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Mental health and school absenteeism in children with long-term physical conditions: A secondary analysis of the British Child and Adolescent Mental Health Surveys 2004 and 2007

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Abstract

Background: Children and young people (CYP) with long-term physical conditions (LTCs) are more likely to have poorer mental health and more school absenteeism compared with CYP with no LTCs. However, there is limited longitudinal research, and the extent to which these difficulties persist in CYP with LTCs is unknown. Furthermore, little is known about the relative impact of different types of LTC on mental health and absenteeism.

Methods: We investigated cross-sectional and longitudinal associations of different LTCs with mental health and school absenteeism in a large ($N = 7977$) nationally representative survey of CYP in Great Britain and its 3-year follow-up. Psychopathology was assessed using the parent-reported Strengths and Difficulties Questionnaire (SDQ), and diagnosis of any psychiatric disorder using the Development and Wellbeing Assessment (DAWBA). Days absent and persistent absence (missing 10% or more of school days) were reported by parents.

Results: Compared with those with no LTCs, CYP with any LTC had higher SDQ total difficulties scores at baseline (adjusted mean difference 1.4, 1.1–1.6) and follow-up (1.1, 0.8–1.4) and were more likely to have a psychiatric disorder at baseline (adjusted odds ratio [aOR] 1.59, 1.34–1.89) and follow-up (1.75, 1.44–2.12). Children with any LTC also missed more days of school at baseline (adjusted incidence rate ratio 1.47, 1.31–1.64) and follow-up (1.17, 1.00–1.36) and were more likely to be persistently absent (aOR baseline 1.78, 1.48–2.14; follow-up 1.27, 1.00–1.61). Neurodevelopmental disorders, migraines and atopic conditions were particularly strongly associated with both mental health and absenteeism.

Conclusions: Children with LTCs had poorer mental health and more school absence than those with no LTCs. Clinicians should routinely enquire about mental health and school attendance in CYP with LTCs and should collaborate with families and schools to ensure these children are provided with sufficient mental health and educational support.

1 | INTRODUCTION

Children and young people (CYP) with long-term physical conditions (LTCs) are more likely to experience mental health problems compared with their peers (Glazebrook et al., 2003; Hysing et al., 2007; Lum et al., 2019; Pearce et al., 2018; Pinquart & Shen, 2011; Wolock et al., 2020). For example, 5- to 15-year-olds attending paediatric outpatient clinics in the United Kingdom were more than twice as likely to have mental health problems compared with CYP from a general population sample, and for those attending neurological clinics the prevalence was more than five times greater (Glazebrook et al., 2003). The association between LTCs and poor mental health has been attributed to factors such as stress caused by the illness and its impact on quality of life; social stigma, difficulties maintaining peer relationships and increased susceptibility to bullying; difficulties in the family environment and impact of the LTC on family functioning; and biological pathways, including the physiological impact of LTCs on the brain, particularly with regard to neurological disorders (Davies et al., 2003; Layte & McCrory, 2013; Leeman et al., 2016; Olsson et al., 2003).

LTCs may also negatively impact attendance at school (Gottfried & Gee, 2017; Ingul et al., 2012; Lum et al., 2017, 2019). In a survey of 5- to 19-year-olds in Australia, those with chronic illness were nearly five times as likely to have missed at least 1 day of school in the last 2 weeks for illness-related reasons and more than twice as likely to have missed at least 1 day for non-illness reasons (Lum et al., 2019). Other research has shown that poor physical health is one of the strongest predictors of persistent absenteeism (Gottfried & Gee, 2017). Symptoms of the LTC, treatment side effects and attendance at medical appointments are likely to contribute to absenteeism, as well as difficulties with peer relationships and keeping up with schoolwork (Lum et al., 2017, 2019). Given that anxiety and depression are predictors of absenteeism (Finning et al., 2020), poor mental health may be an additional pathway through which LTCs impact attendance.

