

The evidence regarding the direction of effect is not consistent, with some studies indicating a positive effect on mental health and some a negative. Klim-Conforti et al. (2021) and Teesson et al. (2020) reported rather small effects, as reflected by the mean differences.[15, 16] Niederkrotenthaler et al. (2020) found that watching online mental illness prevention videos significantly reduced young people's depressive symptoms, with a medium effect size.[17] However, Chisholm et al. (2015) reported that young people in the intervention group, who received both mental health education and an interactive session, had lower emotional well-being compared to those in the control group, who only received education, again with a medium effect size.[14] The AWARE trial also reported long-term (9–12 months post-intervention) negative effects of school-based mental health awareness programmes.[13] However, the effect sizes were small, as the reported effect size was 0.08 for Youth Aware of Mental Health and 0.09 for The Guide. Similarly, the negative effect reported by Andrews et al. (2023) was also small, with effect sizes below 0.09.[6]

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

Not that we are aware of.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

There is no direct evidence indicating that the increase in exposure to mental health awareness initiatives was steeper for girls or white British young people specifically.

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Across five identified high-quality studies (i.e. longitudinal studies that controlled for key confounders and RCTs), there is some evidence suggesting that mental health awareness initiatives have differential effects on emotional symptoms across gender groups, though there is limited or no evidence regarding UK ethnic groups.

Szeto et al. (2024) found that while mental health literacy programs improved resilience in both genders, male participants showed greater increases in resilience, potentially due to their lower baseline levels of resilience before the intervention, whereas female participants exhibited greater reductions in stigma, reflecting their generally higher engagement with mental health discourse and greater willingness to challenge negative perceptions[12]. The AWARE trial, which tested The Guide, also found that girls demonstrated greater increases in intended help-seeking than boys at long-term follow-up.[13]

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

Based on the five reviewed studies, there is limited evidence on the effects of mental health awareness programmes across groups other than gender and UK ethnic minority groups. Only Szeto et al. (2024) included school-level deprivation as a covariate and found no significant interaction between socio-economic status and intervention effects.[12]

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

A good amount of evidence has been identified, including four RCTs, providing a solid foundation for evaluating the impact of mental health awareness programmes on youth mental health. Yet, several methodological concerns affect the quality of the evidence on the relationship between mental health awareness efforts and adolescent mental health.

A key Interpretive challenge In this area Is disentangling whether observed Increases In internalising symptoms reflect genuine increases in emotional distress or changes in how young people report and interpret their experiences. Many studies evaluate the effects of mental health awareness programmes by measuring outcomes such as symptom reports post-intervention, without directly assessing individual levels of mental health awareness as an exposure. While this approach is valid, particularly if the research question concerns change in symptom reporting, it potentially limits our ability to determine the extent to which any negative effects are due to heightened awareness increasing reporting sensitivity, or to actual increases in distress.

Also, most studies primarily focus on awareness levels or stigma reduction. While some include secondary outcomes such as help-seeking behaviours and suicidal behaviours, fewer assess changes in emotional symptoms (e.g. depression and anxiety), limiting their applicability to the current analysis. Follow-up periods in longitudinal studies are relatively short. Among the studies identified in the two reviews, the longest follow-up period was six months, which limits the ability to assess the long-term impact of awareness efforts on mental health outcomes. While the UK Department for Education funded report reports concerning findings that school-based awareness programmes may not only have no short-term effects but could also lead to long-term (e.g. 12-month) negative effects on young people's emotional symptoms, these reports were published as government documents rather than in peer-reviewed journals, so the peer-review process is unclear.

Another concern is publication bias. A substantial proportion of evaluations on the impacts of these programmes are conducted by the programme developers themselves or by individuals whose careers are closely tied to the field, raising potential conflicts of interest. This could lead to the overreporting of positive effects while null or negative findings remain underreported.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable about the theory or evidence base that might inform our evaluation of causality?

No.

References

1. Foulkes L, Andrews JL. Are mental health awareness efforts contributing to the rise in reported mental health problems? A call to test the prevalence inflation hypothesis. New Ideas in Psychology. 2023;69:101010-.

2. Bonell C, Jamal F, Melendez-Torres GJ, Cummins S. 'Dark logic': 123nstagram123 the harmful consequences of public health interventions. Journal of Epidemiology and Community Health. 2015;69(1):95-8.

3. Foulkes L, Stringaris A. Do no harm: can school mental health interventions cause iatrogenic harm? BJPsych Bulletin. 2023;47(5):267-9.

4. Bastounis A, Callaghan P, Lykomitrou F, Aubeeluck A, Michail M. Exploring Students' Participation in Universal, Depression and Anxiety, Prevention Programmes at School: A Meta-aggregation. School Mental Health. 2017;9(4):372-85.

5. Foulkes L, Stapley E. Want to improve school mental health interventions? Ask young people what they actually think. Journal of Philosophy of Education. 2022;56(1):41-50.

6. Andrews JL, Birrell L, Chapman C, Teesson M, Newton N, Allsop S, et al. Evaluating the effectiveness of a universal eHealth school-based prevention programme for depression and anxiety, and the moderating role of friendship network characteristics. Psychological Medicine. 2023;53(11):5042-51.

7. Zachik CP, Collica SC, White J, Espinoza C, Swartz KL, Cataldi ML. Universal, School - Based Mental Health Literacy Programs for Middle School Students: A Scoping Review. Journal of School Health. 2025;95(3):264-79.

8. Guzman - Holst C, Streckfuss Davis R, Andrews JL, Foulkes L. Scoping review: potential harm from school - based group mental health interventions. Child and Adolescent Mental Health. 2025.

9. Henderson C, Potts L, Robinson EJ. Mental illness stigma after a decade of Time to Change England: inequalities as targets for further improvement. European Journal of Public Health. 2020;30(3):497-503.

10. Promoting and supporting mental health and wellbeing in schools and colleges Gov.uk: Department for Education; 2025 [Available from: https://www.gov.uk/guidance/mental-health-and-wellbeing-support-in-schools-and-colleges?utm_source=chatgpt.com#curriculum-teaching-and-learning.

11. Tam MT, Wu JM, Zhang CC, Pawliuk C, Robillard JM. A Systematic Review of the Impacts of Media Mental Health Awareness Campaigns on Young People. Health Promotion Practice. 2024;25(5):907-20.

12. Szeto ACH, Lindsay BL, Bernier E, Henderson L, Mercer S. The Inquiring Mind Youth: Analysis of a Mental Health Promotion and Stigma Reduction Pilot Program for Secondary Students. Journal of Child and Family Studies. 2024;33(9):2900-18.

13. Deighton J, Thompson A, Humphrey N, Thornton E, Knowles C, Patalay P, et al. Effectiveness of school mental health awareness interventions Universal approaches in English secondary schools. London; 2025 2025/2//.

14. Chisholm K, Patterson P, Torgerson C, Turner E, Jenkinson D, Birchwood M. Impact of contact on adolescents' mental health literacy and stigma: the SchoolSpace cluster 124nstagram124 controlled trial. BMJ Open. 2016;6(2):e009435-e.

15. Klim-Conforti PZ, R; Levitt, AJ; Cheung, AH; Schachar, R; Schaffer, A; Goldstein, BI; Fefergrad, M; Niederkrotenthaler, T; Sinyor, M. The Impact of a Harry Potter-Based Cognitive-Behavioral Therapy Skills Curriculum on Suicidality and Well-being in Middle Schoolers: A Randomized Controlled Trial. Journal of Affective Disorders. 2021;286.

16. Teeson MN, NC; Slade, T; Chapman, C; Birrell, L; Mewton, L; Mather, M; Hides, L; McBride, N; Allsop, S; Andrews, G. Combined prevention for substance use, depression, and anxiety in adolescence: a cluster-randomised controlled trial of a digital online intervention. Te Lancet Digital Health. 2020;2(2).

17. Niederkrotenthaler T, Till B. Effects of awareness material featuring individuals with experience of depression and suicidal thoughts on an audience with depressive symptoms: Randomized controlled trial. Journal of Behavior Therapy and Experimental Psychiatry. 2020;66:101515-.

