# Emotional Difficulties and Self-Harm among British Adolescents with and without Disabilities: Cross sectional study

# Abstract

## Background

Little is known about the prevalence of emotional difficulties and self-harm among adolescents with a disability.

## Objective

Our aims were: (1) to estimate the prevalence of emotional difficulties and self-harm among British adolescents with and without disability; (2) to determine whether prevalence varies by gender, severity of disability and type of functional limitation associated with disability.

## Methods

Secondary analysis of age 14 data from the UK’s Millennium Cohort Study.

## Results

Adolescents with disability reported significantly higher rates of emotional difficulties and self-harm than their non-disabled peers. Among participants with and without disability, prevalence rates were notably higher among girls for most outcomes. The strength of the association between disability and emotional difficulties and self-harm was greater for: maternal report of adolescent emotional difficulties; disabled adolescents with moderate/severe activity limitations; and adolescents with psychosocial impairments.

## Conclusions

There is a clear need for providers of all mental health services to ensure that reasonable accommodations are made to services to ensure that they are responsive to the specific needs of adolescents with disabilities. Further research is needed to determine the extent to which our results can be generalised to adolescents in other settings, to specific subgroups of adolescents with disabilities, to other measures of emotional difficulties and to other informants. Future research is also needed to further explore the consistency and determinants of the intersection between gender by disability regarding adolescent mental health.

# Introduction

Mental health problems make a significant contribution to the global burden of disease for adolescents.1, 2 They are also related to lower educational achievements, substance abuse, violence, self-harm, poor adult mental health, and poor reproductive and sexual health.3 Adolescence is therefore regarded as a critical period for laying the foundations for adult health.2, 4

The prevalence of mental health disorders rises significantly during adolescence. For example, a UK study suggested that the prevalence of diagnosable mental health disorders was 49% higher among 11-16 year old adolescents when compared to 5-10 year old children, with emotional disorders being over 100% higher among 11-16 year old adolescents when compared to 5-10 year old children (5.0% vs. 2.4%).5 These differences in prevalence reflect differences in the prevalence of emotional disorders among girls (6.1% among 11-16 year old adolescent girls, 2.5% among 5-10 year old girls).5 In early adolescence, girls start to report higher levels of emotional disorders than boys, a difference that is maintained over the life course.6, 7

Self-harm is defined as any deliberate act of self-injury, irrespective of suicidal intent or motive.8 Gender differences have been reported with regards to the prevalence of self-harm with recent UK estimates for lifetime self-reported self-harm among adolescents of 23.1% among girls and 7.1% among boys.9

Policies aimed at improving mental health need to take account of the situations faced by marginalised groups that may be particularly at risk of exposure to well-established determinants of poorer mental health.10 People with disabilities have been identified as one such group. It is estimated that 9-10% of UK adolescents have a disability.11 Compared to their peers, adolescents with disabilities are more likely to be exposed to social determinants of poor mental health including poverty, poor housing conditions, social exclusion and violence.12, 13

Surprisingly little is known about the prevalence of emotional disorders and self-harm among adolescents with disabilities. Most research undertaken in this area has focused on investigating the extent to which prevalence varies between adolescents with/without specific health conditions or impairments that are potentially associated with disability. Evidence suggests higher prevalence rates occur among children with asthma,14 autism spectrum disorders,15 chronic physical conditions,16 diabetes,14 hearing impairments,17 intellectual disability,18 specific learning disabilities19 and visual impairments.20 Limited evidence also suggests that adolescents with chronic physical conditions and specific learning disabilities have higher odds of self-harm.19, 21, 22 Unfortunately, this literature is often of poor methodological quality; commonly relying on data from unrepresentative convenience samples and failing to address potential confounding effects associated with between group differences in gender and family socio-economic position.14

Only two large population-based studies have assessed whether the participants with specific health conditions/impairments have a disability (i.e., they are impaired in carrying out normal day-to-day activities). Both have reported that the prevalence of emotional disorders was significantly elevated among adolescents who also experience restrictions to participation.23, 24 This suggests that the larger body of studies which have investigated emotional disorders among adolescents with/without specific health conditions may significantly underestimate the strength of the association between disability and emotional disorders. The very small number of contemporary population-based studies that have focused on adolescents with a disability have reported elevated prevalence rates for emotional disorders and self-harm in New Zealand23 and Australia.25, 26

Neither of these two studies presented data disaggregated by gender. This is important as: (1) gender differences in the prevalence of emotional disorders and self-harm are well established (see above); and (2) limited evidence suggests that gender may moderate the association between disability and mental health in childhood.22, 27

Given the paucity of knowledge in this area we seek to answer two research questions: 1) What is the prevalence of emotional difficulties and self-harm among a contemporary nationally representative sample of male and female British adolescents with and without disability?; 2) Does the prevalence of emotional difficulties and self-harm among adolescents with a disability vary by gender and, as been previously suggested, severity of disability and type of functional limitation associated with disability?