School provides children with important opportunities for academic, social and emotional learning, and chronic absenteeism is associated with poor academic attainment, school dropout, poor peer relationships and adult unemployment (Attwood & Croll, 2014; Hancock et al., 2013; Heyne et al., 2019; Malcolm et al., 2003). For CYP with LTCs regular school attendance may play an important role in maintaining a sense of normality and in supporting mental well-being (Boonen & Petry, 2012). This impact on mental health and school attendance may contribute significantly to the burden of LTCs and interventions targeting mental health, in addition to the provision of educational support, may be important considerations for CYP with LTCs (Boonen & Petry, 2012; Lum et al., 2019; Shaw et al., 2019). Although associations between LTCs, mental health and absenteeism are well established, most research is cross sectional and the extent to

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Key messages

- Children and young people (CYP) with long-term physical conditions (LTCs) had poorer mental health than those with no LTCs, both in the short term and at 3-year follow-up.
- CYP with LTCs had greater school absenteeism than those with no LTCs in the short term and, to a lesser degree, at 3-year follow-up.
- Neurodevelopmental conditions, migraines/severe headaches and atopic conditions were the conditions most strongly and consistently associated with mental health and school absenteeism.

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which these difficulties persist is unknown. Furthermore, less is known about the relative impact of different types of LTC (Allison & Attisha, 2019; Gottfried & Gee, 2017), and the mental health and educational needs of CYP with different conditions may not be equal. This study investigates cross-sectional and longitudinal associations of LTCs with mental health and school absenteeism. Specifically, we aim to address the following research questions:

1. Is there an association between LTCs and (a) mental health and (b) school absenteeism in a nationally representative sample of CYP in the United Kingdom?
2. Does having a LTC at baseline predict poorer mental health and/or greater school absenteeism at 3-year follow-up?
3. Do these associations vary according to the type of LTC?

2 | METHODS

The British Child and Adolescent Mental Health Survey (BCAMHS) had approval from Medical Research Ethics Committees (Green et al., 2005). Approval for this secondary analysis was granted by the University of Exeter College of Medicine and Health ethics committee (May20/D/247).

2.1 | Sample

The 2004 BCAMHS involved a representative sample of CYP aged 5–16 years living in Great Britain, sampled via the Child Benefits Register (Green et al., 2005). The Office for National Statistics

selected 426 postal sectors and randomly sampled 29 children per sector; 10 496 families were invited, and 7977 completed a baseline interview. Information was collected via face-to-face interviews with parents of all CYP (N = 7977) and CYP aged 11 or over themselves (N = 3344), and questionnaires were posted to teachers where parents consented (N = 6236). A follow-up was conducted in 2007, for which 7329 families were invited and 5326 (67% of the baseline sample) participated. Full details of survey methods are available elsewhere (Ford et al., 2020; Green et al., 2005). A diagram showing flow of participants is provided in Figure S1.

2.2 | Measures

2.2.1 | LTC (predictor)

We defined an LTC as a physical condition that is predicted to persist for at least 3 months, interferes with everyday activities, is likely to require medical care, and for which a cure is unlikely (Shaw et al., 2019; van der Lee et al., 2007). At baseline, parents reported whether their child had any condition from a list of 29 (Table S1), which we restricted to the 17 that met the criteria above. These were asthma, eczema, epilepsy, cerebral palsy, muscle disease(s), coordination problems, heart problems, kidney/urinary tract problems, migraines/severe headaches, deformities, spina bifida, chronic fatigue syndrome, cystic fibrosis, blood disorders, missing limb(s), diabetes, and cancer. We examined associations between mental health/absenteeism and having any of the 17 conditions listed above ('Any LTC'), as well as individual types of condition where sample sizes were sufficient. These were atopic conditions (asthma, eczema), migraine/severe headaches, neurodevelopmental conditions (epilepsy, cerebral palsy, muscle disease(s), coordination problems), deformities, kidney/urinary tract problems, and heart problems.