8. Risk aversion

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

((locomotor OR dangerous OR risk* OR adventur* OR height* OR outdoor OR independent) NEAR/2 play))
OR "rough and tumble" OR "rough-and-tumble" OR roughhousing
OR "independent mobility" OR "fear-provok*" OR Anti-pobi*
OR ((risk-averse OR helicopter OR worr* OR "over-involved") NEAR/2 (parent* OR supervis*))

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

It is suggested that in the UK (and in several other nations), children are now experiencing less outdoor play, risky and adventurous play, time in natural spaces, and independent mobility (i.e. time away from adult oversight) relative to previous generations,[1, 2] and that this may be partly contributing to declining mental health.[1, 3]

Cognitive and behavioural mechanisms in healthy child development

Engaging in adventurous and risky play supports the development of key cognitive and behavioural capacities that help children manage uncertainty, interpret physiological arousal, and tolerate fear or discomfort.[2, 4, 5] When opportunities for such play are limited, children may be more likely to develop patterns of avoidance or misinterpret arousal cues — factors associated with increased risk for anxiety and other mental health outcomes.[1, 4]

Facilitating exposure (rather than avoidance)

It is suggested that behavioural avoidance, associated with the onset and maintenance of anxiety, can be targeted through interventions that promote risky play by providing children with an opportunity to challenge and adjust their threat and coping appraisals.[4] For example, experiencing thrill sensations can motivate children towards seeking and investigating exposure to developmentally appropriate situations that elicit fear, uncertainty, or physiological arousal, and reduce their safety behaviours, such as avoidance strategies.[5]

Increasing coping

Facilitating such experiences is understood to provide children with a cognitive structure through which to interpret future events that incorporate adaptive skills and cognitive functioning, i.e. offering them a template through which to understand that they can cope with difficult situations.[4, 5]

Decreasing tolerance to uncertainty

Dodd and Lester (2021) propose that play increases children's tolerance of uncertainty and that a drive toward artificial, safe play spaces has reduced children's opportunities to have their judgment, ability, and curiosity challenged through dynamic and unpredictable experiences.[4] Gray (2011) argues that this links to reduced feelings of personal control, suggesting that levels of uncertainty in the world remain similar to previous generations, but that adolescents' appraisal of that uncertainty has changed.[3]

Interpreting related physiological arousal

Children experience complex feelings of thrill, excitement, and adrenaline through adventurous and risky play, and thus may experience positive emotions that facilitate their exposure to fear-provoking situations at the same time as learning about uncertainty, coping, and physiological arousal.[4]

Facilitating emotion regulation

Gray (2011) suggests that risky play experiences and social free play are opportunities for children to experience moderate amounts of fear and conflict and learn how to manage their emotional responses.[3]

Social experiences

Gray (2011) argues that reduced play experiences for children means reduced experiences for complex social interactions with peers, which he suggests provides more egalitarian social experiences in which they must get along with others as equals and be willing to compromise.[3]

Overparenting

Overparenting, also commonly referred to as 'helicopter parenting,' is a parenting style defined by being highly involved and intensive with one's children. This typically includes behaviours that are considered normative and useful for child development but executed to an excessive degree in a manner that is considered harmful, including for instance protectiveness, monitoring, removing obstacles, managing a child's emotions,

problem-solving for the child, and so on.[6] Such behaviours are often understood to be linked to parental anxiety, which predisposes the parent or carer to view their child as vulnerable to the outside world, thus necessitating additional protectiveness.[6, 7] The suggestion is that overparenting can have a range of implications for mental health, including symptoms of low mood and anxiety, through hampering healthy psychosocial development, particularly in limiting opportunities to build independence, grow in self-confidence, develop self-regulation skills, and take risks, as well as through encouraging 'maladaptive' behaviours such as perfectionist tendencies.[7, 8]

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

The available evidence suggests that risk-averse behaviours, such as reduced outdoor play, adventurous play, and independent mobility (i.e. time without adult supervision), do not strongly predict deterioration in externalising behaviours, such as aggression or conduct disorder. Instead, the research overwhelmingly links risk-averse behaviours to increased internalising symptoms, particularly anxiety and emotional dysregulation. Children who engage in less risky play tend to exhibit heightened fear responses, avoidance behaviours, and lower resilience to uncertainty, which are characteristic of anxiety rather than externalising symptoms.[4] Furthermore, while risk-taking behaviours have been associated with externalising symptoms, such as conduct problems and hyperactivity, there is no evidence to suggest that the absence of risk-taking leads to an increase in these behaviours.[5] Children with a tendency towards externalising behaviours, such as high impulsivity or aggression, maybe drawn to more physically risky play rather than avoiding it.[2] Thus, while risk-averse behaviours may contribute to emotional difficulties, they do not appear to play a significant role in the rise of externalising problems among young people.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limits its relevance to young people in England?

No. The theory considers key social and contextual factors affecting young people in England, including increased parental safety concerns, reduced access to outdoor play spaces, and changes in school policies that prioritise safety over exploratory learning. It also accounts for psychological mechanisms such as behavioural inhibition and intolerance of uncertainty, which are particularly relevant to the development of anxiety in childhood and adolescence.[4]

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

Yes, there is some evidence that risk-averse behaviours, particularly reduced outdoor play and independent mobility, have changed over the period during which youth mental health symptoms have increased. The British Children's Play Survey (2020) reported that children aged 5 to 11 played outdoors for about 1.5 hours daily, and the average age at which children were allowed out alone was 10.74 years, compared to 8.91 years when their parents were children, indicating a trend toward more supervised and less adventurous play.[1] Natural England's 2009 report suggests that only 10% of child play occurs in natural spaces, compared to 40% for their parents' generation, suggesting a long-term decline in outdoor, independent play.[9] These parallel trends with the increasing trends in youth mental health symptoms support the argument that increasing risk-aversion and subsequent restricted child behaviours may be contributing to the rise in mental health symptoms among young people in England.

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

N/A

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Yes. Four systematic review papers were identified, examining the association between risk-averse behaviours—such as overparenting/helicopter parenting, reduced independent mobility, and lack of risky play—and young people's mental health.

McLeod et al. (2007) conducted a meta-analysis of 47 studies, including four longitudinal studies, examining parenting (i.e. parental control and rejection) and its relationship with child anxiety.[10] The meta-analysis found that parenting overall accounted for 4% of the variance in child anxiety, with a weighted mean effect size of .21, representing a small effect size. Parental control (i.e. overinvolvement and autonomy-granting) was more strongly associated with child anxiety than parental rejection (i.e. withdrawal,

aversiveness, and warmth). The weighted mean effect size or parental rejection was .20 (accounting for approximately 4% of the variance in childhood anxiety), whereas the weighted mean ES for parental control was .25, suggesting that parental control accounts for almost 6% of the variance in childhood anxiety. No significant moderating effects were found for child age, gender, or parent gender. Similarly, Wood et al. (2003) examined 21 studies, primarily from North America and Europe, and focused on parental control, rejection, and modelling of anxious behaviours.[11]The review found that excessive parental control and lack of autonomy-granting were significantly associated with anxiety symptoms in children. However, most studies were cross-sectional, making it difficult to establish causality.

Miano & Palumbo (2021) conducted a systematic review including 99 studies on overparenting and its psychological consequences.[12] The review reported significant associations between overprotective and intrusive parenting and both internalising (anxiety, depression) and externalising disorders (aggression, substance use, sleep disturbances, eating disorders). The findings also suggested that overparenting reduces children's coping skills, self-efficacy, and independence, leading to long-term psychological difficulties. Additionally, the review explored how overparenting may contribute to pathological narcissism. However, the review only provided narrative summaries rather than systematic review, did not conduct a meta-analysis, and did not specify how many studies were longitudinal or cross-sectional.

Ferreira et al. (2024) analysed 23 studies, primarily from Europe, and explored the impact of children's independent mobility (CIM) on psychological well-being.[13] The findings suggest that greater CIM is associated with improved cognitive and socio-emotional development, including lower fear of crime, increased social interaction, and enhanced spatial awareness. The review also highlighted how urbanisation and parental concerns over safety have contributed to a decline in CIM, particularly in cities, potentially exacerbating youth mental health declines. However, again, the review only provided narrative summaries, did not conduct a meta-analysis, and did not specify how many studies were longitudinal or cross-sectional.

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

No, no longitudinal studies were identified. Although the reviews conducted by McLeod et al. (2007) and Wood et al. (2003) mentioned several longitudinal studies, these studies were either too dated to explain current trends (e.g. published before 1999) or focused on age groups outside our scope (e.g. one study examined mental health in children under 2 years old).[10, 11]

Only one study attempted to mimic a counterfactual framework. Janssen (2016) conducted a modelling study to estimate how replacing active outdoor play with sedentary video games (SVGs) influenced mental health using isotemporal substitution models.[14] A representative sample of 20,122 Canadian youth in grades 6–10 was used. Findings showed that replacing 1 hour/day of SVGs with 1 hour/day of active video games was associated with a 6% (95% CI: 3%-9%) reduced probability of high emotional problems, while replacing 1 hour/day of active outdoor play with 1 hour/day of active video games was linked to a 7% (95% CI: 3%-11%) increased probability of high emotional problems. These results suggest that declining outdoor play is associated with worsening mental health. However, the isotemporal substitution model only estimates the impact of time reallocation and does not fully capture true counterfactual effects in a causal inference framework, particularly in this case, as cross-sectional data were used.

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

As mentioned before, no longitudinal studies were identified. In the modelling study conducted by Janssen (2016), multiple covariates were accounted for, including demographic variables (e.g. age, gender, ethnicity group, immigration status), household socioeconomic status (e.g. household structure, family affluence), and healthy/risky behaviours (e.g. drinking, smoking, diet, sports).[14] After accounting for these covariates, the study reported that replacing 1 hour/day of SVGs with 1 hour/day of AVGs was associated with a 6% (95% CI: 3%-9%) reduced probability of high emotional problems, while replacing 1 hour/day of AOP with 1 hour/day of AVGs was linked to a 7% (95% CI: 3%-11%) increased probability of high emotional problems.

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

Not that we are aware of.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

Not that we are aware of.

Q11: Does the evidence indicate that there is a strong association?

As mentioned above, the meta-analysis conducted by McLeod et al. (2007) suggested a small effect of overall parenting styles on child anxiety.[10] However, the evidence needs to be interpreted with caution, as the effects were largely derived from cross-sectional studies.