# Method

Secondary analysis of data from the UK’s Millennium Cohort Study (MCS), data which are available through the UK Data Service (<http://ukdataservice.ac.uk/>). Full details of the design of MCS are available in a series of reports and technical papers,28 key aspects of which are summarised below.

## Sampling

Participant families were randomly selected from Child Benefit Records, a universal welfare benefit available to all UK children. Sampling was geographically clustered in 398 randomly selected electoral wards in the UK and stratified to over-sample children from ethnic minority groups, disadvantaged communities and children in Scotland, Wales and Northern Ireland.29 The first survey (MCS1) took place when children were nine months old and included a total of 18,551 families. Children were followed up at ages 3, 5, 7, 11 and 14 (MCS Wave 6; 11,726 families, 63% retention rate from MCS1). For each family, information was collected on the target child falling within the designated birth date window. For multiple births (e.g., twins, triplets) information was collected on each child.

## Procedure

All data used in the present study were collected at child age 14 by face-to-face computer assisted personal interview with a key informant, a key informant self-completion questionnaire and computer assisted child self-report.

## Identification of Child Disability

Child disability was identified through four items administered in the maternal interview at child age 14:

1. Does [^Cohort member’s name] have any physical or mental health conditions or illnesses lasting or expected to last 12 months or more?
2. Do any of these condition(s) or illness(es) affect ^Cohort member’s name] in any of the following areas (vision (for example blindness or partial sight), hearing (for example deafness or partial hearing), mobility (for example walking short distances or climbing stairs), dexterity (for example lifting and carrying objects, using a keyboard), learning or understanding or concentrating, memory, mental health, stamina or breathing or fatigue, socially or behaviourally (for example associated with autism, attention deficit disorder or Asperger’s Syndrome), other (PLEASE SPECIFY)?
3. Does this (Do any of these) condition(s) or illness(es) reduce [^Cohort member’s name]’s ability to carry out day-to-day activities? Would you say... 1 Yes, a lot, 2 Yes, a little, or 3 Not at all?
4. For how long has [^Cohort member’s name]’s ability to carry out day-to-day activities been reduced? Would you say .... 1 less than six months, 2 between six months and 12 months, or 3 12 months or more?

Cohort members were considered to have a disability if question 1 was answered in the affirmative by the child’s mother and question three was answered ‘a little’ or ‘a lot’ and question four was answered ‘between six months and 12 months’ or ‘12 months or more’.

## Measures of Emotional Difficulties and Self-Harm

Indicators of emotional wellbeing and self-harm at age 14 were collected through maternal completion of the *Strengths and Difficulties Questionnaire*,adolescent completion of the *Short-Form Mood and Feelings Questionnaire* and adolescent computer assisted self-report of a single item regarding self-harm.

### Strengths and Difficulties Questionnaire (SDQ)

The SDQ is a psychometrically robust instrument commonly used in large-scale population surveys to measure emotional and behavioural difficulties in children.5, 30-32 It contains five subscales. For the purposes of the present study, we used the recommended binary variable of emotional difficulties scoring in the ‘abnormal’ range on the Emotional Symptoms subscale (see http://www.sdqinfo.org/ for recommended scoring of binary variables for SDQ subscales).33

### Short-Form Mood and Feelings Questionnaire (SF-MFQ)

The SF-MFQ is a 13-item questionnaire designed to screen for depression in children and adolescents.34 While two studies have suggested using a cut-off of eight or higher for major depression,34, 35 sensitivity (ranging from 60%-75%) and specificity (ranging from 74%-85%) are less than optimal. In addition, this cut-off identifies 28.5% (95% CI 27.2% to 29.8%) of children at risk of major depression compared to an estimated population prevalence among 11-16 year old children in the UK of 1.4%.5 Given this, to maintain consistency with SDQ-based estimates we created a binary variable based on scoring in the top 10% of the weighted population distribution.