2.2.2 | Mental health (outcome)

Psychopathology
Both surveys used the parent-reported Strengths and Difficulties Questionnaire (SDQ), which is a validated questionnaire that screens for childhood psychopathology (Goodman, 2001). The SDQ comprises five subscales: emotional, conduct, hyperactivity-inattention, and peer problems; and prosocial behaviour. The first four are combined to produce a total difficulties score, which ranges from 0 to 40, with higher scores indicating greater difficulties. The SDQ has satisfactory test–retest reliability (teacher Pearson correlation coefficient [r] = 0.84, parent r = 0.76) and is able to discriminate between clinical and community samples (Stone et al., 2010). In the current sample the SDQ had good internal consistency (Cronbach's alpha [α] = 0.80).

Psychiatric disorder
The Development and Wellbeing Assessment (DAWBA) was used to assess psychiatric disorders according to the Diagnostic and Statistical

Manual of Mental Disorders (DSM-IV) (Goodman et al., 2000). The DAWBA is a diagnostic interview that combines structured and open-ended questions and incorporates information from parents, children and teachers. Computer-generated predictions of psychiatric disorders are produced, which are reviewed by clinical raters. In a validation study the DAWBA demonstrated excellent discrimination between clinical and community samples, and in the clinical sample there were high levels of agreement between DAWBA diagnoses and clinical case notes (van der Lee et al., 2007). We analysed a binary variable indicating diagnosis of any versus no psychiatric disorders.

2.2.3 | School absenteeism (outcome)

Days absent
Parents reported the number of days in the previous school term that the child was absent. Seven parents reported the number of days to be well in excess of the total number of days available in a school term. Most schools in England do not exceed 70 days of teaching in a term (Department for Education, 2015), so 70 was set as the maximum and the seven observations greater than this were coded as missing.

Persistent absence
Due to its importance in education policy, we also explored associations with persistent absence based on the 10% threshold used by the Department for Education (2019) (i.e. 7 days absent or more in the previous term).

2.2.4 | Potential confounders

Parents reported the following variables at baseline: child's age, sex and ethnicity; whether the child had any learning difficulties; number of stressful life events experienced by the child (e.g. parental separation, death of a close relative); family structure; housing tenure; and parental academic qualifications. All of these variables were selected for the current analysis based on their theoretical plausibility as confounders and/or previous literature indicating their relevance as confounders.

2.3 | Analysis

Analyses were conducted using Stata/SE 16.1. Variables were summarized for CYP with and without LTCs using means and standard deviations for continuous and count variables and numbers and percentages for categorical variables. We examined associations for 'Any LTC', followed by specific types of LTC. For the latter, the control group (i.e. no LTC) involved CYP with none of the 17 LTCs, and the LTC group included those with *only* that condition. Multiple imputation was used to adjust for the bias and loss of statistical power associated with missing values, on the assumption that data were

missing at random (MAR) (Rubin, 1976; Sterne et al., 2009). Fifty imputed datasets were generated using the chained equations approach (Lee & Carlin, 2010). The imputation model included LTCs, outcome variables, and background variables.

Regression models examined the impact of having an LTC at baseline on all outcomes at baseline and 3-year follow-up using linear, logistic and negative binomial regression for continuous, binary and count variables, respectively. We excluded individuals who were missing data on absence (*n* = 387) at baseline because otherwise sensitivity analyses would have involved different individuals across the imputed datasets. The final analytic sample, therefore, included 7590 CYP. Unadjusted models were followed by models adjusted for the background variables that were associated with at least one outcome at the 5% level. These were age, sex, ethnicity, learning difficulties, number of stressful life events, parental qualifications, housing tenure and family structure. All regression analyses were weighted to correct for unequal sampling probabilities for the children and variation across regions in the response rate and to make the sample representative of the age–sex–region structure of the population aged 5–16 years in Great Britain (Green et al., 2005).