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

Not that we are aware of.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

Partially yes. Gender differences are particularly evident, with research showing that girls spend significantly less time outdoors and engage in fewer adventurous play activities than boys.[15] This disparity is potentially driven by safety concerns, parental restrictions, and societal expectations. Ethnic disparities exist, with children from minority ethnic backgrounds playing outdoors less than their white counterparts, partly due to differences in access to green spaces and cultural attitudes toward risk and supervision.[15]

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

No longitudinal studies were identified that could help address this question.

C. Were there greater increase in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example those in lower socio-economic groups?

No longitudinal studies were identified that could help address this question.

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

Evidence has been identified to evaluate the effect of risk-averse behaviours, including systematic reviews, providing a foundation for assessing its impact on young people's mental health. One critical limitation is that no longitudinal studies were identified that fall within the scope of this work, which focuses on emotional symptom outcomes for youth aged 10–24 years. This leaves the current evidence with significant uncertainty in causally explaining recent trends in youth mental health problems. Even though associations were largely reported in the reviews, it remains unclear whether these reflect a true causal effect of risk-averse behaviours or a false association, as no studies have measured exposure before the outcomes, and confounders were not appropriately accounted for. There are a range of important factors that could influence this relationship (e.g. factors such as parental mental health), as well as inter-related variables that could help us better estimate the specific contributions of each individual component of how risk aversion may influence child or youth activities (for instance, time spent outdoors versus physical activity, which might contribute differentially to outcomes). This is a surprising finding, representing a missed opportunity to capture the effect of risk-averse behaviour on youth mental health, especially given existing evidence suggesting a decline in outdoor play, time in natural spaces, and independent mobility. The existing evidence base does not fully align with the theoretical framing of this issue. Most of the available reviews identified here focus narrowly on specific parenting behaviours, with less attention given to broader components, such as risky and adventurous play, which, while potentially influenced by parenting, represent a distinct area.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable in relation to the theory or evidence base that might inform our evaluation of causality?

No.

References

1. Dodd HF, FitzGibbon L, Watson BE, Nesbit RJ. Children's Play and Independent Mobility in 2020: Results from the British Children's Play Survey. International Journal of Environmental Research and Public Health. 2021;18(8):4334-.

2. Harper NJ. Outdoor risky play and healthy child development in the shadow of the "risk society": A forest and nature school perspective. Child Youth Serv. 2017;38:318-34.

3. Gray P. The decline of play and the rise of psychopathology in children and adolescents. American Journal of Play. 2011;3(4):443-63.

4. Dodd HF, Lester KJ. Adventurous Play as a Mechanism for Reducing Risk for Childhood Anxiety: A Conceptual Model. Clinical Child and Family Psychology Review. 2021;24(1):164-81.

5. Sandseter EBH, Kennair LEO. Children's Risky Play from an Evolutionary Perspective: The Anti-Phobic Effects of Thrilling Experiences. Evolutionary Psychology. 2011;9(2):257-84.

6. Starcher SC, Child JT. Overparenting Measure. In: Graham EE, Mazer JP, editors. Communication Research Measures III. 1 ed. New York: Routledge; 2019. P. 329-34.

7. Srivastav D, Lal Mathur MN. Helicopter Parenting and Adolescent Development: From the Perspective of Mental Health. In: Benedetto L, Ingrassia M, editors. Parenting: Studies by an Ecocultural and Transactional Perspective. 1 ed. London: IntechOpen; 2021. P. 71-90.

8. Sadoughi M. Overparenting and adolescent's trait anxiety: Unraveling the roles of basic psychological needs frustration and emotion dysregulation. Acta Psychologica. 2024;251:104579-.

9. REPORT TO NATURAL ENGLAND ON CHILDHOOD AND NATURE: A SURVEY ON CHANGING RELATIONSHIPS WITH NATURE ACROSS GENERATIONS. England Marketing; 2009.

10. McLeod BD, Wood JJ, Weisz JR. Examining the association between parenting and childhood anxiety: A meta-analysis. Clinical Psychology Review. 2007;27(2):155-72.

11. Wood JJ, McLeod BD, Sigman M, Hwang WC, Chu BC. Parenting and childhood anxiety: theory, empirical findings, and future directions. Journal of Child Psychology and Psychiatry. 2003;44(1):134-51.

12. Miano P, Palumbo A. Overparenting hurts me: how does it affect offspring psychological outcomes? Mediterranean Journal of Clinical Psychology. 2021;9(1).

13. Ferreira IA, Fornara F, Pinna V, Manca A, Guicciardi M. Autonomy as key to healthy psychological well-being: A systematic literature review on children's independent mobility, cognitive and socio-emotional development. Journal of Transport & Health. 2024;38:101837-.

14. Janssen I. Estimating Whether Replacing Time in Active Outdoor Play and Sedentary Video Games With Active Video Games Influences Youth's Mental Health. Journal of Adolescent Health. 2016;59(5):517-22.

15. Dodd HF, Hesketh K. The British Preschool Children's Play Survey: When, Where, and How Adventurously Do British Preschool-Aged Children Play? Journal of Physical Activity and Health. 2024;21(11):1142-9.

9.Social media and smartphone use

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

((“social media” OR “digital media” OR (screen NEAR/1 (time OR hour*))
OR “social networking site*” OR “online communication” OR “digital communication”
OR “internet use” OR “smartphone”
OR facebook OR twitter OR 135nstagram OR youtube OR tiktok OR snapchat OR wechat OR whatsapp)

Theoretical Considerations

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

There have been multiple ways that increases in time spent on smartphones and social media have been hypothesised to negatively affect symptoms of low mood and anxiety.

Cyberbullying and cyber-victimisation

The anonymous and disinhibited nature of social media platforms can facilitate cyberbullying and peer exclusion. Direct cyberbullying and indirect exclusion (e.g. being left out of online activities) have been linked to increased anxiety, depression, loneliness, and even suicidal ideation.[1, 2]

Social isolation and fear of missing out

While social media allows for more connections, these may be superficial and lack the depth of face-to-face social interactions. This can lead to feelings of social disconnection and loneliness, which contribute to symptoms such as depression and anxiety.[3, 4]

During adolescence, social media can amplify the significance of peer approval. Young people, particularly those with low self-esteem, may be more likely to experience feelings of exclusion and rejection, which are strongly linked to anxiety and depressive symptoms.[5, 6]

Upward social comparison

Social media fosters an environment of comparison with others, which can lead to negative self-perception and decreased self-esteem. Leaked documents have shown that social media companies themselves have sold markers of adolescents' psychological vulnerability (such as when a selfie is deleted) to marketing companies.[7] Adolescents, perhaps especially girls, may be more vulnerable to this at a developmental stage where peer feedback heavily influences self-worth.[5, 8]

The culture of presenting an idealised version of oneself on social media can increase feelings of pressure to achieve perfection, particularly among adolescent girls. This pressure can be linked to anxiety, stress, and negative body image.[9]

Addiction and compulsive use

Social media can lead to compulsive behaviour resembling addiction. Young people may experience symptoms such as irritability, withdrawal, and difficulty focusing when unable to access social media, leading to heightened stress, anxiety, and even depression.[6, 10]

Exposure to harmful content

It is estimated that almost 70% of young people aged 13-24 have experienced harmful content online,[11] such as inappropriate sexual material, violence or substance misuse. This exposure may affect anxiety and depression symptoms, as well as the development of risky behaviours.[2]

Displacement of beneficial activities

Social media use can displace time spent on activities that benefit mental well-being, such as sleep, face-to-face social interaction, and physical activities. This displacement can reduce well-being, increase stress, and contribute to feelings of loneliness and depression.[6]

For example, excessive screen time, particularly before bedtime, can disrupt sleep patterns. Poor sleep is closely linked to poor mental health, such as depression and anxiety, and can exacerbate the negative impact of social media on adolescent well-being.[12, 13]

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

There is some evidence that suggests that social media use is associated with mental health outcomes such as antisocial behaviours and risk behaviours. Purba et al. (2023) conducted a systematic review of 126 studies, of which 73 were included in a meta-analysis, comprising data from 1,431,534 adolescents aged 10 to 19 years.[14] The studies were conducted primarily in high-income countries such as the UK, USA, and several European nations. Social media use was typically measured via self-reported frequency or intensity.

The meta-analysis found that social media use was significantly associated with externalising behaviours. For antisocial behaviour, which included bullying, physical assault, and delinquent acts, the pooled odds ratio was 1.73, 95% CI [1.44, 2.06], based on 54,993 adolescents. Significant associations were also found for substance use behaviours. For example, for alcohol use (n = 383,068), the odds ratio was 1.48, 95% CI [1.35, 1.62]; for tobacco use (n = 424,326), 1.85, 95% CI [1.49, 2.30]; and for drug use (n = 117,646), 1.28, 95% CI [1.06, 1.56]. However, it is not clear whether these associations are causal, and the theories above mostly point towards increases in emotional symptoms.

