

# Community-based participation of children with and without disabilities

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## PUBLICATION DATA

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## ABBREVIATION

MCS5 Millennium Cohort Study fifth sweep

**AIM** To describe and compare the socio-demographic characteristics and community-based participation of children with and without disabilities.

**METHOD** This cross-sectional study reports data on 1073 children with disabilities (663 males, 410 females) and 11 122 children without disabilities (5617 males, 5505 females) aged 10 to 12 years from the fifth sweep of the Millennium Cohort Study.  $\chi^2$  was used to explore differences between the two groups. Logistic regression models were used to assess the relationships between childhood disability (dependent variable) and socio-demographic characteristics. Logistic regression models were also used to examine the associations between childhood disability (dependent variable) and participation in community-based activities.

**RESULTS** Children with disabilities were more likely to be male, have psychosocial and behavioural problems, live in single-parent households, and have a parent with a longstanding illness. Patterns of community-based participation were similar between children with and without disabilities. However, the extent to which the two groups participated differed. Children with disabilities participated with lower frequency in unstructured physical activities (adjusted odds ratio [OR] 2.41; 95% confidence interval [CI]: 1.95–2.99), organized physical activities (adjusted OR 2.29; 95% CI: 1.83–2.86), religious gatherings (adjusted OR 2.08; 95% CI: 1.35–3.20), and getting together with friends (adjusted OR 3.31; 95% CI: 2.61–4.20).

**INTERPRETATION** Socio-demographic characteristics differed between children with and without disabilities. Children with disabilities had greater restriction in participation compared to peers without disabilities. Participation promoting interventions are required to support the participation of children with disabilities in social and physical activities.

An estimated 93 million children under 14 years (5.1%) are living with moderate or severe disability worldwide.<sup>1</sup> There is a considerable global commitment to improve the health and social outcomes for children with disabilities and to support their participation in all aspects of life.<sup>1,2</sup> Reliable evidence on characteristics, life circumstances, and the participation of children with disabilities is essential to achieve these internationally agreed goals.<sup>2</sup>

Participation is a key contributor to a child's health and well-being.<sup>3,4</sup> Participation in age-appropriate activities supports social, physical, and emotional development and offers numerous health benefits.<sup>4</sup> Understanding and support for promoting the participation of children with disabilities is improving.<sup>1,2</sup> Nonetheless, recent evidence suggests that children with disabilities participate less frequently and are less involved when participating compared to children without disabilities.<sup>4,5</sup> Children with disabilities also experience greater restriction in community participation compared to participation in home or school settings.<sup>5,6</sup>

To direct the allocation of additional resources towards supporting children with disabilities and promoting their participation, professionals and policy-makers need robust evidence from nationally representative samples. There is currently a lack of such evidence.<sup>5,7</sup> Much existing research into participation in childhood disability is restricted to clinical samples and/or focused on children with physical disabilities.<sup>5,7</sup> Generalization from these samples to a wider population is limited.<sup>5</sup> Further, disability is a biopsychosocial phenomenon;<sup>3</sup> children with the same health conditions can have different experiences and participation in community-based activities depending on the environmental context.<sup>7</sup>

The present study has two objectives: (1) to provide evidence on socio-demographic characteristics of a nationally representative sample of children with and without disabilities aged 10 to 12 years; and (2) to describe and compare community-based participation between children with and without disabilities aged 10 to 12 years. Children between ages 10 to 12 years were of interest because: (1) 10- to 12-

year-olds are gaining more independence, but have not yet transitioned into adolescence; and (2) 10- to 12-year-olds are changing physically, biologically, and emotionally which makes them sensitive to contextual influences and predisposes them to behavioural inconsistencies.<sup>8</sup> Findings from this study will help to identify inequalities between children with and without disabilities and provide professionals and policy-makers with a number of important considerations for the development of targeted interventions to better support children with disabilities in this age range.

## METHOD

### Data

This is a cross-sectional study based on secondary analysis of an existing national cohort study. Data are from the Millennium Cohort Study fifth sweep (MCS5) carried out in 2012 and 2013.<sup>9</sup> The MCS is a nationally representative study which supplies a wide range of information about 19 000 children (and their families) born in the UK.<sup>10</sup> The first sweep was carried out in 2001 and 2002 when children were 9 to 11 months old and the follow-ups were conducted when children were aged 3, 5, 7, 11, and 14 years old.<sup>10</sup> Detailed descriptions of the complex sampling strategy (i.e. a random two-stage sampling of electoral wards with oversampling of families living in the smaller UK countries, families from deprived backgrounds, and high minority ethnic populations), participant recruitment, response rates, and handling of missing data (multiple imputation) are provided elsewhere.<sup>10</sup>

Ethical approval for the MCS5 was obtained by the Centre for Longitudinal Studies from the National Health Service Research Ethics Committee – the Yorkshire and Humber Research Ethics Committee on 29th July 2011 (Ref: 11/YH/0203).<sup>10</sup> Participants provided written informed consent to the survey and to the publication of results arising from the survey data.<sup>10</sup> Ethical approval for the secondary data analysis was granted by Queen Margaret University on 2nd July 2018. The fifth sweep supplies information on 13 469 children in 13 287 families living in the UK (response rate 69%).<sup>10</sup> This study reports on data collected from the main carer (96% mothers) on singleton births.