3 | RESULTS

3.1 | Sample characteristics

Table 1 summarizes characteristics of children with (*N* = 2341) and without (*N* = 5249) any LTC at baseline. The proportion of individuals with missing data on key variables ranged from 0% (baseline psychiatric disorder) to 49.8% (follow-up absence) (see Table S2 for full details). Several background variables were associated with missingness on the predictor or outcomes (Table S3); these variables were all included in imputation models.

3.2 | LTC and mental health

At baseline, CYP with any LTC had higher SDQ total difficulties scores than those with no LTCs (adjusted mean difference 1.4 [95% CI 1.1–1.6], *P* < 0.001) (Table 2). Associations were strongest for neurodevelopmental disorders (4.1 [2.9–5.3], *P* < 0.001), migraines (2.8 [2.0–3.6], *P* < 0.001), deformities (1.6 [0.3–2.9], *P* = 0.02) and atopic conditions (0.8 [0.5–1.1], *P* < 0.001). Kidney/urinary and heart problems were not associated with SDQ scores, although there were fewer children with these conditions; hence, estimates were less precise (Table 2). Similar associations were found at follow-up with the exception of deformities, which was no longer statistically significant (Table 2).

The odds of having any psychiatric disorder at baseline were greater for children with any, compared with no, LTCs (adjusted odds ratio (aOR) 1.59 [1.34–1.89], *P* < 0.001) (Table 3). Associations were greatest for neurodevelopmental (3.60 [2.27–5.72], *P* < 0.001) and

TABLE 1 Sample characteristics

	No LTC (N = 5249)	Any LTC (N = 2341)
Age: mean (SD)	10.5 (3.4)	10.5 (3.4)
Female: n (%)	2603 (49.6)	1084 (46.3)
Ethnicity: n (%)		
White	4609 (87.9)	2093 (89.4)
Black	207 (4.0)	96 (4.1)
Asian	275 (5.2)	100 (4.3)
Other	155 (3.0)	51 (2.2)
Child has learning difficulties: n (%)	273 (5.2)	260 (11.1)
Child has experienced three or more stressful life events: n (%)	495 (9.4)	350 (15.0)
Parent has qualifications at GCSE grade C or above, or equivalent: n (%)	4357 (83.2)	1945 (83.3)
Rented housing: n (%)	3798 (72.4)	1648 (70.4)
Non-traditional family structure: n (%)	1254 (23.9)	577 (24.7)
Mental health		
Baseline SDQ total difficulties score: mean (SD)	7.2 (5.4)	9.1 (6.4)
Follow-up SDQ total difficulties score: mean (SD)	7.0 (5.5)	8.6 (6.3)
Baseline psychiatric disorder: n (%)	384 (7.3)	307 (13.1)
Follow-up psychiatric disorder: n (%)	241 (6.7)	216 (13.3)
School absenteeism		
Baseline total days absent: mean (SD)	1.5 (3.9)	2.3 (5.1)
Follow-up total days absent: mean (SD)	1.5 (3.8)	1.8 (4.4)
Baseline persistent absence: n (%)	290 (5.5)	232 (9.9)
Follow-up persistent absence: n (%)	152 (5.6)	92 (7.5)
Long-term physical conditions: n (%)		
Atopic condition	1754 (23.1)	
Migraine/severe headaches	324 (4.3)	
Neurodevelopmental condition	219 (2.9)	
Deformity	129 (1.7)	
Kidney or urinary tract problems	100 (1.3)	
Heart problems	89 (1.2)	
Any LTC	*2341 (30.8)*	

Notes: Atopic conditions include asthma and eczema, and neurodevelopmental conditions include epilepsy, cerebral palsy, muscle disease or weakness and difficulties with coordination. The category 'Any LTC' includes children with any of the 17 conditions described in Section 2.2 and is less than the sum of individual conditions as some children had more than one condition.
Abbreviations: GCSE, General Certificate of Secondary Education; LTC, long-term physical condition; SD, standard deviation; SDQ, Strengths and Difficulties Questionnaire.

atopic (1.34 [1.08–1.67], *P* = 0.008) conditions, whereas migraines, deformities, kidney/urinary problems and heart problems were not associated with psychiatric disorder (Table 3). These associations

largely remained at follow-up with the exception of migraines, which was statistically significant (Table 3).