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

Overall, young people's social media and smartphone use soared from 2010 to 2025. In 2010, social media was still relatively new for teens (with limited daily use, especially among under-14s), and smartphones were not yet ubiquitous. Over the next decade, social networking became nearly universal among youth, and the smartphone transformed into the primary screen for this age group. Average daily screen time

roughly doubled over the period, rising from around 1–2 hours in the early 2010s to 3–6 hours per day in the early 2020s.[15] This varies by age group. 18–24-year-olds averaged about 6 hours online per day in 2024. At the same time, there has also been a steep increase in smartphone ownership among 12–15-year-olds; 35% of this age group owned a smartphone in 2010, 41% in 2011,[16] 65% in 2014[17] and 83% in 2017. This then plateaued and has remained similar since 2017.[18]

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the risk factor has changed during the relevant period?

N/A

Effect on Mental Health

Q6: Is there evidence that the risk factor is associated with young people's mental health?

Two recently published umbrella reviews report that social media is negatively associated with mental health, particularly symptoms of anxiety and depression.[19, 20] The umbrella review by Sanders et al. highlights small but consistent associations between social media use and poor mental health.[20] Similarly, Sala et al. reported that social media use and other types of screen use is negatively correlated with anxiety and depressive symptoms.[19] In another review, specifically of smartphone use, Girela-Serrano et al. report an association between smartphone use and poorer mental health symptoms.[21]

Q7: Is there evidence from longitudinal studies where the risk factor is measured before mental health?

Much of the evidence of correlation between smartphone or social media use and mental health in the umbrella and systematic reviews comes from cross-sectional studies[19, 20] and many reviews do not isolate evidence from longitudinal studies. In their review, Santos et al. (2023) found that social media use was consistently associated with worse mental health outcomes among adolescents, particularly a higher risk of depression in girls.[22] Although the majority of studies included were cross-sectional, the longitudinal studies similarly supported a negative association, especially for social media use during weekdays.

Tang et al. reviewed only longitudinal studies and reported that increased social media use showed a small but positive association with later depressive symptoms[23] In a narrative review In a narrative review, Girela-Serrano et al. also noted that there is insufficient longitudinal evidence on smartphone use and mental health problems to draw firm causal conclusions.[21] Li et al. (2022) conducted a meta-analysis of longitudinal studies involving 241,398 participants, reporting that young people with higher exposure to screen time had a 10% increased risk of later depressive symptoms compared to those with lower exposure.[24]

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

From the systematic review literature, Ferguson et al. (2022) noted that in their analysis of longitudinal studies, studies that controlled for relevant third variables, including baseline mental health, generally reported negative associations, albeit with lower effect sizes.[25] Santos et al. (2023) noted that many longitudinal studies explicitly included potential confounders such as socio-economic factors, physical activity, and sleep when examining the relationship between screen time and mental health outcomes.[22] The review suggested that replacing screen time with physical activities could have a protective effect on mental health. Similarly, Li et al. (2022) mentioned that some cohort studies adjusted for key confounders like age, gender, and physical activity.[24] However, not all studies adjusted for these variables, which limits our ability to draw robust conclusions about the causal impact of screen time on youth mental health.

Due to this lack of quality assessment of confounding in the systematic review literature, we provide a more in-depth assessment of UK cohort studies. Using the Millenium Cohort Study, Kelly et al. (2018) controlled for internalising symptoms at age 11, as well as family income, family structure, and age when assessing the relationship between social media use and depressive symptoms at age 14.[26] They reported high-social media usage was associated with depressive symptoms, particularly in girls. Because this study is assessing mental health at the same time as social media, it is still subject to reverse causality, whereby some of the observed association is due to the outcome (mental health) causing the exposure (level of social media use).

Using Understanding Society, Plackett et al. (2023) controlled for mental health at ages 12-13, along with socio-economic factors (e.g. household income) and demographic factors (e.g. age, ethnicity) and did not find any association between social media use at age 12-13 and mental health outcomes at 14-15[27]. However, it is likely that this study design *overcontrols* for mental health, because controlling for mental health measured

at the same time as the exposure means it is looking for an effect of the exposure that's independent of current mental health, and as social media might be strongly affecting current mental health, this may explain the null effect. Using a measure of mental health before the exposure, or proxy measures for mental health (e.g. parental mental health), is likely a more effective way to control for confounding.

In another longitudinal analysis of Understanding Society taken during the COVID-19 pandemic, Lowthian et al. (2023) examined how patterns of online communication identified through latent class analysis in November 2020 predicted mental, social, and physical well-being outcomes in March 2021, controlling for age, sex, ethnicity, parental education, and baseline emotional and conduct problems.[28] They showed that, in the adjusted analysis, "Avid users" had consistently poorer mental health outcomes over time compared to other groups. Similarly, Metherell et al. (2022) conducted a longitudinal analysis using data from the Understanding Society study to examine whether digital exclusion during the COVID-19 pandemic predicted changes in adolescent mental health.[29] The study included 1,387 adolescents aged 10 to 15, with mental health assessed across four waves—one pre-pandemic (2017–2019) and three during the pandemic (2020–2021)—using the Strengths and Difficulties Questionnaire (SDQ). Digital exclusion was defined as lacking access to a computer or a good internet connection for schoolwork. Using latent growth curve modelling, the authors indicated that, after adjusting for key confounders including age, sex, ethnicity, and household income, 24% of adolescents without computer access reached the "high" or "very high" SDQ range during the pandemic, compared to 14% of those with access. No significant association was found for internet access after adjustment.

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

A US study used the staggered rollout of Facebook at US colleges to estimate its impact on student mental health.[30] Analysing data from over 430,000 students through the National College Health Assessment, the study reported that Facebook's introduction led to a significant rise in depression and anxiety symptoms, with a 0.085 standard deviation increase in poor mental health and a 2% rise in depression diagnoses. The negative effects were most pronounced among vulnerable students, those who have weaker offline social networks and those with lower socioeconomic status.

Q10: Is there evidence from randomised controlled trials demonstrating that removing or reducing the risk factor improves young people's mental health?

Four systematic reviews have been conducted to examine either reductions or detox from social media or smartphones and mental health outcomes.[31-34] These find mixed results: two report significant reductions in depression,[31, 34] and two conclude there is no significant impact [32, 33]. However, none of these studies had age restrictions, and it could be hypothesised that the impact of social media and smartphone use is only notable for young people.

To find relevant RCTs conducted in young people, we cross-referenced included studies from these reviews and (after removing duplicates) identified 19 individual randomised trials. We screened these for studies that: have a mean age between 10 and 24, where the intervention lasted at least one week, and the sample size was at least 50 participants. This resulted in 2 relevant trials. Hand searches revealed 3 more studies published since these systematic reviews were completed. Table T54 summarises these and their findings on symptoms of depression and anxiety.

4 out of 5 of these studies report significant improvements in young people's depression from those randomised to interventions aimed at rescripting or abstaining from social media use. 3 out of 5 of these studies report improvements in anxiety symptoms. Broader wellbeing measures such as loneliness, sleep quality, and body image dissatisfaction also improved in some studies, although these effects were not universal.

Table T4: randomised controlled trials of social media interventions in young people

Study	Population	Intervention	Duration	Depression results	Anxiety results	Notes
Davis & Goldfield, 2025[35] *(Canada)*	N=260, distressed[1] youth (mean =19)	Social media ≤1 hr/day	3 weeks	CES-D: large improvement compared to control (η^2 = .24; p = 0.02)	GAD-7: large improvement compared to control (η^2 = .27; p =.02)	Also, an effect on fear-of missing out (FOMO) and sleep
Pieh et al. 2025[36] *(Austria)*	111 students (mean age = 22.7)	Smartphone use reduction	3 weeks	PHQ-9: medium improvement (η^2 = .11; p <0.001)	NA	Also, small effect on sleep and stress

de Hesselle & Montag, 2024[37] *(Germany)*	86 young women (mean age = 23 years)	2-week social media abstinence	2 weeks	PHQ-4 depression: No significant difference	PHQ-4 anxiety: No significant difference	Positive effect on body image dissatisfaction
Mosquera et al., 2020 *(US)*[38]	N=167 university students (mean age ≈20.5)	One-week Facebook abstinence	1 week	OECD measure of depression: significant improvement of 0.57 points (approx[2] 95% CI: 0.1 to 1.1)	*NA*	No measured effect of intervention on worry or other domains of wellbeing
Hunt et al., 2018[39] *(USA)*	N=143, undergraduates (ages 18–22)	Social media ≤10 min/day	3 weeks	BDI-II: Significant reduction vs. control only in those with symptoms of depression	STAI-State: No difference detected	Loneliness improved significantly (p =0.01)

[1]distressed defined as reporting 2 of 4 symptoms of anxiety and depression
[2]Approximate confidence intervals come from a figure and are not directly reported

Also of note, Smith et al (2024) found that female undergraduates randomised to take a week's break from social media reported higher self-esteem and body satisfaction.[40]

Also, Schmidt-Persson et al. (2024) report from an RCT of a screen time reduction initiative aimed at families with a younger sample (mean age 9.5) and showed a significant improvement in overall mental health scores.[41] The most notable benefits were observed for internalising symptoms, with a between-group mean difference of −1.03 (95% CI [−1.76, −0.29]).

Q11: Does the evidence indicate that there is a strong association?