### Self-harm

Adolescents at age 14 were asked to respond to the following computer presented question: ‘*In the past year have you hurt yourself on purpose in any way?*’ (Response options: yes/no).

## Covariates

### Adolescent gender

Adolescent gender was measured by maternal report.

### Adolescent ethnicity

Due to the relatively small numbers of adolescents with disabilities in specific minority ethnic groups, adolescent self-reported ethnicity was recoded into a single binary variable white/other.

### Family composition

Family composition at age 14 was coded as a binary variable (one parent household/two parent household).

### Family socio-economic position

Wave 6 of the MCS includes a range of indicators of socio-economic position. We included three indicators of household/family socio-economic position: (1) *income poverty,* defined as living in a household whose equivalised income was 60% less than the sample median;36 (2) experiencing *material hardship,* defined as not being able to afford two or more of a list of five goods/activities that have been identified as basic necessities for UK families (e.g., having celebrations on special occasions such as birthdays, Christmas or other religious festivals);37 (3) *low maternal educational* *attainment*, defined as having a highest educational/vocational qualification equivalent to National Vocational Qualification (NVQ) Level One (acquisition of basic knowledge and skills plus ability to apply learning with guidance or supervision).

## Approach to Analysis

In the first stage of analysis we examined the bivariate associations between the covariates and: (1) disability status; (2) outcome measures. Prevalence estimates with 95% confidence intervals were estimated. In the second stage of analysis we used bivariate correlations (r) to examine the strength of association between the three outcome measures.

In the third stage of analysis we examined the association between disability status and the three outcomes separately for boys and girls. For each outcome we report prevalence estimates for participants without disability and for three different classifications of disability (those with mild activity limitations, those with moderate/severe activity limitations and those with any disability (mild or moderate/severe activity limitations). We also report unadjusted and adjusted PRR (with non-disabled participants as the reference group). We used Poisson regression with robust standard errors to estimate prevalence rate ratios adjusted for adolescent ethnicity, household composition, income poverty, material deprivation and maternal education).38 To further explore disability and gender differences in prevalence we used Poisson regression to estimate the association between disability, gender and a two-way disability\*gender interaction and each outcome.

In the final stage of analysis, we examined whether the prevalence of emotional difficulties and self-harm among adolescents with a disability varied by type of functional limitation associated with disability. Due to small sample sizes for some specific impairments we created three groups of functional limitations from the available data:

* psychosocial limitations (defined as disability with impairments in one or more of the following areas – ‘learning’, ‘memory’, ‘social/behavioural’);
* motor limitations (defined as disability with impairments in one or more of the following areas – ‘mobility’, ‘dexterity’, ‘stamina’);
* sensory limitations (defined as disability with impairments in one or more of the following areas – ‘vision’, ‘hearing’).

We included ‘stamina’ in the motor limitations group given that exploratory factor analysis indicated that stamina primarily loaded on the same factor as mobility and dexterity. These are not mutually exclusive groups as the respondent could identify multiple areas in which their child experienced functional limitations. For each outcome we report prevalence estimates for participants without disability and for the three impairment-based groups of participants with disability, and unadjusted and adjusted PRR. These analyses were not stratified by gender due to the relatively small sample sizes.

All analyses were undertaken in Stata 15 using the svyset and svy: commands with sample weights provided with the data to adjust for the initial sampling design and biases in recruitment and retention at Wave 6.39 To avoid the statistical problems associated with the clustering of multiple births within households, the present analyses are restricted to the first named target child in multiple birth households. To reduce biases resulting from the identity of the primary informant, we restricted our analyses to the subset of families in which the primary informant was the child’s biological mother (n=10,244; 90.5% of child participants). A proportion of participants identified as having a disability would have had a mental health condition as the primary health condition or impairment associated with their disability. Unfortunately, information on the nature of the primary health condition or impairment associated with disability was not collected. However, maternal informants were asked whether the child’s condition(s) or illness(es) affected their functioning in several areas, including mental health. To reduce the risk of conflation resulting from mental health being both an exposure and outcome we excluded participants with a disability whose functioning was *only* reportedly limited in relation to their mental health on the assumption that these participants were likely to have had a mental health condition as the primary health condition or impairment associated with their disability. The resulting subsample included 9,845 participants.

Data was missing for SDQ for 3.0% of children and child –self report measures for less than 6.5% of children. Data on individual covariates was missing for less than 2.5% of children except for ethnicity (missing for 4.2%). Given the relatively small amounts of missing data we undertook complete case analysis of a restricted dataset in which data was available for all three outcome measures with complete data on disability and all covariates (n=8,146).