3.3 | LTC and school absenteeism

At baseline children with any LTC had more days absent than those with no LTCs (adjusted incidence rate ratio (aIRR) 1.47 [1.31–1.64],

$P < 0.001$) (Table 4). Associations were greatest for kidney/urinary problems (1.86 [1.14–3.04], $P = 0.01$), neurodevelopmental disorders (1.79 [1.03–3.10], $P = 0.04$), deformities (1.72 [1.01–2.92], $P = 0.05$), migraines (1.47 [1.16–1.88], $P = 0.002$) and atopic conditions (1.32 [1.15–1.52], $P < 0.001$), although no association was found for heart problems (Table 4). At follow-up, there was evidence for an association between days absent and any LTC (aIRR 1.17 [1.00–1.36], $P = 0.04$), but the only individual type of condition that was

TABLE 2 Associations between long-term physical conditions and SDQ total difficulties scores

| Group | N | Mean (SD) | Mean difference (crude) | Adjusted mean difference | | |
				Estimate	95% CI	P-value
SDQ score at baseline						
No LTC	5245	7.2 (5.4)	-	-		
Atopic	1521	8.2 (5.7)	1.0	0.8	0.5–1.1	<0.001
Migraine	199	10.0 (6.4)	2.8	2.8	2.0–3.6	<0.001
Neurodevelopmental	112	14.1 (7.2)	7.0	4.1	2.9–5.3	<0.001
Deformity	62	9.7 (6.6)	2.6	1.6	0.3–2.9	0.02
Kidney/urinary	58	8.0 (4.7)	1.0	0.7	−0.6–2.0	0.31
Heart	40	9.1 (6.6)	2.1	1.0	−0.8–2.8	0.27
Any LTC	2339	9.1 (6.4)	2.0	1.4	1.1–1.6	<0.001
SDQ score at follow-up						
No LTC	3545	7.0 (5.5)	-	-	-	-
Atopic	1056	8.0 (5.9)	1.0	0.7	0.4–1.1	<0.001
Migraine	134	8.7 (5.8)	1.8	1.9	1.0–2.8	<0.001
Neurodevelopmental	71	13.5 (8.0)	6.5	3.8	2.3–5.3	<0.001
Deformity	42	7.6 (6.4)	0.4	−0.5	−1.8–0.8	0.46
Kidney/urinary	40	7.8 (4.1)	0.9	0.5	−0.9–1.9	0.46
Heart	29	7.6 (6.4)	1.8	0.7	−1.4–2.7	0.51
Any LTC	1610	8.6 (6.3)	1.7	1.1	0.8–1.4	<0.001

Notes: Mean (SD) is reported for participants with available outcome data (N). Estimated mean differences are based on analyses of imputed datasets that include all 7590 participants, of which 5249 had no LTC, 2341 had at least one LTC, 1521 had atopic only, 199 had migraine/severe headache only, 113 had neurodevelopmental only, 62 had deformity only, 58 had kidney/urinary problems only and 40 had heart problems only.
Abbreviations: CI, confidence interval; LTC, long-term physical condition; SD, standard deviation; SDQ, Strengths and Difficulties Questionnaire.