### Measures

#### *Childhood disability*

Children with disabilities were identified through the main carers' affirmative responses to two questions: (1) whether children have a physical or mental health condition lasting or expected to last 12 or more months; and (2) whether this condition reduces children's ability to carry out day-to-day activities.

#### *Psychosocial and behavioural functioning*

This construct was measured using the total difficulties score from the parent-report Strengths and Difficulties Questionnaire.<sup>11</sup> The Strengths and Difficulties

### What this paper adds

- Patterns of community-based participation were similar between children with and without disabilities.
- Children with disabilities had lower frequency of participation in physical activities, religious gatherings, and getting together with friends.

Questionnaire is a behaviour screening questionnaire for children and young people aged 11 to 17 years.<sup>11</sup> The 25 items in the questionnaire generate five subscales measuring: (1) emotional symptoms; (2) conduct/behavioural problems; (3) hyperactivity; (4) peer relationships problems; and (5) prosocial behaviour.<sup>11</sup> The Strengths and Difficulties Questionnaire total difficulties scores are generated by summing scores from the first four subscales. Based on standardized cut-offs,<sup>12</sup> children can be categorized into three subgroups, corresponding to 'normal', 'borderline', and 'abnormal' psychosocial and behavioural problems.<sup>12</sup>

#### *Socio-demographic characteristics*

Measures included child sex, ethnicity, and family characteristics: family type (single vs coparent household), parental education, family income, presence of parental longstanding illness, and parental mental health functioning. The selection of family characteristics was informed by literature showing the important role of these factors in child development and well-being.<sup>1,2</sup>

Parental education was determined through the highest educational qualification achieved according to the UK's national vocational qualification classification. A unified seven-category responses measure was collapsed into four corresponding to 'no formal UK qualifications', 'general certificate of secondary education/equivalent', 'A levels/equivalent', and 'university degree/equivalent'. The categories were developed based on the UK Government equivalents for academic qualifications.<sup>13</sup> The measure of family income was determined through the modified Organization for Economic Co-operation and Development equivalence scale since it takes into account the size and composition of families.<sup>14</sup> Parental mental health functioning was measured using the total scores generated from the Kessler 6 scale.<sup>15</sup> The Kessler 6 scale is a six-item psychological screening tool which is broadly used at the population level to screen for moderate distress (Kessler 6 $\geq$ 5) and severe mental illnesses (Kessler 6 $\geq$ 13).<sup>16</sup> Before calculating the total scores from the Kessler 6 scale, the authors checked the internal constancy of the Kessler 6 items available in the original survey. Reliability analysis for six items produced Cronbach's alpha of 0.89 which is indicative of a high level of internal consistency.<sup>17</sup>

#### *Participation in community-based activities*

In this study, participation in community-based activities was defined as a child's attendance in formal and informal everyday activities in the out-of-school community-based environment. In the MCS5, parents were asked to indicate how often their child had attended a variety of formal and

informal activities.<sup>10</sup> Most of the items were scored on a 7-point Likert type scale, ranging from daily to never.

Selection of community-based participation items from the MCS5 was informed by: (1) review of literature on participation measurement, and (2) cross-reference of available items in the MCS5 with a measure demonstrating a contemporary model of participation: the Participation and Environment Measure: Children and Youth<sup>18</sup> (Table S1, online supporting information). Although the Participation and Environment Measure: Children and Youth consists of fewer items compared to other participation measurement tools, evidence suggests its content density is high in relation to the International Classification of Functioning, Disability and Health's participation domains.<sup>19</sup>

Six items related to community-based participation were selected from the MCS5. The aspect of participation captured was attendance or 'being there'.<sup>20</sup> Attendance was measured in terms of: (1) diversity or range of activities in which the child took part;<sup>20</sup> (2) 'never participated' vs 'participated' in each activity; and (3) frequency of participation in each activity.<sup>20</sup> To measure participation diversity, a dichotomized scale was generated by collapsing the 7-point Likert type scale into 'never participated' and 'participated'. Diversity was measured by counting the number of activities for which the parent gave an affirmative response for participation.<sup>20</sup> Participation frequency measure was derived by collapsing the 7-point Likert type scale into three new categories corresponding to 'low', 'regular', and 'high' frequency of participation. These categories were developed in consultation with a group of experts in participation research.

### Analysis

The analysis was completed using the SPSS Complex Samples Module, version 23.0 (IBM Corp., Armonk, NY, USA). All analyses were adjusted for complex sampling design features (clustering, stratification) of the survey, attrition, and non-response.<sup>21</sup>  $\chi^2$  tests of independence were used to explore the differences between children with and without disabilities on their socio-demographic characteristics and participation in each community-based activity. Results of  $\chi^2$  are based on the adjusted F and its degrees of freedom. The adjusted F is a variant of the second-order Rao-Scott adjusted  $\chi^2$  statistic and was used here because of a lack of independence of observations in the MCS5 caused by complex sampling design features of the survey.