## Ethics approval and consent to participate

The organisers of the Millennium Cohort Study have documented that they received approval from NHS Multi-Centre Ethics Committees before surveying, and that informed consent to participate has been gained from children and parents/guardians.28, 40, 41

# Results

## Prevalence of Disability

Our procedure led to the identification of 972 adolescents with disability (9.9% of the analytic sample, 95% CI 9.0%-10.8%); 603 (6.1%, 95%CI 5.5%-6.8%) who were reported to experience ‘a little’ limitation in carrying out day-to-day activities and 369 (3.8%, 95%CI 3.2%-4.4%) who were reported to experience ‘a lot’ of limitation in carrying out day-to-day activities. We will refer to these two groups as participants with ‘mild limitations ’ and ‘moderate/severe limitations’. Prevalence rates for type of functional limitation are presented in Table 1.

## Prevalence of Emotional Difficulties and Self-Harm

Our procedures led to the identification at age 14 of: ‘abnormal’ emotional difficulties among 13.8% of children (95% CI 12.9%-14.7%); self-reported depression among 8.9% of children (95% CI 8.2%-9.7%%); and self-reported self-harm among 14.9% of children (95% CI 13.9%-15.9%).

## Association between Covariates and Disability Status

The prevalence of disability was significantly greater among boys, and among children living in single parent households and lower SEP households. Full details are available in Table 2.

## Association between Covariates and Adolescent Outcomes

Scoring in the ‘abnormal’ range on the SDQ emotional symptoms subscale was associated with female gender, living in a single parent household and living in a low SEP family. Scoring in the top 10% of the population on the SF-MFQ was associated with female gender and living in material hardship. Adolescent-reported self-harm was associated with female gender, white ethnicity, living in a single parent household and living in material hardship. Full details are available in Supplementary Tables 1-3.

## Association between Outcomes

There were only modest associations between maternal and adolescent report of indicators of emotional wellbeing at age 14 (maternal report (SDQ) and adolescent report (SF-MFQ) r=0.15; maternal report (SDQ) and adolescent report (self-harm) r=0.15). There was a stronger association between adolescent self-report of depression and self-harm (r=0.41).

## Association between Disability Status, Gender and Adolescent Emotional Difficulties and Self-Harm

Results are presented in Table 3.

### Maternal Reported Emotional Difficulties

For both boys and girls there were strong and statistically significant associations between disability status and maternal report of emotional difficulties on the SDQ. The prevalence of emotional difficulties was approximately four times higher for both boys and girls with disabilities compared to those without. Significantly larger prevalence rate ratios were seen for boys and girls with moderate/severe activity limitations.

Among participants with and without disability prevalence rates were significantly higher among girls The disability\*gender interaction term was not statistically significant.

### Self-Reported Depression

For girls there were strong and statistically significant associations between disability status and adolescent self-report of indicators of depression, with the prevalence of depression being approximately two times higher for girls with disabilities compared to those without. For boys, the association between disability status and depression was only statistically significant for participants with moderate/severe activity limitations. Among participants with and without disability, prevalence rates were significantly higher among girls. The disability\*gender interaction term was not statistically significant.

### Self-Reported Self-Harm

For both boys and girls there were moderate and statistically significant associations between disability status and self-harm, with the prevalence of self-harm being more than 50% higher among adolescents with a disability when compared to their non-disabled peers. Among participants with a disability, the severity of activity limitation was not significantly related to prevalence of self-harm. Prevalence rates for self-harm were significantly higher among girls when compared to boys among participants with and without disability. The disability\*gender interaction term was not statistically significant.

## Association between Type of Functional Activity Limitation and Adolescent Emotional Difficulties and Self-Harm

The prevalence of emotional difficulties and self-harm was elevated on all outcome measures for each of the three functional activity limitation groups (Table 4). In 16 of 18 instances these differences were statistically significant. Effect sizes were significantly greater for maternal reported outcomes than adolescent self-reported outcomes. In most analyses the highest risk for emotional difficulties and self-harm was observed among adolescents with psychosocial limitations. Disability\*gender interaction terms were not statistically significant.

# Discussion

The results of our study indicate that: (1) in the majority of analyses adolescents with disability reported significantly higher rates of emotional difficulties and self-harm than their non-disabled peers; (2) the strength of the association between disability and emotional difficulties and self-harm was greater for maternal report of adolescent emotional difficulties among disabled adolescents with moderate/severe activity limitations, and among adolescents with psychosocial impairments; (3) among participants with and without disability, prevalence rates of emotional difficulties and self-harm were notably higher among girls for most outcomes.