TABLE 3 Associations between long-term physical conditions and psychiatric disorder diagnoses

| Group | % (n/d) | Odds ratio (crude) | Adjusted odds ratio | | |
			Estimate	95% CI	P-value
Psychiatric disorder at baseline					
No LTC	7.3% (384/5249)	-	-	-	-
Atopic	9.7% (147/1521)	1.40	1.34	1.08–1.67	0.008
Migraine	13.1% (26/199)	1.94	1.46	0.92–2.32	0.11
Neurodevelopmental	35.4% (40/113)	7.04	3.60	2.27–5.72	<0.001
Deformity	17.7% (11/62)	2.75	1.69	0.79–3.63	0.18
Kidney/urinary	8.6% (5/58)	1.32	1.16	0.45–3.02	0.76
Heart	12.5% (5/40)	1.87	1.12	0.40–3.09	0.83
Any LTC	13.1% (307/2341)	1.97	1.59	1.34–1.89	<0.001

(Continues)

TABLE 3 (Continued)

Group	% (n/d)	Odds ratio (crude)	Adjusted odds ratio Estimate	95% CI	P-value
Psychiatric disorder at follow-up					
No LTC	6.7% (241/3576)	-	-	-	-
Atopic	10.8% (115/1061)	1.66	1.58	1.26–1.99	<0.001
Migraine	12.6% (17/135)	1.97	1.75	1.00–3.07	0.05
Neurodevelopmental	35.2% (25/71)	6.98	3.56	2.04–6.21	<0.001
Deformity	14.3% (6/42)	1.84	1.16	0.46–2.90	0.75
Kidney/urinary	7.5% (3/40)	0.95	0.77	0.22–2.68	0.68
Heart	6.9% (2/29)	1.63	1.03	0.29–3.58	0.97
Any LTC	13.4% (216/1619)	2.12	1.75	1.44–2.12	<0.001

Notes: % (numerator/denominator) is reported for participants that provided outcome data (N). Estimated odds ratios are based on analyses of imputed datasets that include all 7590 participants, of which 5249 had no LTC, 2341 had at least one LTC, 1521 had atopic only, 199 had migraine/severe headaches only, 113 had neurodevelopmental only, 62 had deformity only, 58 had kidney/urinary problems only and 40 had heart problems only.
Abbreviations: CI, confidence interval; LTC; long-term physical condition.

TABLE 4 Associations between long-term physical conditions and days absent from school

Group	N	Mean	Rate ratio (crude)	Adjusted rate ratio Estimate	95% CI	P-value
Days absent at baseline						
No LTC	5249	1.47	-	-	-	-
Atopic	1521	1.91	1.31	1.32	1.15–1.52	<0.001
Migraine	199	2.40	1.64	1.47	1.16–1.88	0.002
Neurodevelopmental	113	2.44	1.71	1.79	1.03–3.10	0.04
Deformity	62	2.69	1.83	1.72	1.01–2.92	0.05
Kidney/urinary	58	3.33	2.37	1.86	1.14–3.04	0.01
Heart	40	1.6	1.09	1.09	0.61–1.95	0.77
Any LTC	2341	2.25	1.54	1.47	1.31–1.64	<0.001
Days absent at follow-up						
No LTC	2701	1.50	-	-	-	-
Atopic	858	1.78	1.18	1.19	1.01–1.40	0.04
Migraine	69	2.17	1.36	1.08	0.70–1.66	0.73
Neurodevelopmental	50	2	1.11	1.05	0.56–1.97	0.88
Deformity	30	1.83	1.20	1.00	0.50–2.00	1.00
Kidney/urinary	30	2.2	1.35	1.27	0.70–2.31	0.44
Heart	24	1	0.87	0.80	0.32–2.02	0.63
Any LTC	1231	1.82	1.22	1.17	1.00–1.36	0.04

Notes: Mean (SD) is reported for participants that provided outcome data (N). Estimated mean differences are based on analyses of imputed datasets that include all 7590 participants, of which 5249 had no LTC, 2341 had at least one LTC, 1521 had atopic only, 199 had migraine/severe headaches only, 113 had neurodevelopmental only, 62 had deformity only, 58 had kidney/urinary problems only and 40 had heart problems only.
Abbreviations: CI, confidence interval; LTC, long-term physical condition.

associated with days absent was atopic conditions (1.19 [1.01–1.40], $P = 0.04$) (Table 4).