Univariable logistic regression models were used to assess the relationships between the dependent variable: childhood disability (measured as 'present' vs 'absent') and socio-demographic characteristics. To explore whether differences between children with and without disabilities could be explained by variations in socio-demographic characteristics, a multivariable logistic regression model was fitted accounting for all these characteristics. Univariable logistic regression models were also fitted to explore the associations between childhood disability (dependent

variable) and participation in each community-based activity. To explore whether differences in participation between children with and without disabilities could be explained by child sex and variations in socio-economic status (family income, parental education), multivariable logistic regression models were fitted adjusting for these key participation associated covariates.<sup>1,4-6,22</sup>

## RESULTS

### Children's characteristics and circumstances

The final sample consisted of 12 195 children aged 10 to 12 years (mean age 10y 8mo, standard error [SE] 0.06mo), out of which 6283 (51.5%) were male and 5915 (48.5%) female. One thousand and seventy-three children (8.8%; 95% confidence interval [CI]: 8.2–9.5%) were reported as having a disability and 1406 (11.6%) had teacher-identified special education needs. Clinical characteristics of children with disabilities by sex are presented in Table S2 (online supporting information).

The most commonly reported functional issues experienced by children with disabilities were learning, understanding, and concentrating (36.9%), socializing and behaviour (32.3%), stamina, breathing, and fatigue (27.1%), and mobility (17.3%). Many children with disabilities experienced more than one category of functional issues. Nearly half of the sample (48.4%) had teacher-identified special educational needs and 39.2% had clinically significant (abnormal) psychosocial and behavioural problems. Males were more likely to experience functional issues in learning, understanding, and concentrating ( $p<0.001$ ), socializing and behaviour ( $p<0.001$ ), mental health ( $p<0.01$ ), stamina, breathing, and fatigue ( $p=0.02$ ), and mobility ( $p=0.01$ ) compared to females. Similarly, a higher proportion of males had psychosocial and behavioural problems ( $p<0.001$ ) and were identified with special education needs ( $p<0.001$ ; Table S2).

Children with and without disabilities differed in respect to socio-demographic characteristics (Table 1). Significant associations were established between presence of childhood disability and child sex ( $p<0.001$ ), psychosocial and behavioural problems ( $p<0.001$ ), family type ( $p<0.001$ ), parental education ( $p=0.001$ ), and family income ( $p<0.001$ ). Associations were further established between childhood disability and parental health indicators (Table 1). The odds of having a disability was 1.59 times higher for males compared to females (crude odds ratio [OR] 1.59; 95% CI: 1.35–1.87; Table 2). Children with disabilities also had higher odds of having clinically significant psychosocial and behavioural problems (crude OR 9.70; 95% CI: 7.98–11.8), living in single-parent households (crude OR 1.91; 95% CI: 1.61–2.27), having a parent with no formal UK qualification (crude OR 1.61; 95% CI: 1.28–2.02) or general certificate of secondary education/equivalent (crude OR 1.32; 95% CI: 1.10–1.59), and being from the bottom 60 per cent of financially more deprived families (Table 2).

Further, the odds of living with a parent having long-standing illness was nearly three times higher for children

**Table 1:** Main carer report characteristics of children with and without disabilities aged 10–12y

Characteristics	Children with disabilities <sup>a</sup>		Children without disabilities <sup>b</sup>		$\chi^2$ test <sup>c</sup>
	Population estimate (SE)	%	Population estimate (SE)	%	
Sex					
Male	663 (40)	61.8	5617 (228)	50.5	$p<0.001$
Female	410 (30)	38.2	5505 (220)	49.5	
Country of origin					$p=0.39$
England	830 (52)	83.8	9007 (409)	82.4	
Scotland	85 (12)	8.5	936 (51)	8.6	
Wales	44 (5)	4.5	538 (47)	4.9	
Northern Ireland	32 (5)	3.2	447 (24)	4.1	
Ethnicity					$p=0.03$
Mixed/other	69 (12)	6.4	552 (60)	5.0	
Black/Black British	27 (9)	2.5	417 (77)	3.7	
Indian/Pakistani/Bangladeshi	53 (13)	5.0	830 (128)	7.5	
White	924 (51)	86.1	9323 (355)	83.8	
PSB problems					$p<0.001$
Abnormal	410 (31)	39.2	814 (53)	7.6	
Borderline	155 (17)	14.8	649 (44)	6.0	
Normal	481 (31)	46.0	9264 (348)	86.4	
Family type					$p<0.001$
Single-parent household	569 (39)	53.0	4109 (188)	37.0	
Coparent household	504 (33)	47.0	7004 (281)	63.0	
Parental education					$p=0.001$
No formal UK qualifications	262 (27)	24.6	2134 (136)	19.3	
GCSE/equivalent	467 (32)	43.7	4624 (211)	41.8	
A levels/equivalent	79 (11)	7.4	894 (46)	8.1	
University degree/equivalent	260 (21)	24.3	3401 (161)	30.8	
Family income <sup>d</sup>					$p<0.001$
Bottom	325 (27)	30.3	2140 (153)	19.2	
Second	247 (24)	23.0	2190 (106)	19.7	
Third	212 (17)	19.8	2229 (102)	20.0	
Fourth	152 (16)	14.1	2285 (106)	20.5	
Top	138 (15)	12.9	2277 (132)	20.5	
Parental longstanding illness					$p<0.001$
Present	402 (31)	37.5	1936 (91)	17.4	
Absent	671 (40)	62.5	9180 (366)	82.6	
Parental mental health functioning					$p<0.001$
Serious mental distress	130 (20)	13.1	590 (40)	5.8	
Moderate mental distress	356 (27)	35.8	2818 (132)	27.7	
No distress	509 (35)	51.2	6781 (255)	66.6	