Our study is, to our knowledge, the first population-based study to examine the association between disability, gender and the emotional wellbeing of adolescents. It adds significantly to existing knowledge in two areas. First, it highlights the very high prevalence of emotional difficulties and self-harm among adolescents with disabilities (who account for approximately 10% of all adolescents). From these data we estimate that adolescents with disability account for 14%-30% of all adolescents with potential emotional disorders. There is a clear need for providers of all mental health services (including those focusing on primary prevention) to ensure that reasonable accommodations are made to services to ensure that they are responsive to the specific needs of adolescents with disabilities. This is particularly the case for girls with disabilities.

Second, it adds to the very limited literature on the interaction between gender and disability regarding child and adolescent wellbeing. Our results suggested a significant gender by disability interaction for one of the three outcomes (self-reported depression) with higher than expected prevalence rates (31%) among disabled girls. The few studies that have addressed this issue have reported: (1) higher than expected rates of disruptive behaviours among girls with intellectual disabilities;27 (2) higher than expected rates of emotional difficulties among adolescent girls with chronic health conditions;22 and, more recently, (3) higher than expected rates of dissatisfaction with school among adolescent girls with disabilities.42

The main strengths of the present study are: (1) the use of a contemporary nationally representative sample of adolescents; (2) the use of multiple informants and measures of emotional difficulties; and (2) the wide range of covariates that could be included in our analyses. However, three limitations need to be considered when considering the implications of our study. First, both of our measures of emotional difficulties (the SDQ and SF-MFQ) were short scales developed for screening for potential emotional disorders. While both are psychometrically robust, they are not equivalent to formal diagnoses of the presence of emotional disorders. Second, we are not aware of any studies regarding the psychometric properties of the single item measure of self-harm. Finally, while our results indicated marked differences in the association between disability and emotional difficulties depending on the measure used, it is not possible to determine whether these differences reflect differences in informants or the nature of the measure used.

Future research is needed to determine the extent to which our results can be generalised to adolescents in other settings, to specific subgroups of adolescents with disabilities (e.g., adolescents with disabilities in minority ethnic groups), to other measures of emotional difficulties and to other informants. Future research is also needed to further explore the consistency, determinants and impact of the intersection between gender by disability regarding adolescent mental health.

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| Table 1: Areas of functioning affected by the health conditions/impairments associated with adolescent disability |
|  | N | % with 95% CI |
| Psychosocial  | 519  | 5.5% (4.9%-6.3%)  |
| Motor |  381  |  4.1% (3.6%-4.7%)  |
| Sensory |  148  | 1.6% (1.3%-2.1%)  |

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| Table 2: Association between covariates and disability status at age 14 |
| Covariates | No disability (% with 95% CI) | Disability with ‘a little’ activity limitation | Disability with ‘a lot’ of activity limitation | Statistical significance (Adjusted Fa, (df), p) |
| Gender |  |  |  |  |
| Male (n=5155) | 51.5% (50.1%-52.8%) | 56.9% (51.7%-61.9%) | 66.1%(59.2%-72.4%) | 9.98 (2, 772)\*\*\* |
| Female (n=4690) | 48.5%(47.2%-49.9%) | 43.1%(38.1%-48.3%) | 33.9%(27.6%-40.8%) |
| Ethnicity |  |  |  |  |
| White (n=7731)  | 81.7%(78.7%-84.4%) | 86.7%(82.2%-90.2%) | 81.9%(71.2%-89.2%) | 1.56 (2, 666) |
| Other (n=1699) | 18.3%(15.6%-21.3%) | 13.3%(9.8%-17.3%) | 18.1%(10.8%-28.8%) |
| Household composition |  |  |  |  |
| Single parent (n=2889) | 28.5%(27.0%-30.0%) | 34.5%(29.7%-39.6%) | 41.5%(34.4%-48.9%) | 10.09 (2, 763)\*\*\* |
| Two parents (n=6956) | 71.5%(70.0%-72.9%) | 65.5%(60.4%-70.3%) | 58.5%(51.1%-65.6%) |
| Income poverty  |  |  |  |  |
| Yes (n=3210) | 31.0%(28.6%-33.5%) | 39.7%(34.5%-45.2%) | 59.6%(52.8%-66.0%) | 43.10 (2, 777)\*\*\* |
| No (n=6635) | 68.9%(66.5%-71.3%) | 60.2%(55.0%-65.2%) | 38.9%(32.6%-45.6%) |
| Material deprivation |  |  |  |  |
| Yes (n=2230) | 22.0%(20.5%-23.5%) | 24.8%(20.4%-29.7%) | 35.2%(29.2%-41.7%) | 11.00 (2, 768)\*\*\* |
| No (n=7614) | 78.0%(76.5%-79.5%) | 75.2%(70.3%-79.6%) | 64.8%(58.3%-70.8%) |
| Maternal education |  |  |  |  |
| Low (n=2175) | 21.6%(19.8%-23.5%) | 24.6%(19.7%-30.1%) | 30.5%(24.5%-37.4%) | 4.55 (2, 759)\* |
| High (n=7667) | 78.4%(76.5%-80.1%) | 75.4%(69.9%-80.3%) | 69.5%(62.6%-75.5%) |
| Notesa The adjusted F is a variant of the second-order Rao-Scott adjusted χ2 statisticdf = degrees of freedom\*\* p<0.01 \*\*\* p<0.001 |