Children with any LTC at baseline also had higher odds of being persistently absent compared to those with no LTCs: aOR 1.78 [1.48–2.14], $P < 0.001$ (Table 5). Associations were greatest for neurodevelopmental disorders (2.51 [1.28–4.89], $P = 0.007$), migraines (2.03 [1.28–3.21], $P = 0.003$) and atopic conditions (1.49 [1.19–1.86], $P = 0.001$). At follow-up, there was only weak evidence for an association with any LTC (aOR 1.27 [1.00–1.61], $P = 0.05$), and none of the associations for individual conditions were statistically significant (Table 5).

TABLE 5 Associations between long-term physical conditions and persistent absence from school

Group	% (n/d)	Odds ratio (crude)	Adjusted odds ratio Estimate	95% CI	P-value
Persistent absence at baseline					
No LTC	5.5% (290/5249)	-	-	-	-
Atopic	8.0% (122/1521)	1.50	1.49	1.19–1.86	0.001
Migraine	11.6% (23/199)	2.21	2.03	1.28–3.21	0.003
Neurodevelopmental	11.5% (13/113)	2.39	2.51	1.28–4.89	0.007
Deformity	9.7% (6/62)	1.81	1.56	0.62–3.89	0.34
Kidney/urinary	12.1% (7/58)	2.58	2.11	0.94–4.74	0.07
Heart	7.5% (3/40)	1.44	1.27	0.37–4.35	0.70
Any LTC	9.9% (232/2341)	1.90	1.78	1.48–2.14	<0.001
Persistent absence at follow-up					
No LTC	5.6% (152/2701)	-	-	-	-
Atopic	7.1% (61/858)	1.26	1.28	0.98–1.66	0.07
Migraine	10.1% (7/69)	1.63	1.33	0.65–2.74	0.43
Neurodevelopmental	6% (3/50)	0.92	0.77	0.28–2.13	0.61
Deformity	10% (3/30)	1.55	1.22	0.40–3.74	0.72
Kidney/urinary	6.7% (2/30)	1.27	1.16	0.33–4.07	0.81
Heart	4.2% (1/24)	0.96	0.88	0.15–5.21	0.89
Any LTC	7.5% (92/1231)	1.34	1.27	1.00–1.61	0.05

Notes: % (numerator/denominator) is reported for participants that provided outcome data (*N*). Estimated odds ratios for persistent absence at baseline and follow-up are based on analyses of imputed datasets that include all 7590 participants, of which 5249 had no LTC, 2341 had at least one LTC, 1521 had atopic only, 199 had migraine/severe headaches only, 113 had neurodevelopmental only, 62 had deformity only, 58 had kidney/urinary problems only and 40 had heart problems only.
Abbreviations: CI, confidence interval; LTC, long-term physical condition.

4 | DISCUSSION

This study investigated associations of LTCs with mental health and school absenteeism in a large representative survey of CYP in the United Kingdom and its 3-year follow-up. In line with previous studies (Hysing et al., 2007; Lum et al., 2019), we found evidence for cross-sectional and longitudinal associations between LTCs and poor mental health assessed via both dimensional and diagnostic measures. As also previously reported (Gottfried & Gee, 2017; Ingul et al., 2012; Lum et al., 2017), children with LTCs had more school absences and were more likely to be persistently absent at baseline and follow-up compared with those with no LTCs, although evidence of a relationship was weaker at follow-up.

The conditions most strongly associated with poor mental health were also largely those most strongly associated with absenteeism, specifically neurodevelopmental conditions, migraines/severe headaches, and atopic conditions. Previous research suggests that CYP with neurological disorders are at particularly high risk of mental health problems (Davies et al., 2003; Glazebrook et al., 2003), which has been attributed to 'direct and powerful brain-behaviour links' (Glazebrook et al., 2003, p. 146). Social and psychological pathways may also be important, and neurological disorders are often associated with cognitive difficulties that impede learning,

which makes sufficient support at school for these children imperative.