All analyses are adjusted for complex sampling design features of the survey, attrition, and non-response. Because of rounding column percentages may not add exactly to 100%. <sup>a</sup> $n=1073$ . <sup>b</sup> $n=11\ 122$ . <sup>c</sup>Significance is based on the adjusted F and its degrees of freedom. <sup>d</sup>Based on the Organization for Economic Co-operation and Development equalized quintiles for the entire UK. SE, standard error; PSB, psychosocial and behavioural; GCSE, general certificate of secondary education.

with disabilities (crude OR 2.84; 95% CI: 2.40–3.36) compared to peers without disabilities. Children with disabilities also were more likely to be from families with a parent having moderate (crude OR 1.68; 95% CI: 1.41–2.01) or serious mental distress (crude OR 2.93; 95% CI: 2.14–4.03; Table 2).

To examine whether observed differences between groups could be explained by variations in socio-demographic characteristics, a multivariable logistic regression model was fitted. In the multivariable model, child sex, psychosocial and behavioural problems, family type, and parental longstanding illness continued to be associated with childhood disability (Table 2). Based on the adjusted model, males (adjusted OR 1.37, 95% CI: 1.15–1.64), children with borderline (adjusted OR 4.27; 95% CI: 3.32–5.50), and abnormal psychosocial and behavioural problems (adjusted OR 8.86; 95% CI: 7.12–11.01), children from single-parent households (adjusted OR 1.37, 95% CI: 1.11–1.68), and those with a parent having a

longstanding illness (adjusted OR 2.36; 95% CI: 1.94–2.87) were more likely to have a disability.

### Participation in community-based activities

Patterns of participation (i.e. the ranking of proportions for participation across activities) in community-based activities were similar between children with and without disabilities (Table S3, Fig. S1, online supporting information). Higher proportions of children in both groups participated in community-based activities that were more unstructured in nature, such as getting together with friends (88% and 97% of children with and without disabilities participated) and unstructured physical activities (86% and 94% of children with and without disabilities participated).

The proportion of children with disabilities who never participated in each community-based activity ranged from 12.2 per cent to 67.7 per cent, whereas among children without disabilities this proportion ranged from 3.4 per

**Table 2:** Logistic regression analysis of childhood disability by socio-demographic characteristics

Characteristics	Univariable analysis			Multivariable analysis <sup>a</sup>		
	B (SE)	COR	95% CI	B (SE)	AOR	95% CI
<b>Sex</b>						
Male	0.46 (0.08) <sup>b</sup>	1.59	(1.35–1.87)	0.32 (0.09) <sup>b</sup>	1.37	(1.15–1.64)
Female (ref)	0.00	1.00		0.00	1.00	
<b>Ethnicity</b>						
Mixed/other	0.23 (0.18)	1.26	(0.90–1.78)	0.19 (0.20)	1.21	(0.82–1.79)
Black/Black British	–0.42 (0.32)	0.66	(0.35–1.22)	–0.16 (0.37)	0.85	(0.41–1.77)
Indian/Pakistani/Bangladeshi	–0.44 (0.18) <sup>d</sup>	0.65	(0.46–0.92)	–0.41 (0.19) <sup>d</sup>	0.66	(0.46–0.96)
White (ref)	0.00	1.00		0.00	1.00	
<b>PSB problems</b>						
Abnormal	2.27 (0.10) <sup>b</sup>	9.70	(7.98–11.8)	2.18 (0.11) <sup>b</sup>	8.86	(7.12–11.0)
Borderline	1.52 (0.13) <sup>b</sup>	4.59	(3.57–5.91)	1.45 (0.13) <sup>b</sup>	4.27	(3.32–5.50)
Normal (ref)	0.00	1.00		0.00	1.00	
<b>Family type</b>						
Single-parent household	0.65 (0.09) <sup>b</sup>	1.91	(1.61–2.27)	0.31 (0.10) <sup>c</sup>	1.37	(1.11–1.68)
Coparent household (ref)	0.00	1.00		0.00	1.00	
<b>Parental education</b>						
No formal UK qualifications	0.48 (0.12) <sup>b</sup>	1.61	(1.28–2.02)	–0.16 (0.15)	0.85	(0.63–1.14)
GCSE/equivalent	0.28 (0.09) <sup>c</sup>	1.32	(1.10–1.59)	–0.11 (0.11)	0.89	(0.72–1.11)
A levels/equivalent	0.14 (0.16)	1.15	(0.85–1.56)	–0.04 (0.17)	0.96	(0.69–1.33)
University degree/equivalent (ref)	0.00	1.00		0.00	1.00	
<b>Family income<sup>e</sup></b>						
Bottom	0.92 (0.14) <sup>b</sup>	2.50	(1.92–3.26)	0.21 (0.18)	1.23	(0.87–1.76)
Second	0.62 (0.13) <sup>b</sup>	1.86	(1.43–2.40)	0.06 (0.16)	1.06	(0.77–1.45)
Third	0.45 (0.13) <sup>b</sup>	1.57	(1.23–2.01)	0.10 (0.15)	1.11	(0.83–1.49)
Fourth	0.09 (0.14)	1.09	(0.83–1.44)	–0.11 (0.16)	0.90	(0.66–1.22)
Top (ref)	0.00	1.00		0.00	1.00	
<b>Parental longstanding illness</b>						
Present	1.04 (0.09) <sup>b</sup>	2.84	(2.40–3.36)	0.86 (0.10) <sup>b</sup>	2.36	(1.94–2.87)
Absent (ref)	0.00	1.00		0.00	1.00	
<b>Parental mental health functioning</b>						
Serious mental distress	1.08 (0.16) <sup>b</sup>	2.93	(2.14–4.03)	–0.31 (0.19)	0.74	(0.51–1.07)
Moderate mental distress	0.52 (0.09) <sup>b</sup>	1.68	(1.41–2.01)	–0.14 (0.10)	0.87	(0.71–1.07)
No distress (ref)	0.00	1.00		0.00	1.00	