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| Table 3: Association between disability status and adolescent emotional difficulties and self-harm |
| **BOYS** |  |  |  |
| **Maternal-reported outcomes** | % | Unadjusted PRR | Adjusted PRRa |
| *Emotional Difficulties* |  |  |  |
| No disability (n=4441) |  8.4% (7.3%-9.7%) | 1 | 1 |
| Disability (LS) (n=336) | 22.9% (17.8%-29.0%) | 2.73 (2.05-3.63)\*\*\* | 2.60 (1.90-3.57)\*\*\* |
| Disability (MS) (n=231) | 54.0% (45.5%-62.2%) | 6.42 (5.21-7.92)\*\*\* | 5.80 (4.44-7.58)\*\*\* |
| Disability (ALL) (n=567)  | 35.6% (30.4%-41.1%) | 4.23 (3.44-5.21)\*\*\* | 3.90 (3.07-4.96)\*\*\* |
| **Adolescent-reported outcomes** |  |  |  |
| *Depression* |  |  |  |
| No disability |  4.1% (3.3%-4.9%) | 1 | 1 |
| Disability (LS)  |  3.7% (1.6%-8.4%) | 0.92 (0.39-2.18) | 0.90 (0.39-2.08) |
| Disability (MS)  |  9.2% (4.7%-17.0%) | 2.26 (1.18-4.33)\* | 2.07 (1.10-3.89)\* |
| Disability (ALL) |  5.7% (3.4%-9.2%) | 1.40 (0.82-2.37) | 1.33 (0.80-2.22) |
| *Self-harm* |  |  |  |
| No disability |  7.6% (6.7%-8.6%) | 1 | 1 |
| Disability (LS)  | 13.4% (8.8%-19.9%) | 1.77 (1.15-2.72)\*\* | 1.77 (1.16-2.71)\*\* |
| Disability (MS)  | 14.4% (8.9%-22.3%) | 1.89 (1.20-2.98)\*\* | 1.74 (1.10-2.75)\* |
| Disability (ALL) | 13.8% (10.1%-18.5%) | 1.81 (1.31-2.50)\*\*\* | 1.76 (1.28-2.42)\*\* |
| **GIRLS** |  |  |  |
| **Maternal-reported outcomes** |  |  |  |
| *Emotional Difficulties (SDQ)* |  |  |  |
| No disability (n=4169) | 13.6% (12.3%-15.0%) | 1 | 1 |
| Disability (LS) (n=251) | 38.2% (30.9%-46.0%) | 2.81 (2.22-3.56)\*\*\* | 2.75 (2.17-3.48)\*\*\* |
| Disability (MS) (n=94) | 66.3% (54.9%-76.0%) | 4.88 (4.04-5.89)\*\*\* | 4.79 (3.90-5.89)\*\*\* |
| Disability (ALL) (n=344)  | 47.1% (40.8%-53.5%) | 3.47 (2.91-4.14)\*\*\* | 3.37 (2.81-4.03)\*\*\* |
| **Adolescent-reported outcomes** |  |  |  |
| *Depression (SF-MFQ)* |  |  |  |
| No disability | 13.0% (11.8%-14.4%) | 1 | 1 |
| Disability (LS)  | 22.6% (17.0%-29.4%) | 1.73 (1.31-2.29)\*\*\* | 1.68 (1.27-2.23)\*\*\* |
| Disability (MS)  | 30.6% (19.4%-44.8%) | 2.35 (1.53-3.62)\*\*\* | 2.27 (1.51-3.43)\*\*\* |
| Disability (ALL) | 24.8% (19.6%-30.7%) | 1.90 (1.46-2.32)\*\*\* | 1.84 (1.46-2.32)\*\*\* |
| *Self-harm* |  |  |  |
| No disability | 21.2% (19.4%-23.1%) | 1 | 1 |
| Disability (LS)  | 30.7% (24.5%-37.8%) | 1.45 (1.08-1.75)\*\* | 1.38 (1.08-1.75)\*\* |
| Disability (MS)  | 33.5% (22.9%-46.0%) | 1.47 (1.04-2.06)\* | 1.47 (1.04-2.06)\* |
| Disability (ALL)  | 31.5% (25.8%-37.8%) | 1.49 (1.20-1.85)\*\*\* | 1.40 (1.13-1.74)\*\* |
| Note: n (sample sizes) are weighted PRR = prevalence rate ratio LS = mild activity limitationsMS = moderate/severe activity limitationsALL = mild or moderate/severe activity limitations a adjusted for child gender, child ethnicity, family income poverty, family composition (one or two resident parents), family material hardship.\* p<0.05, \*\* p<0.01, \*\*\* p<0.001 |