Our findings show that mental health problems and absenteeism are common in CYP with LTCs and may contribute significantly to the burden and impact of these conditions, particularly in the case of neurodevelopmental disorders, migraines and atopic conditions. Clinicians should routinely enquire about mental health in CYP with LTCs and should consider the use of screening tools such as the SDQ to identify those who require further mental health assessment (Hysing et al., 2007), particularly as poor mental health is associated with lower quality of life, poorer physical functioning and more frequent hospital admissions in this population (Ding et al., 2008; Johnson et al., 2004; Zima et al., 2016). Effective mental health interventions for children are available, although access to and implementation of such interventions in CYP with LTCs is poor (Lum et al., 2019; Ott et al., 2003; Welch et al., 2018). Interventions tailored to the needs of those with LTCs may be beneficial, and a recent systematic review concluded that high-quality research to assess the effectiveness of psychological interventions for CYP with LTCs is needed (Moore et al., 2019).

Our findings support a recent review that identified school absence as a key marker of functional impairment in childhood chronic illness, suggesting that clinicians should routinely enquire

about school attendance and help families to minimize absenteeism where possible (Cozzi & Barbi, 2020). Supporting parents in addressing barriers to attendance (such as arranging medical appointments outside of school hours or at school-based clinics), helping families to work with schools to develop a plan to support regular attendance, and collaborating with educational professionals and external support services may help to improve problematic absenteeism for CYP with LTCs (Allison & Attisha, 2019).

Findings add to mounting evidence for the important interplay between health and education (Allison & Attisha, 2019; Hale & Viner, 2018) and suggest that mental and physical health promotion should be a core part of school business. CYP with LTCs may need additional support to ensure their needs are met at school, either through Special Educational Needs and Disability provision or less formal arrangements such as classroom adjustments, flexible approaches to attendance and schoolwork, or support from school-based mental health practitioners. Such accommodations, alongside supportive school staff, can reduce the worries of students with chronic illness and result in fewer days of missed school (Lum et al., 2017).

It is unknown whether mental health problems and absenteeism are concurrent outcomes of LTCs or whether one precedes or exacerbates the other; future research should investigate this using multiple data points and techniques such as cross-lagged regression. Given the high rates of psychiatric disorder in CYP with LTCs, mental health may be a key predictor of later absence (Finning et al., 2020). However, absenteeism may also adversely affect CYP's mental health due to missed social, emotional and academic opportunities. Future research should also explore why neurodevelopmental disorders, atopic conditions and migraines are particularly strongly associated with poor mental health and school absenteeism, and may identify potential therapeutic targets.

4.1 | Strengths and limitations

The use of a large, nationally representative population survey alongside follow-up data was a strength of this study and supports the generalizability of our findings. The use of validated measures for the assessment of mental health was an additional strength. However, LTCs were reported by parents based on single yes/no questions, were not corroborated with medical reports, and did also not account for severity of the LTC. Parent-reported absences may be affected by reporting and recall biases, and although our threshold of 7 days for persistent absence was based on average school term lengths, future research should aim to make use of administrative educational data from the National Pupil Database.

4.2 | Conclusions

In a large, nationally representative survey of 5- to 16-year-olds in the United Kingdom, CYP with LTCs had poorer mental health and more school absence compared to those with no LTCs. Neurodevelopmental disorders, migraines and atopic conditions were particularly strongly associated with mental health and absenteeism. Clinicians should routinely enquire about mental health and school attendance in CYP with LTCs and should collaborate with families and schools to ensure these children are provided with sufficient mental health and educational support.

CONFLICT OF INTEREST
None declared.

ETHICAL APPROVAL
The British Child and Adolescent Mental Health Survey (BCAMHS) had approval from Medical Research Ethics Committees. Approval for this secondary analysis was granted by the University of Exeter College of Medicine and Health ethics committee (May20/D/247).

DATA AVAILABILITY STATEMENT
Data from the 2004 British Child and Adolescent Mental Health Survey are available for researchers to download via the UK Data Service.

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