All analyses are adjusted for complex sampling design features of the survey, attrition, and non-response. <sup>a</sup>*n*=11 095. The multivariable model is fitted on dependent variable: childhood disability adjusting for the socio-demographic variables. <sup>b</sup>*p*<0.001. <sup>c</sup>*p*<0.01. <sup>d</sup>*p*<0.05. <sup>e</sup>Based on the Organization for Economic Co-operation and Development equalized quintiles for the entire UK. *B*, beta coefficient; SE, standard error; COR, crude odds ratio; CI, confidence interval; AOR, adjusted odds ratio; PSB, psychosocial and behavioural; GCSE, general certificate of secondary education.

cent to 57.2 per cent (Table S3, Fig. S2, online supporting information). Similar to children without disabilities, the highest restriction in participation for children with disabilities was for vacations abroad (67.7% never participated), followed by participation in religious gatherings (58.7% never participated), visiting a library (39.7% never participated), and participation in organized physical activities (38.5% never participated).

Participation diversity scores were roughly similar. Children with disabilities participated on average in 3.7 out of 6 activities (SE 0.06, 95% CI: 3.66–3.81), whereas children without disabilities in 4.2 activities (SE 0.02, 95% CI: 4.18–4.28) (Fig. S3, online supporting information). Although sharing similarities in the patterns and average diversity scores of participation, the extent to which children with and without disabilities participated in each community-based activity differed (Table 3).

Based on univariable logistic regression results, children with disabilities had the highest restriction in participation in getting together with friends (crude OR 3.95, 95% CI: 2.96–5.28) followed by participation in unstructured physical activities (crude OR 2.51, 95% CI: 1.95–3.22) and

organized physical activities (crude OR 1.95, 95% CI: 1.63–2.34) compared to peers. To examine whether observed differences could be explained by variations in child sex (predominantly associated with activity preferences), family income, and parental education, each univariable model was adjusted for these covariates. Based on the adjusted multivariable model results, children with disabilities were less likely to get together with friends (adjusted OR 3.22; 95% CI: 2.38–4.34), participate in unstructured physical activities (adjusted OR 2.27; 95% CI: 1.76–2.94), organized physical activities (adjusted OR 1.73; 95% CI: 1.43–2.09), or religious gatherings (adjusted OR 1.28; 95% CI: 1.10–1.48), and travel for vacations abroad (adjusted OR 1.28; 95% CI: 1.06–1.54; Table 3).

The frequency with which children with and without disabilities participated in each community-based activity was significantly different, except for visiting a library (Table S4, online supporting information). Proportionately more children with disabilities participated in activities with low frequency compared to children without disabilities. Similarly, a lower proportion of children with disabilities participated in each of these activities with

regular or high frequency (Table S4). Univariable logistic regression results showed that for children with disabilities the odds for lower frequency of participation in unstructured physical activities, organized physical activities, and getting together with friends were significantly higher compared to children without disabilities (Table 4). These differences did not change after adjusting for child sex, family income, and parental education. Based on the adjusted multivariable models, children with disabilities were twice as likely to have lower frequency of participation in unstructured physical activities (adjusted OR 2.41;

95% CI: 1.95–2.99), organized physical activities (adjusted OR 2.29; 95% CI: 1.83–2.86), or religious gatherings (adjusted OR 2.08; 95% CI: 1.35–3.20), and three times more likely to have lower frequency in getting together with friends (adjusted OR 3.31; 95% CI: 2.61–4.20; Table 4).