Small associations have been reported from meta-analyses of observational studies. For example, Ferguson et al. (2022) conducted a meta-analysis reviewing 33 studies on the

effects of social media and smartphone use on young people's mental health and found small effect sizes below $r = 0.10$.[25]

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

Yes, this is available from systematic reviews. For example, Liu et al. (2022) conducted a dose–response meta-analysis to examine whether time spent on social media is associated with adolescent depression and whether a dose–response relationship exists.[42] The review included 26 studies (21 cross-sectional, 5 longitudinal) with a total of 55,340 adolescents aged 10–19 years. Social media use was assessed by self-reported daily hours on platforms such as Facebook and Instagram, while depression was measured using scales like the CESD, SMFQ, PHQ-9, and BDI. The pooled results demonstrated that greater time on social media was associated with a higher risk of depression, with an overall odds ratio (OR) of 1.60, 95% CI [1.45, 1.75]. A dose–response meta-analysis including five studies reported a linear relationship. Each additional hour of social media use was associated with a 13% increased risk of depression (OR = 1.13, 95% CI [1.09, 1.17]).

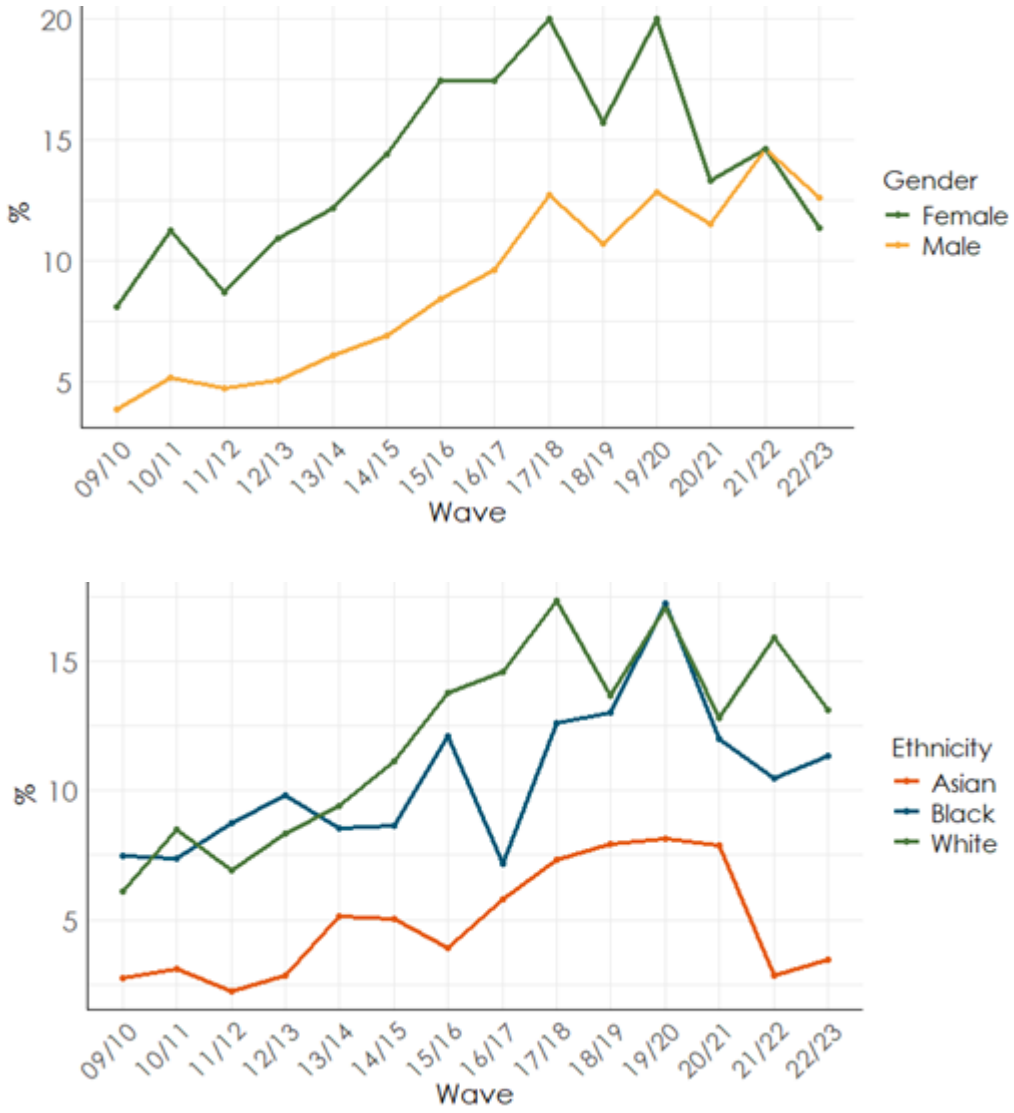
Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

Figure T9: Proportion of young people reporting four or more hours per weekday on social media

Young people aged 10-15 years, by sex and ethnicity, England, 2009 to 2023

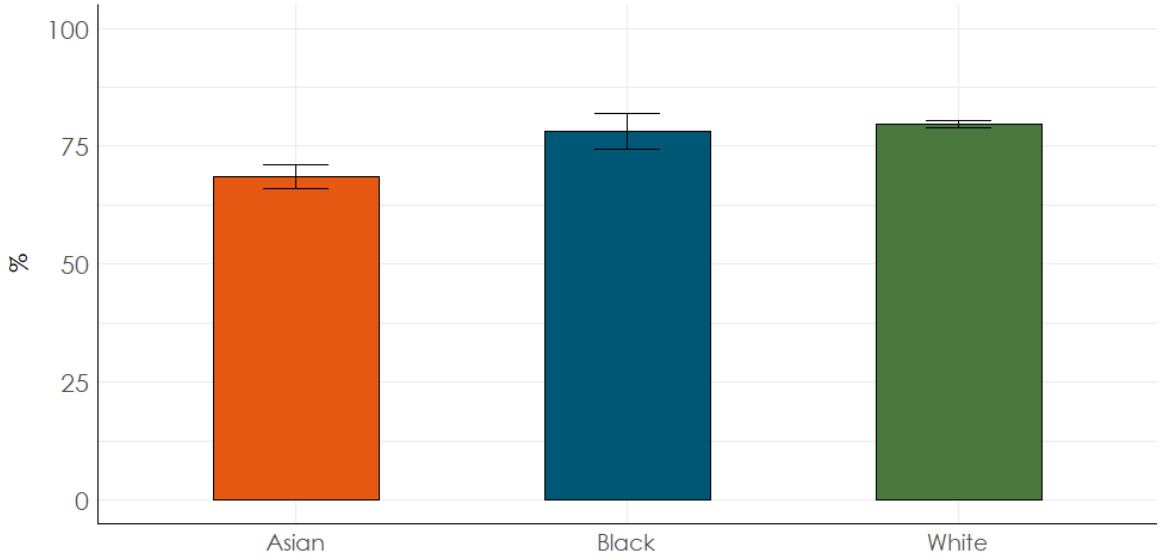


Source: Understanding Society

In part. Examining data on 10–15-year-olds from Understanding Society, the proportion of young people from South Asian backgrounds who reported ≥4 hours on social media per weekday or own a smartphone compared to peers was smaller than White British young people (Figure T9). However, the rates for Black young people were similar. The overall level of time spent on social media was greater for females; however, the trend was greater for boys.

Figure T10: Smartphone use by ethnicity

Young people aged 10-15 years, England, 2009 to 2023



Source: Understanding Society

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

Across the identified high-quality studies (e.g. longitudinal studies that controlled for key confounders), gender differences in the association between social media use and youth internalising symptoms were reported in two papers. Kelly et al. (2019), using data from over 10,000 UK adolescents, found that the association between social media use and depressive symptoms was significantly stronger for girls than for boys.[26] For example, adolescents using social media for 5 or more hours per day had higher depressive symptom scores compared to those using it for 1-3 hours. The increase was 50% for girls and 35% for boys, with a statistically significant interaction ($p < 0.05$). However, while the overall effect size was larger for girls, their mediation analysis revealed that the pathways explaining this association, such as poor sleep, low self-esteem, and body dissatisfaction, did not differ significantly by gender. In contrast, Plackett et al. (2023), analysing a different UK dataset of 3,228 adolescents, tested for a gender by social media use interaction and reported no significant moderation effect ($\beta = 0.21$, 95% CI [−0.43, 0.84]).[27]

With regard to ethnicity, two studies explored group differences. Plackett et al. (2023) reported that adolescents identifying as Black or African Caribbean reported lower average internalising symptom scores compared to their white peers ($\beta = -3.33$, 95% CI

[−6.09, −0.57]).[27] However, they did not find any evidence that ethnicity moderated the effect of social media use on internalising symptoms.

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

Among the identified high-quality studies, evidence for group differences in the effect of social media on internalising symptoms beyond gender and ethnicity, such as socio-economic status, is limited.

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

There is a substantial body of research evaluating the effect of social media use on youth mental health, including two umbrella reviews published in the last five years. While some studies are considered methodologically weak due to cross-sectional designs and lack of control for confounding variables, high-quality studies have also been identified (e.g. longitudinal studies with appropriate controls, RCTs, and natural experiments). These provide a solid foundation for evaluating the impact of social media.