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| Table 4: Association between functional activity limitation groupings and adolescent emotional difficulties and self-harm |
|  | % | PRR adjusted for gender  | Fully adjusted PRR a |
| **Maternal-reported outcomes** |  |  |  |
| *Emotional Difficulties* |  |  |  |
| No disability (n=8610) | 10.9% (10.1-11.8) | 1 | 1 |
| Motor impairments (n=381)  | 40.1% (33.9-46.6) | 3.69 (3.07-4.43)\*\*\* | 3.58 (2.94-4.36)\*\*\* |
| Psychosocial impairments (n=519)  | 51.9% (45.7-58.1) | 5.29 (4.55-6.16)\*\*\* | 5.04 (4.27-5.95)\*\*\* |
| Sensory impairments (n=148)  | 44.8% (32.9-57.3) | 4.23 (3.12-5.74)\*\*\* | 4.00 (2.99-5.36)\*\*\* |
| **Adolescent-reported outcomes** |  |  |  |
| *Depression* |  |  |  |
| No disability |  8.4% (7.7-9.2) | 1 | 1 |
| Motor impairments  | 12.9% (9.1-17.8) | 1.57 (1.14-2.17)\*\* | 1.54 (1.13-2.12)\*\* |
| Psychosocial impairments  | 15.8% (11.7-21.0) | 2.42 (1.79-3.28)\*\*\* | 2.28 (1.68-3.09)\*\*\* |
| Sensory impairments  | 18.6% (10.7-30.3) | 2.24 (1.35-3.72)\*\* | 2.23 (1.33-3.73)\*\* |
| *Self-Harm* |  |  |  |
| No disability | 14.4% (13.4-15.4) | 1 | 1 |
| Motor impairments  | 19.1% (14.3-25.0) | 1.37 (1.05-1.80)\* | 1.33 (1.01-1.74)\* |
| Psychosocial impairments  | 23.2% (18.0-29.3) | 2.01 (1.58-2.56)\*\*\* | 1.86 (1.47-2.36)\*\*\* |
| Sensory impairments  | 19.7% (11.7-31.1) | 1.41 (0.86-2.30) | 1.38 (0.85-2.25) |
| Note: n (sample sizes) are weighted, sample sizes for depression and self-harm are the same as for emotional difficultiesPRR = prevalence rate ratio a adjusted for child gender, child ethnicity, family income poverty, family composition (one or two resident parents), family material hardship.\* p<0.05, \*\* p<0.01, \*\*\* p<0.001 |

## **Key points**

* Little is known about the association between emotional difficulties and self-harm among adolescents with a disability
* In a nationally representative cohort of UK adolescents, those with disability reported markedly higher levels of emotion difficulties and self-harm
* Levels of emotional difficulties and self-harm among adolescent girls with disabilities were 1.5 to 4.5 times higher than their non-disabled peers
* There is a clear need for providers of all mental health services (including those focusing on primary prevention) to ensure that reasonable accommodations are made to services to ensure that they are responsive to the specific needs of adolescents with disabilities. This is particularly the case for girls with disabilities.