## DISCUSSION

This study provides evidence on socio-demographic characteristics and community-based participation of 12 195 children with and without disabilities aged 10 to 12 years across the UK. One thousand and seventy-three (8.8%)

**Table 3:** Logistic regression analysis of childhood disability by participation (never vs ever) in each community-based activity

Community-based activities	Univariable analysis			Multivariable analysis <sup>a</sup>		
	B (SE)	COR	95% CI	B (SE)	AOR	95% CI
Visiting a library						
Never participated	0.20 (0.10) <sup>d</sup>	1.22	(1.01–1.48)	0.12 (0.10)	1.12	(0.93–1.36)
Participated (ref)	0.00	1.00		0.00	1.00	
Organized physical activities						
Never participated	0.67 (0.09) <sup>b</sup>	1.95	(1.63–2.34)	0.55 (0.10) <sup>b</sup>	1.73	(1.43–2.09)
Participated (ref)	0.00	1.00		0.00	1.00	
Unstructured physical activities						
Never participated	0.92 (0.13) <sup>b</sup>	2.51	(1.95–3.22)	0.82 (0.13) <sup>b</sup>	2.27	(1.76–2.94)
Participated (ref)	0.00	1.00		0.00	1.00	
Religious gatherings						
Never participated	0.31 (0.07) <sup>b</sup>	1.37	(1.18–1.58)	0.24 (0.08) <sup>c</sup>	1.28	(1.10–1.48)
Participated (ref)	0.00	1.00		0.00	1.00	
Getting together with friends						
Never participated	1.37 (0.15) <sup>b</sup>	3.95	(2.96–5.28)	1.17 (0.15) <sup>b</sup>	3.22	(2.38–4.34)
Participated (ref)	0.00	1.00		0.00	1.00	
Vacations abroad						
Never participated	0.45 (0.09) <sup>b</sup>	1.57	(1.32–1.87)	0.24 (0.10) <sup>d</sup>	1.28	(1.06–1.54)
Participated (ref)	0.00	1.00		0.00	1.00	

All analyses are adjusted for complex sampling design features of the survey, attrition, and non-response. <sup>a</sup>All multivariable models are adjusted for child sex, family income, and parental education. <sup>b</sup> $p < 0.001$ . <sup>c</sup> $p < 0.01$ . <sup>d</sup> $p < 0.05$ . B, beta coefficient; SE, standard error; COR, crude odds ratio; CI, confidence interval; AOR, adjusted odds ratio.

**Table 4:** Logistic regression analysis of childhood disability by participation frequency in each community-based activity

Community-based activities	Univariable analysis			Multivariable analysis <sup>a</sup>		
	B (SE)	COR	95% CI	B (SE)	AOR	95% CI
Organized physical activities						
Low	0.95 (0.11) <sup>b</sup>	2.58	(2.08–3.20)	0.83 (0.11) <sup>b</sup>	2.29	(1.83–2.86)
Regular	0.47 (0.10) <sup>b</sup>	1.60	(1.31–1.96)	0.44 (0.10) <sup>b</sup>	1.55	(1.26–1.90)
High (ref)	0.00	1.00		0.00	1.00	
Unstructured physical activities						
Low	0.92 (0.10) <sup>b</sup>	2.52	(2.07–3.07)	0.88 (0.11) <sup>b</sup>	2.41	(1.95–2.99)
Regular	–0.01 (0.11)	0.99	(0.80–1.22)	0.05 (0.11)	1.05	(0.85–1.29)
High (ref)	0.00	1.00		0.00	1.00	
Religious gatherings						
Low	0.39 (0.20)	1.47	(0.99–2.18)	0.73 (0.22) <sup>c</sup>	2.08	(1.35–3.20)
Regular	0.07 (0.21)	1.07	(0.70–1.62)	0.44 (0.23)	1.55	(0.99–2.43)
High (ref)	0.00	1.00		0.00	1.00	
Getting together with friends						
Low	1.28 (0.12) <sup>b</sup>	3.58	(2.84–4.52)	1.20 (0.12) <sup>b</sup>	3.31	(2.61–4.20)
Regular	0.06 (0.09)	1.06	(0.89–1.26)	0.15 (0.09)	1.16	(0.98–1.38)
High (ref)	0.00	1.00		0.00	1.00	
Vacations abroad						
Low	0.51 (0.34)	1.67	(0.85–3.25)	0.23 (0.35)	1.26	(0.63–2.50)
Regular	0.17 (0.37)	1.19	(0.57–2.48)	0.16 (0.38)	1.18	(0.56–2.48)
High (ref)	0.00	1.00		0.00	1.00	

All analyses are adjusted for complex sampling design features of the survey, attrition and non-response. <sup>a</sup>All multivariable models are adjusted for child sex, family income, and parental education. <sup>b</sup> $p < 0.001$ . <sup>c</sup> $p < 0.01$ . B, beta coefficient; SE, standard error; COR, crude odds ratio; CI, confidence interval; AOR, adjusted odds ratio.

out of 12 195 children aged 10 to 12 years were reported to have a disability. Socio-demographic characteristics of children with disabilities differed from those of children without disabilities. Childhood disability was significantly more prevalent in socio-economically disadvantaged families. Children with disabilities were also more likely to be male, have psychosocial and behavioural problems, live in single-parent households, and have a parent with a long-standing illness. These findings are consistent with the results of previous research.<sup>23,24</sup>