Most of the evidence to date has relied on self-reported social media or smartphone use; however, a recent review highlighted that this is a poor measure when compared to objective measures (e.g. logs of use from smartphones themselves). [36] The 'noise' created by these errors will mean that the estimates from studies are inaccurate. It is even more complicated if the reporting error is causally linked to the mental health of the participant. Furthermore, the specific activities measured (e.g. social media, smartphone use, or gaming) are often not distinguished, potentially diluting effects attributable to particular activities.[43] This is particularly true for studies using screen time as the primary exposure, where conflating distinct digital activities may further obscure specific effects. Also, few studies break down the nature of social media engagement, such as content type, which is likely to be more relevant for mental health outcomes. While some distinguish between active and passive use, Valkenburg et al. (2021) argue this distinction is conceptually weak, noting that the same activity can have both positive and negative effects depending on context and user characteristics.[44]

The bidirectional relationship between poor mental health and social media use further complicates causal inference. Some studies control for mental health assessed concurrently with social media use, which risks 'overcontrolling' by removing any effect on future mental health that is due to its effect on current mental health. This will result in a biased estimate, towards the null. Conversely, other studies measure social media use simultaneously with mental health outcomes and control for prior mental health. Studies using this design will inflate observed effects due to reverse causality. A better approach would be to measure confounders before exposure and consider later mental health; however, few datasets provide this option.

Randomised trials overcome issues of measurement error and complexities associated with confounding by assigning participants randomly to well-defined interventions. However, existing trials have several limitations. All have small-to-medium sample sizes (ranging from 86 to 181 participants) and short follow-up periods (less than 3 months), restricting robust conclusions about long-term effects. Additionally, blinding of participants is not feasible, meaning participants assigned to abstinence may experience mental health improvements due to anticipation alone (a 'placebo effect'). This placebo effect could be particularly pronounced among volunteers in social media abstinence trials, who may already believe reducing social media use will benefit their mental health. Such self-selection further exaggerates treatment effects and limits the generalisability of findings.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable in relation to the theory or evidence base that might inform our evaluation of causality?

Many policy changes could inform our evidence of how social media affects mental health. For example, Australia's parliament has passed one of the most stringent social media restrictions for young people. Under the new law, anyone under 16 years old is banned from opening a social media account.[45] Policy changes such as these presents an opportunity for more robust studies on the effects of social media, such evidence is not yet available.

References

1. Nesi J, Choukas-Bradley S, Prinstein MJ. Transformation of Adolescent Peer Relations in the Social Media Context: Part 2—Application to Peer Group Processes and Future Directions for Research. Clinical Child and Family Psychology Review. 2018;21(3):295-319.

2. Viner RM, Gireesh A, Stiglic N, Hudson LD, Goddings A-L, Ward JL, et al. Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: a secondary analysis of longitudinal data. The Lancet Child & Adolescent Health. 2019;3(10):685-96.

3. Shakya HB, Christakis NA. Association of Facebook Use With Compromised Well-Being: A Longitudinal Study. American Journal of Epidemiology. 2017.

4. Twenge JM. Does Online Social Media Lead to Social Connection or Social Disconnection? Journal of College and Character. 2013;14(1):11-20.

5. Orben A, Blakemore S-J. How social media affects teen mental health: a missing link. Nature. 2023;614(7948):410-2.

6. Twenge JM. More Time on Technology, Less Happiness? Associations Between Digital-Media Use and Psychological Well-Being. Current Directions in Psychological Science. 2019;28(4):372-9.

7. Levin S. Facebook told advertisers it can identify teens feeling 'insecure' and 'worthless'. The Guardian. 2017.

8. Twenge JM, Martin GN. Gender differences in associations between digital media use and psychological well - being: Evidence from three large datasets. Journal of Adolescence. 2020;79(1):91-102.

9. Hogue JV, Mills JS. The effects of active social media engagement with peers on body image in young women. Body Image. 2019;28:1-5.

10. Rosen LD, Whaling K, Rab S, Carrier LM, Cheever NA. Is Facebook creating "iDisorders"? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. Computers in Human Behavior. 2013;29(3):1243-54.

11. Just one in six young people flag harmful content online [Web Page]. Ofcom2022 [updated 16 Mar 2023. Available from: https://www.ofcom.org.uk/online-safety/illegal-and-harmful-content/one-in-six-young-people-flag-harmful-content-online#:~:text=Two%20thirds%20of%20teens%20and,posts%20they%20may%20find%20harmful.

12. Orben A, Przybylski AK, Blakemore S-J, Kievit RA. Windows of developmental sensitivity to social media. Nature Communications. 2022;13(1):1649-.

13. Twenge JM, Martin GN, Spitzberg BH. Trends in U.S. Adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near) demise of print. Psychology of Popular Media Culture. 2019;8(4):329-45.

14. Purba AKT, R M; Henery, P M; Pearce, A; Henderson, M; Katikireddi, S V. Social media use and health risk behaviours in young people: systematic review and meta-analysis. BMJ. 2023;383:e073552.

15. Screen use and health in young

people. UK Parliament POST; 2020. Contract No.: 635.

16. Children and parents: media use and attitudes report. London: Ofcom; 2011.

17. Children and Parents: Media Use and Attitudes Report. London: Ofcom; 2014.

18. Children and Parents: Media Use and Attitudes Report. London: Ofcom; 2024.

19. Sala A, Porcaro L, Gómez E. Social Media Use and adolescents' mental health and well-being: An umbrella review. Computers in Human Behavior Reports. 2024;14:100404-.

20. Sanders T, Noetel M, Parker P, Del Pozo Cruz B, Biddle S, Ronto R, et al. An umbrella review of the benefits and risks associated with youths' interactions with electronic screens. Nature Human Behaviour. 2023;8(1):82-99.

21. Girela-Serrano BM, Spiers ADV, Ruotong L, Gangadia S, Toledano MB, Di Simplicio M. Impact of mobile phones and wireless devices use on children and adolescents' mental health: a systematic review. European Child & Adolescent Psychiatry. 2024;33(6):1621-51.

22. Santos RMS, Mendes CG, Sen Bressani GY, de Alcantara Ventura S, de Almeida Nogueira YJ, de Miranda DM, et al. The associations between screen time and mental health in adolescents: a systematic review. BMC Psychology. 2023;11(1):127-.

23. Tang SW-S, A; Torok, M; Mackinnon, A J; Christensen, H. The relationship between screen time and mental health in young people: A systematic review of longitudinal studies. Clinical Psychology Review. 2021;86.

24. Li L, Zhang Q, Zhu L, Zeng G, Huang H, Zhuge J, et al. Screen time and depression risk: A meta-analysis of cohort studies. Frontiers in Psychiatry. 2022;13.

25. Ferguson CJ, Kaye LK, Branley-Bell D, Markey P, Ivory JD, Klisanin D, et al. Like this meta-analysis: Screen media and mental health. Professional Psychology: Research and Practice. 2022;53(2):205-14.

26. Kelly Y, Zilanawala A, Booker C, Sacker A. Social Media Use and Adolescent Mental Health: Findings From the UK Millennium Cohort Study. EClinicalMedicine. 2018;6:59-68.

27. Plackett R, Sheringham J, Dykxhoorn J. The Longitudinal Impact of Social Media Use on UK Adolescents' Mental Health: Longitudinal Observational Study. Journal of Medical Internet Research. 2023;25:e43213-e.

28. Lowthian EF, G; Wakeham, C; Clegg, Z; Crick, T; Anthony, R. Identifying protective and risk behavior patterns of online communication in young people. Journal of Adolescence. 2023;96(2).

29. Metherell TEG, S; McCormick, E M; Ford, T J; Orben, A. Digital access constraints predict worse mental health among adolescents during COVID-19. Scientific Reports. 2022;12:19088.

30. Braghieri L, Levy Re, Makarin A. Social Media and Mental Health. American Economic Review. 2022;112(11):3660-93.

31. Liu YM, E M W; Azlan, A A; Tan, Y. Am I Happier Without You? Social Media Detox and Well-Being: A Meta-Analysis of Randomized Controlled Trials. Behavioural Sciences. 2025;15:290.

32. Plackett RB, A; Schartau, P. he Impact of Social Media Use Interventions on Mental Well-Being: Systematic Review. J Med Internet Res. 2023;25:e44922.

33. Lemahieu LVZ, Y; Mennes, M; oster E H W; Van den Abeele, M M P; Poels, K. The effects of social media abstinence on affective well-being and life satisfaction: a systematic review and meta-analysis. Scientific Reports. 2025;15:7581.

34. Ranadhan RNR, D D; Yumnashia, D A; Setiono, S B; Tjandra, K C; Ariyanto, M V; Idrisov, B; Empitu, M A. Impacts of digital social media detox for mental health: A systematic review and meta-analysis. narra j. 2024;2(4).

35. Davis CG, GS. Limiting social media use decreases depression, anxiety, and fear of missing out in youth with emotional distress: A randomized controlled trial. Psychology of Popular Media. 2025;14(1):1-11.

36. Pieh CH, E; Hoenigl, A; Schwab, J; Mayerhofer, D; Dale, R; Haider, K. Smartphone screen time reduction improves mental health: a randomized controlled trial. BMC Medicine. 2025;23(107).

37. de Hesselle LM, C. Effects of a 14-day social media abstinence on mental health and well-being: results from an experimental study. BMC Psychology. 2024;12(1).

38. Mosquera RO, M; McNamara, T; Xiongfei, G; Petrie, R. The economic effects of Facebook. Experimental Economics. 2020;23(2):576-602.