# Supplementary Tables

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| Supplementary Table 1: Association between covariates and maternal-reported SDQ abnormal child emotional difficulties at age 14 |
| Covariates | % (with 95% CI) | Prevalence rate ratio (with 95% CI) |
| Gender  |  |  |
| Male | 11.5% (10.3%-12.8%) | 1 |
| Female | 16.3% (15.0%-17.7%) | 1.42 (1.24-1.63)\*\*\* |
| Ethnicity |  |  |
| White  | 13.1% (12.2%-14.2%) | 1 |
| Other | 15.7% (13.2%-18.5%) | 1.19 (0.99-1.43) |
| Household composition |  |  |
| Single parent | 18.7% (16.8%-20.8%) | 1.60 (1.40-1.83)\*\*\* |
| Two parents | 11.7% (10.8%-12.8%) | 1 |
| Income poverty  |  |  |
| Yes | 29.4% (17.4%-21.5%) | 1.75 (1.53-2.00)\*\*\* |
| No | 11.1% (10.2%-12.0%) | 1 |
| Material deprivation |  |  |
| Yes | 21.7% (19.5%-24.1%) | 1.90 (1.67-2.16)\*\*\* |
| No | 11.5% (10.6%-12.4%) | 1 |
| Maternal education |  |  |
| Low | 18.9% (16.5%-21.7%) | 1.53 (1.30-1.81)\*\*\* |
| High | 12.3% (11.4%-13.4%) | 1 |
| \* p<0.05, \*\* p<0.01, \*\*\* p<0.001 |

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| Supplementary Table 2: Association between covariates and adolescent-reported SF-MFQ mental health outcomes at age 14 |
| Covariates | % (with 95% CI) | Prevalence rate ratio (with 95% CI) |
| Sex  |  |  |
| Male |  4.2% (3.5%-5.1%) | 1 |
| Female | 13.9% (12.6%-15.3%) | 3.31 (2.67-4.09)\*\*\* |
| Ethnicity |  |  |
| White  | 9.4% (8.6%-10.2%) | 1 |
| Other |  7.2% (5.5%-9.4%) | 0.78 (0.58-1.02) |
| Household composition |  |  |
| Single parent | 10.0% (8.4%-11.8%) | 1.17 (0.97-1.41) |
| Two parents |  8.5% (7.7%-9.3%) | 1 |
| Income poverty  |  |  |
| Yes | 9.4% (8.0%-11.1%) | 1.08 (0.90-1.30) |
| No |  8.7% (7.9%-9.6%) | 1 |
| Material deprivation |  |  |
| Yes | 11.9% (10.2%-13.8%) | 1.48 (1.25-1.75)\*\*\* |
| No |  8.1% (7.3%-8.9%) | 1 |
| Maternal education |  |  |
| Low |  8.9% (7.2%-11.0%) | 1.00 (0.79-1.27) |
| High |  8.9% (8.1%-9.8%) | 1 |
| \* p<0.05, \*\* p<0.01, \*\*\* p<0.001 |

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| Supplementary Table 3: Association between covariates and adolescent-reported self-harm at age 14 |
| Covariates | % (with 95% CI) | Prevalence rate ratio (with 95% CI) |
| Sex  |  |  |
| Male | 8.2% (7.3%-9.2%) | 1 |
| Female | 22.0% (20.3%-23.7%) | 2.67 (2.44-3.19)\*\*\* |
| Ethnicity |  |  |
| White  | 15.8% (14.8%-16.9%) | 1 |
| Other | 11.0% (9.2%-13.1%) | 0.69 (0.57-0.84)\*\*\* |
| Household composition |  |  |
| Single parent | 16.9% (14.9%-19.0%) | 1.20 (1.05-1.38)\*\* |
| Two parents | 14.0% (13.0%-15.1%) | 1 |
| Income poverty  |  |  |
| Yes | 16.1% (14.1%-18.4%) | 1.13 (0.97-1.31) |
| No | 14.3% (13.2%-15.4%) | 1 |
| Material deprivation |  |  |
| Yes | 19.4% (16.9%-22.1%) | 1.43 (1.23-1.65)\*\*\* |
| No | 13.6% (12.6%-14.6%) | 1 |
| Maternal education |  |  |
| Low | 14.2% (11.7%-17.1%) | 0.95 (0.77-1.15) |
| High | 15.0% (14.0%-16.1%) | 1 |
| \* p<0.05, \*\* p<0.01, \*\*\* p<0.001 |