A link between socio-economic disadvantage and childhood disability is well established.<sup>1,2</sup> Literature suggests that low birthweight, undernourishment, and suboptimal living conditions are some of the factors that may predispose children born to socio-economic disadvantage to the onset of health conditions and associated disability.<sup>1</sup> On the other hand, direct costs associated with childhood disability are high and many families have to outlay additional resources (i.e. financial, time, support) to effectively support children.<sup>1</sup> To meet care commitments, some parents are unable to participate in employment.<sup>1,2</sup> Because of these reasons many families with childhood disability may experience socio-economic disadvantage.<sup>1,2</sup>

Approximately two-thirds of children with disabilities were male. Moreover, a significantly higher proportion of males had psychosocial and behavioral problems and were identified with special educational needs compared to females. Many theories have been proposed to explain this phenomenon with biological vulnerability, referral bias, and testing bias being the most plausible explanations at hand.<sup>25</sup>

For children with disabilities the odds of living in single-parent households and in families with a parent having a longstanding illness were significantly higher, as found in other studies.<sup>23,24</sup> These associations persisted after adjusting for key cofounders. High divorce rate and a presence of multiple births and disabilities are some of the proposed explanations to observed high rates of single-parenthood in households with childhood disability.<sup>23</sup> Although associations between childhood disability and parental poor health have been described previously,<sup>23</sup> it is not clear from the literature whether health problems precede or are triggered or exacerbated by stressors related to having and/or caring for a child with a disability.

Although patterns of participation were similar, the extent to which children with disabilities participated in each activity differed as compared to children without disabilities. Children with disabilities had more restricted participation in five out of six community-based activities. They also participated in those activities with lower frequency. These results are consistent with studies comparing community participation of children with and without disabilities in other cultural contexts.<sup>5,26</sup> Participation in unstructured spontaneous activities was proportionately the highest within both groups. Nevertheless, children with disabilities were three times more likely to have lower frequency in getting together with friends compared to peers.

This is concerning given that social participation offers numerous benefits and is a valuable experience for children.<sup>27</sup> Social participation supports children's social, emotional, and intellectual development and helps children to build their self-esteem and confidence.<sup>27</sup> Social interactions with peers are also powerful motivators for physical activity and encouraging children to engage in activities more regularly.<sup>27</sup> This is important given the findings of this study that children with disabilities were twice as likely to have lower frequency of participation in unstructured and organized physical activities compared to peers even after accounting for child sex, family income, and parental education.

Groups differed in respect to participation in religious gatherings and travelling for vacations abroad. Nevertheless, less than half of children attended religious gatherings in both groups. This is not surprising given that UK church membership has been declining rapidly over the last two decades.<sup>28</sup> More than half of the British public now describe themselves as having 'no religion'.<sup>28</sup> Further, although children with disabilities were less likely to travel for vacations abroad compared to peers, there were no group differences in respect to participation frequency after controlling for potential confounders.

### **Recommendations for practice and further research**

Families of children with disabilities living in disadvantaged circumstances may lack resources to seek support. Empowering families and improving parental access to community support programmes, parental counselling services, and financial schemes may help families to improve life chances of children with disabilities.

Although the average scores for diversity of participation did not differ much, children with disabilities were more likely to have restricted participation and lower frequency of participation in most of the community-based activities assessed compared to children without disabilities. Therefore, to have a more complete understanding about participation differences between groups, it is important to measure both diversity and frequency with which activities are undertaken.

Given observed group differences in participation and evidence suggesting that the gap in participation widens as children move to adolescence,<sup>1</sup> children with disabilities may benefit from strategies directed towards promoting their participation in community-based activities, especially in activities which are social and physical in nature. Previous research<sup>29</sup> identified child functional limitations, high costs, and a lack of nearby facilities or programmes as main reasons contributing to restricted participation in unstructured physical activities and sports. Setting up mutually agreed, short-term attainable goals while taking into account children's functional capabilities, interests, and preferences can help to develop and sustain motivation for activities that are physical in nature. Professionals can also share information on physical activity and sport opportunities in local facilities and educate parents on affordable

alternatives which will enable children with disabilities to be active and which will promote fitness and fun.

This study also established that children with disabilities were more likely to have psychosocial and behavioural problems. Psychosocial and behavioural problems were linked to reduced participation in previous research.<sup>6,26</sup> Further research exploring the independent effect of psychosocial and behavioral problems on the participation of a nationally representative sample of children with disabilities will be helpful. Nevertheless, given the evidence at hand, focusing on children's psychosocial needs and working towards enacting behavioural change strategies may enhance their abilities to effectively socialize with peers, engage with environments, and optimize their participation. More research is needed to explore children's own perspectives on participation to inform the development of more tailored interventions.

### Study strengths and limitations

Secondary analysis of data has known limitations. However, this study used data from a nationally representative sample, a factor which increases confidence in the generalizability of results. The study analysed main-carer reports. Although most of the reports were from biological mothers, information or recall bias might be present. Six participation items were selected from the MCS5 and matched to a validated measure of participation. Nevertheless, the validity of these items is unknown. Further, participation in community-based activities is not limited to the activities described in this study. Finally, participation was conceptualized as attendance overlooking at other important aspects of participation such as involvement and enjoyment. Though items measuring subjective aspects of participation were not available in the MCS5.