39. Hunt MG, Marx R, Lipson C, Young J. No More FOMO: Limiting Social Media Decreases Loneliness and Depression. Journal of Social and Clinical Psychology. 2018;37(10):751-68.

40. Smith OEMJSS, L. Taking a one-week break from social media leads to better self-esteem and body image among young women. Body Image. 2024(49):101715.

41. Schmidt-Persson J, Rasmussen MGB, Sørensen SO, Mortensen SR, Olesen LG, Brage S, et al. Screen Media Use and Mental Health of Children and Adolescents. JAMA Network Open. 2024;7(7):e2419881-e.

42. Liu MK-D, K E; Zhang, J; Xiao, J; Dong D; Xue, P. Time Spent on Social Media and Risk of Depression in Adolescents: A Dose–Response Meta-Analysis. International Journal of Environmental Research and Public Health. 2022;9(19):51-64.

43. Orben AP, AK. The association between adolescent well-being and digital technology use. Nat Hum Behav. 2019;3.

44. Valkenburg PvD, II; Beyens, I. The associations of active and passive social media use with well-being: A critical scoping review. New Media & Society. 2021.

45. Ritchie H. Australia approves social media ban on under-16s: BBC News; 2024 [updated 28 Nov 2024. Available from: https://www.bbc.co.uk/news/articles/c89vjj0lxx9o.

10. Children and Youth Services

Searches were carried out as outlined at the start of Section F. Additional theory-specific search terms were as follows:

("family hub*" OR "community hub*" OR SureStart OR "children* centre*" OR "integrated service*" OR "whole-system" OR "multi-agency" OR "joined-up" OR "one-stop shop" OR "wraparound service*")
OR (cuts NEAR/6 service*) OR (austerity NEAR/6 service*) OR (reduc* NEAR/4 service*) OR "NHS mental health" OR CAMHS OR "Child and Adolescent Mental Health Service*" OR "mental health support team*" OR ("mental health" AND (service* OR provision))
OR ((communit* OR neighbourhood) AND (institution* OR space* OR service* OR resource*))
OR ("youth work*" AND (space* OR service* OR resource*)) OR "youth service*" OR "youth center*" OR "youth centre*"

Q1: How is the theory described, and what are the mechanisms by which a change in the factor would affect either general mental health or symptoms of low mood and anxiety?

The theory proposes that austerity-driven budget cuts in the UK during the 2010s, particularly affecting local councils, which led to fewer community services for children and young people, had a knock-on effect on the mental health and resilience of young people. By children and youth services, we specifically refer to community-based, non-specialist provisions aimed at prevention and early intervention (e.g. youth clubs, community centres, and structured youth activities), rather than specialist mental health treatment.

Three distinct, non-overlapping mechanisms have been suggested to explain how reductions in community services for children and young people could lead to deteriorating mental health:

Prevention: Community-based preventive services, such as Family Hubs and SureStart centres, provide integrated support aimed at bolstering children's socio-emotional development, parenting skills, and early identification of emerging mental health issues. Budget cuts and closures of these services have led to reduced early support, potentially exacerbating vulnerabilities to anxiety and depression by removing key protective factors at critical developmental stages.[1-3] It is argued that at present,

changes in infrastructure and cuts to these service has meant that delivery of current public service systems is now fragmented and can be difficult to navigate, particularly for families and communities who are experiencing disadvantage, and that this is feeding into poor ill health generally among children and young people.[4, 5]

Social connectedness: The closure of community institutions such as youth clubs and leisure spaces may have affected opportunities for social interaction, leading to increased social isolation and loneliness among young people, particularly affecting disadvantaged communities. Reduced opportunities for structured and supervised peer interaction negatively affect emotional well-being and can heighten symptoms of low mood and anxiety.

Early intervention: Community services for children and young people are an informal route for early identification and referral of young people experiencing initial symptoms of emotional distress. Budget cuts and subsequent closures of these institutions have meant fewer opportunities for early intervention, resulting in mental health difficulties becoming entrenched and more severe before support is accessed. This delay reduces the likelihood of effective management and increases the burden of symptoms experienced by young people. These closures and cuts may have led to higher thresholds for accessing mental health support, meaning many young people do not receive timely help, exacerbating mental health issues.[4, 6, 7]

Q2: Does it also predict increases in mental health symptoms that are not increasing over time, in particular conduct disorder?

Cuts to services may also have contributed to externalising behaviours. Higher thresholds for accessing care mean that many young people do not receive support until their distress escalates, potentially leading to increased aggression, impulsivity, and self-harm.[4] Community service cuts have also removed key protective factors that may have once mitigated externalising behaviours. The closure of youth centres and the loss of structured activities have resulted in more young people spending time in unsupervised spaces, increasing their risk of engaging in antisocial behaviour and substance use.[8] Schools have been expected to fill these gaps, but financial and structural limitations have hindered their ability to provide adequate support. While initiatives like Mental Health Support Teams (MHSTs) show promise, their implementation has faced challenges, reducing their effectiveness in addressing externalising behaviours.[9] However, well-funded school interventions have been linked to reductions in violence and antisocial behaviour, highlighting the need for greater investment in educational mental health support.[3]

Q3: Does the theory omit important biological, social, cultural, or contextual factors that affect its plausibility and/or limit its relevance to young people in England?

No. The theory considers key structural factors affecting young people's mental health in England, including cuts to mental health services, fragmentation of public support, and the loss of community spaces. It also accounts for psychological mechanisms such as increased thresholds for accessing care and the impact of reduced early intervention on emotional regulation and distress management.

Trend Considerations

Q4: Is there evidence that the level/prevalence of the risk factor has changed over the period during which we observe increases in mental health problems?

Yes, there is substantial evidence indicating that community services for children and young people have significantly declined during the austerity period of the 2010s. Central government grants to councils for children's services fell by approximately 22% in real terms between 2010–11 and 2020–21[10] and between 2010–11 and 2023–24, local authority spending on services for children and young people in England fell by 73% in real terms, from £1.41 billion to £447.5 million.[11]

These cuts have affected both open-access community-based services for children and young people (e.g. youth clubs, leisure and enrichment activities) and targeted provision (e.g. mental health support, substance misuse programmes, youth justice initiatives). At least 1,243 council-run youth centres were closed across England and Wales between 2010 and 2023, with only 581 remaining open at the start of the 2022–23 financial year.[11] This significant reduction in funding led directly to the closure of approximately 750 youth centres[12] and the elimination of over 4,500 youth worker jobs nationally during the same period. Early intervention services, including children's centres, youth outreach, family support, and parenting programmes, experienced even greater cuts, plummeting by around 46% over the decade.[13] Furthermore, SureStart centres, crucial for early preventive support, saw closures exceeding 1,200 centres post-2010.[5, 14] Additionally, school-based mental health initiatives have struggled due to high staff turnover and inconsistent funding, limiting their effectiveness.[15] Regional inequalities have further restricted access. The most deprived areas have faced the deepest cuts, while wealthier regions have maintained better service provision.[14]

Q5: If there is no direct evidence for Q4, is it plausible that either the level/prevalence of the factor has changed during the relevant period?

N/A

Effect on Mental Health

Q6: Is there evidence that the factor is associated with young people's mental health?

Yes. A key 2024 review by the University of Warwick (2024) for the Department for Culture, Media and Sport[16] indicates that participation in open-access youth activities is positively associated with young people's mental health. This systematic review screened over 20,000 studies and included 77, and found convincing evidence demonstrating positive associations across multiple mental health outcomes, including reduced anxiety, depression, emotional distress, and improved overall mental wellbeing. Additionally, these youth activities were associated with secondary mental health-related outcomes such as reduced loneliness, enhanced resilience, improved self-esteem, and stronger social connectedness.

An umbrella review by Boelens et al. (2022) further reinforces these findings, identifying consistent positive associations between young people's participation in organised community activities—such as youth clubs, sports, and arts programmes—and improved mental health outcomes.[17] The effect sizes were modest but consistently positive across different contexts, demonstrating reductions in depressive and anxiety symptoms and emotional distress.

In another review, Osborn et al. (2021) reviewed 16 interventions aimed at reducing loneliness among adolescents, with 14 showing statistically significant reductions in loneliness and social isolation.[18]

Q7: Is there evidence that comes from longitudinal studies where the factor is measured before mental health?

The 2024 report for the UK Department for Culture, Media and Sport draws on five UK longitudinal datasets (e.g. the UK Household Longitudinal Study [UKHLS] and the

Millennium Cohort Study [MCS]) to examine the effects of weekly participation in youth clubs on outcomes later in life, covering ages 10 to 26, with one cohort tracking outcomes up to age 30.[16] In some cohorts, such as MCS and UKHLS, the models also adjusted for baseline mental health indicators. The report found statistically significant associations between weekly youth provision participation and improved mental health outcomes. For example, in the MCS, youth club participants at age 14 were 2 percentage points less likely to report feeling unhappy or miserable compared to non-participants (59% vs. 61%). In UKHLS, participants had significantly lower emotional symptoms scores (2.90 vs. 3.14) and higher prosocial behaviour scores (7.75 vs. 7.44) on the Strengths and Difficulties Questionnaire. Overall, the evidence supports a consistent link between youth club participation and improved mental health trajectories across multiple cohorts.[16]

Q8: Where evidence comes from longitudinal studies, do those studies account for important confounding factors, such as socio-economic factors and particularly mental health measured before or at the same time as the exposure?

In some cohorts, such as MCS and UKHLS, the models also adjusted for baseline mental health indicators. The report found statistically significant associations between weekly youth provision participation and improved mental health outcomes. For example, in the MCS, youth club participants at age 14 were 2 percentage points less likely to report feeling unhappy or miserable compared to non-participants (59% vs. 61%). In UKHLS, participants had significantly lower emotional symptoms scores (2.90 vs. 3.14) and higher prosocial behaviour scores (7.75 vs. 7.44) on the Strengths and Difficulties Questionnaire. Overall, the evidence supports a consistent link between youth club participation and improved mental health trajectories across multiple cohorts.[16]

Q9: Is there evidence from natural experiments (e.g. policy evaluation, sibling analyses, instrumental variable analysis)?

A study by the IFS exploited the staggered opening of Sure Start centres in the UK.[2] They used difference-in-difference models to estimate what outcomes *would have been* in the absence of 'treatment' (one additional centre) by using trends in not-yet-treated areas as comparators. Their models suggested that exposure to an additional Sure Start centre at birth led to a decrease in the probability of a mental health hospital admission at ages 12-14 by almost 50%, after controlling for neighbourhood and area effects. Due to using hospital-level statistics, they only capture the more extreme end of distress and are unable to evaluate the impact on internalising symptoms that do not result in a hospitalisation.

Q10: Is there evidence from randomised controlled trials demonstrating that changing the factor improves young people's mental health?

From the DCMS report, 41 out of the 77 studies were randomised controlled trials.[16] These generally showed that services for children and young people can positively impact young people's mental health or proximal outcomes. For example, an evaluation of an integrated adventure, community and mentoring programme (Project K) showed substantial positive effects on self-efficacy, resilience, and general wellbeing, with large effect sizes (d = 0.93 for self-efficacy and d = 0.77 for connectedness. A 2017 meta-analyses of randomised controlled trials of positive youth development interventions delivered outside of school settings showed small but significant effects on reductions in emotional distress (Hedge's g = 0.14, 95% CI 0.00 – 0.29).[19]

Q11: Does the evidence indicate that there is a strong association?

The results from meta-analyses and longitudinal studies suggest a moderate effect of preventative, early-intervention or acute mental health services.[16, 19] However, caution is needed, as individual longitudinal studies normally only report the mean difference in scores before and after the intervention. Thus, a moderate effect is a reasonable subjective evaluation when also considering the results from meta-analyses.

Q12: Is there evidence of a dose-response relationship between the risk factor and mental health outcomes (i.e. does a change in the level of exposure lead to a change in the outcome variable)?

Not that we are aware of, based on the identified evidence. However, it is plausible to expect that the more service sessions a young person attends, the greater the potential for a more profound effect.

Subgroup considerations

13. To what extent does the evidence explain subgroup differences in mental health trends (i.e. largest increases among white British young people and girls)? Specifically:

A. Was there a steeper increase in the risk factor for these groups?

No direct evidence was identified to suggest any group differences. However, linguistic and cultural barriers in service delivery may pose obstacles for certain ethnic groups. Standardised interventions such as Cognitive Behavioural Therapy (CBT) may be poorly suited to some ethnic minority communities due to differences in conceptualising mental health problems, language barriers, and the lack of culturally adapted treatments[9].

B. Is there evidence that the risk factor has a stronger effect on mental health in these groups?

No high-quality studies examined subgroup specific differences in the association between youth services and subsequent emotional problems.

C. Were there greater increases in the risk factor or stronger effects of the risk factor in groups that we do not see diverging trends, for example, those in lower socio-economic groups?

No evidence has been identified to suggest differential effects across socioeconomic groups. However, Kehoe et al. (2013), evaluating the Tuning into Teens programme, found that youth with higher pre-existing internalising symptoms and parents with greater difficulties in emotion regulation benefited more from the intervention.[21] This suggests that groups with higher baseline needs may experience stronger effects.

Overall strength and limitations

Q14: Are there any strengths or methodological concerns (e.g. generalisability, sampling, or measurement issues) to consider when evaluating the quality of the evidence?

Evidence has been identified to evaluate the effect of service access, including systematic reviews, providing a foundation for assessing its impact on young people's mental health.

One major concern is that the evidence reviewed primarily evaluates the effect of specific intervention programmes on youth mental health. Given this focus, it is unsurprising that these studies consistently report beneficial effects of programme engagement. While the fact that participation improves outcomes does not necessarily imply that non-participation is harmful, the theoretical framing here centres on the removal or reduction of a resilience factor. From this perspective, direct evidence of harm may not be necessary. Even if service constraints (e.g. long wait times) are not

shown to actively cause poor outcomes, failing to provide timely support when needed may allow difficulties to escalate. In this sense, limited access can still play a meaningful role in shaping youth mental health outcomes.

Moreover, the current body of evidence predominantly focuses on specific treatment programmes or therapies targeting clinical populations, rather than on broader structural barriers to mental health care, such as delays in access or insufficient service provision, and their impact on the general population. A further limitation is that much of this evidence comes from international contexts, meaning findings may not fully reflect the structure, availability, or policy landscape of youth mental health services in the UK. Additionally, none of the identified longitudinal studies account for key confounders, such as socio-economic status, which significantly restricts the ability to draw causal conclusions about the relationship between service access and youth mental health outcomes in the UK context.

Other/unanticipated

Q15: Is there anything else not covered in the above questions that is notable about the theory or evidence base that might inform our evaluation of causality?

Not that we are aware of.

References

1. Anning A, Ball M. Improving services for young children : from Sure Start to children's centres. 1 ed. Los Angeles: SAGE; 2008.

2. Cattan C, Conti G, Farquharson C, Ginja R, Pecher M. The health effects of universal early childhood interventions: evidence from Sure Start. London: Institute for Fiscal Studies; 2022.

3. Todd L, Pini S, Mathai M, et al. A country that works for all children and young people: An evidence-based plan for building the foundations of a new "Sure Start" in and around education settings. 2024.

4. Callaghan JEM, Fellin LC, Warner-Gale F. A critical analysis of Child and Adolescent Mental Health Services policy in England. Clinical Child Psychology and Psychiatry. 2017;22(1):109-27.

5. Webb CJR, Bywaters P. Austerity, rationing and inequity: trends in children's and young peoples' services expenditure in England between 2010 and 2015. Local Government Studies. 2018;44(3):391-415.

6. Docherty M, Thornicroft G. Specialist mental health services in England in 2014: overview of funding, access and levels of care. International Journal of Mental Health Systems. 2015;9(1):34-.

7. Mattheys K. The Coalition, austerity and mental health. Disability & Society. 2015;30(3):475-8.

8. Price T. "They pulled that funding away, and we're not recovering it's getting worse": deaths of despair in post-austerity northeast England. International Journal for Equity in Health. 2024;23(1):242-.

9. Ellins J, Hocking L, Al-Haboubi M, Newbould J, Fenton S-J, Daniel K, et al. Implementing mental health support teams in schools and colleges: the perspectives of programme implementers and service providers. Journal of Mental Health. 2024;33(6):714-20.

10. Franklin JL, J; Mansoor, M. The well-worn path: Children's services spending 2010-11

to 2021-22. The Children's Society; 2023.

11. Beyond the Brink?: The state of funding for youth services. YMCA; 2025.

12. : National Youth Agency. 2023. Available from: https://nya.org.uk/youth-centre-closures-linked-to-greater-risk-of-young-people-entering-criminal-justice-system/.

13. Britain's Lost Generation: Government cuts have shattered council youth services and left vulnerable youngsters exposed. UNISON; 2024.

14. Fahy K, Alexiou A, Daras K, Mason K, Bennett D, Taylor-Robinson D, et al. Mental health impact of cuts to local government spending on cultural, environmental and planning services in England: a longitudinal ecological study. BMC Public Health. 2023;23(1):1441-.

15. Cummins I. The Impact of Austerity on Mental Health Service Provision: A UK Perspective. International Journal of Environmental Research and Public Health. 2018;15(6):1145-.

16. Youth provision and lifeoutcomes: A study of longitudinal research. SQW; 2024.

17. Boelens MS, MS; Raat, H; Bramer, M W; Jansen, W. Impact of organized activities on mental health in children and adolescents: An umbrella review. Prev Med Rep. 2021;25:101687.

18. Osborn TW, P; French, R S. Interventions to address loneliness and social isolation in young people: A systematic review of the evidence on acceptability and effectiveness. Journal of Adolescence. 2021;93:53-79.

19. Ciocanel OP, K; Eriksen, A; Gillings, K. Effectiveness of Positive Youth Development Interventions: A Meta-Analysis of Randomized Controlled Trials. J Youth Adolesc. 2017;46(3).

20. Clark TC, Johnson EA, Kekus M, Newman J, Patel PS, Fleming T, et al. Facilitating Access to Effective and Appropriate Care for Youth With Mild to Moderate Mental Health Concerns in New Zealand. Journal of Child and Adolescent Psychiatric Nursing. 2014;27(4):190-200.

21. Kehoe CE, Havighurst SS, Harley AE. Tuning in to Teens: Improving Parent Emotion Socialization to Reduce Youth Internalizing Difficulties. Social Development. 2014;23(2):413-31.