### CONCLUSION

Socio-demographic characteristics differed between children with and without disabilities. Childhood disability was more prevalent in disadvantaged families and families with a presence of parental health problems. Empowering families and improving parental access to support programmes, counselling services, and financial schemes might help disadvantaged families to provide better opportunities

for their children and support their participation in community-based activities. Further, given the findings, effective strategies are required to promote the participation of children with disabilities in activities that are social and physical in nature. Development of mutually agreed goal-directed activities which account for children's capabilities, psychosocial and emotional needs, and interests might sustain and increase community-based participation. Further, practical, emotional, and informational support regarding local opportunities and affordable alternatives may enable children with disabilities to be active and promote fitness and fun.

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### SUPPORTING INFORMATION

The following additional material may be found online:

**Table S1:** Cross-reference of available participation items in the MCS5 with the community participation items in the Participation and Environment Measure: Children and Youth

**Table S2:** Clinical characteristics of children with disabilities aged by sex

**Table S3:** Children's participation in each community-based activity

**Table S4:** Children's frequency of participation in each community-based activity

**Figure S1:** Percentages of children who participated in each community-based activity.

**Figure S2:** Percentages of children who never participated in each community-based activity.

**Figure S3:** The range of community-based activities children participated in.

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**RESUMEN****Participación comunitaria de niños con y sin discapacidad****OBJETIVO**

Describir y comparar las características sociodemográficas y la participación comunitaria de niños con y sin discapacidad.

**METODO**

Este estudio transversal informa datos de 1.073 niños con discapacidades (663 varones, 410 mujeres) y 11.122 niños sin discapacidades (5.617 varones, 5.505 mujeres) de 10 a 12 años del quinto barrido del Millennium Cohort Study.  $\chi^2$  se utilizó para explorar las diferencias entre los dos grupos. Se utilizaron modelos de regresión logística para evaluar las relaciones entre la discapacidad infantil (variable dependiente) y las características sociodemográficas. Los modelos de regresión logística también se utilizaron para examinar las asociaciones entre la discapacidad infantil (variable dependiente) y la participación en actividades comunitarias.

**RESULTADOS**

Los niños con discapacidades tenían más probabilidades de ser hombres, tener problemas psicosociales y de comportamiento, vivir en hogares monoparentales y tener un padre con una enfermedad de larga data. Los patrones de participación comunitaria fueron similares entre los niños con y sin discapacidad. Sin embargo, la medida en que los dos grupos participaron fue diferente. Los niños con discapacidades participaron con menor frecuencia en actividades físicas no estructuradas (odds ratio ajustado [OR] 2.41; intervalo de confianza [IC] 95% 1.95–2.99), actividades físicas organizadas (OR ajustado 2.29; IC 95% 1.83–2.86), reuniones religiosas (OR ajustado 2.08; IC 95% 1.35–3.20) y reunirse con amigos (OR ajustado 3.31; IC 95% 2.61–4.20).

**INTERPRETACION**

Las características sociodemográficas diferían entre los niños con y sin discapacidad. Los niños con discapacidad tenían una mayor restricción en la participación en comparación con sus compañeros sin discapacidad. Se requieren intervenciones que promuevan la participación para apoyar la participación de niños con discapacidades en actividades sociales y físicas.

**RESUMO****Participação baseada na comunidade de crianças com e sem deficiências****OBJETIVO**

Descrever e comparar as características sócio-demográficas e a participação baseada na comunidade de crianças com e sem deficiências.

**MÉTODO**

Este estudo transversal reporta dados sobre 1.073 crianças com deficiências (663 do sexo masculino, 410 do sexo feminino) e 11.122 crianças sem deficiências (5.617 do sexo masculino, 5.055 do sexo feminino) com idades de 10 a 12 anos do quinto grupo do Estudo de Coorte do Milênio.  $\chi^2$  foi usado para explorar diferenças entre os dois grupos. Modelos de regressão logística foram usados para avaliar relações entre deficiência infantil (variável dependente) e características sócio-demográficas. Modelos de regressão logística também foram usados para examinar associações entre deficiência infantil (variável dependente) e participação em atividades baseadas na comunidade.

**RESULTADOS**

Crianças com deficiências têm maior probabilidade de ser do sexo masculino, ter problemas psicossociais e comportamentais, viver em casa com apenas um dos pais, e ter um dos pais com doença crônica. Os padrões de participação na comunidade foram similares entre crianças com e sem deficiências. No entanto, o quanto cada grupo participou diferiu. Crianças com deficiências participaram com menor frequência em atividades físicas não estruturadas (taxa de risco ajustada [OR] 2,41; intervalo de confiança [IC] a 95% 1,95–2,99), atividades físicas organizadas (OR ajustada 2,29; IC 95% 1,83–2,86), reuniões religiosas (OR ajustada 2,08; IC 95% 1,35–3,20), e se reunir com amigos (OR ajustada 3,31; IC 95% 2,61–4,20).

**INTERPRETAÇÃO**

Características sócio-demográficas diferiram entre crianças com e sem deficiências. Crianças com deficiências tiveram mais restrições na participação comparadas com os pares sem deficiência. Intervenções que promovem a participação são necessárias para apoiar a participação de crianças com deficiências em atividades físicas e sociais.