Vaccine Coverage among Children with and without Intellectual Disabilities in the UK: Cross Sectional Study

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Abstract

Background: Universal childhood vaccination programmes form a core component of child health policies in most countries, including the UK. Achieving high coverage rates of vaccines is critical for establishing 'herd immunity' and preventing disease outbreaks. Evidence from the UK has identified several groups of children who are at risk of not being fully immunised. Our aim was to determine whether children with intellectual disabilities constitute one such group.

Methods: Secondary analysis of parental report data on child vaccination collected in the UK's Millennium Cohort Study when the children were 9 months, 3 years, 5 years and 14 years old.

Results: With one exception (MMR coverage at age 5) vaccination coverage rates were lower for children with intellectual disabilities (when compared to children without intellectual disability) for all vaccinations at all ages. Complete coverage rates were significantly lower for children with intellectual disabilities at ages 9 months (unadjusted prevalence rate ratio (PRR) for non-vaccination = 2.20 (1.64-2.94), $p<0.001$) and 3 years (PRR = 1.52 (1.18-1.96), $p<0.01$), and lower (but not significantly so) at age 5 (PRR = 1.18 (0.91-1.51), $p=0.208$). HPV vaccination was lower (but not significantly so) at age 14 (PRR = 1.83 (0.99-3.37), $p=0.054$). Adjusting PRRs for between group differences in family socio-economic position and other factors associated with coverage reduced the strength of association between intellectual disability and coverage at all ages. However, incomplete vaccination remained significantly elevated for children with intellectual disabilities at ages 9 months and 3 years. There were no statistically significant differences between parents of children with/without intellectual disability regarding the reasons given for non-vaccination.

Conclusions: Children with intellectual disabilities in the UK are at increased risk of vaccine preventable diseases. This may jeopardise their own health, the health of younger siblings and may also compromise herd immunity.

Keywords

Intellectual disability, children, vaccination

Background

Universal childhood vaccination programmes have been described as 'one of the most successful and cost-effective health interventions known' [1] and form a core component of child health policies in most countries, including the UK [2, 3]. Achieving high coverage rates of vaccines is critical for establishing 'herd immunity' and preventing disease outbreaks.

Evidence from the UK has identified a number of groups of children who are at risk of not being fully immunised including children: living in more deprived areas; of teenage or lone parents; of unemployed parents; not registered with a GP; with older siblings; from some minority ethnic groups; from non-English speaking families; whose families are travellers, asylum seekers or are homeless [4-10]. Identifying and tailoring interventions to the needs of such 'at risk' groups will be critical to achieving high coverage rates.

A present it is not known whether whether, in the UK, children with intellectual disabilities constitute one such group. Only two small scale studies have addressed this issue in the UK [11, 12], although some evidence of lower coverage among children with intellectual disability from population based studies is available from Taiwan [13, 14] and Australia [15]. Tuffrey and Finlay [12] report lower vaccination rates for pertussis, measles and rubella for children with intellectual or physical disabilities attending special schools in one health district in England. More recently, MacLeod and Tuffrey [11] have reported lower rates of human papillomavirus vaccination among girls attending schools for children with intellectual disability in one health district in England.

Two sources of evidence suggest that it is likely that vaccination coverage among children with intellectual disabilities may be lower than the national average. First, indicators of lower socio-economic position have been associated in the UK with lower childhood vaccination coverage rates (see above) and an increased prevalence of intellectual disability [16]. Second, there is some limited evidence that historically in the UK paediatricians may have advised parents of children with intellectual and developmental disabilities not to immunise [17].

The primary aim of our paper is to determine whether, in the UK, children with intellectual disabilities are at risk of non-vaccination. A secondary aim is to determine the extent to which any differences in coverage rates between children with and without intellectual disability may be accounted for by between-group differences in family socio-economic position and/or exposure to other established risk factors for low coverage.

Methods

We undertook secondary analysis of Waves 1-3 and 6 of the UK's Millennium Cohort Study (MCS). MCS is the fourth in the series of British birth cohort studies. It aims to follow throughout their lives a cohort of over 18,000 children born in the UK between 2000 and 2002. MCS data are managed by the Centre for Longitudinal Studies at the University of London (www.cls.ioe.ac.uk/) and are available to researchers registered with 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 [18-20], key aspects of which are summarised below.

Sampling

Participant families were randomly selected from Child Benefit Records, a non means-tested welfare benefit available to all UK children. Sampling was geographically clustered to include all four countries of the UK (England, Wales, Scotland, Northern Ireland), and disproportionately stratified to over-sample children from ethnic minority groups, disadvantaged communities and children born in Wales, Scotland and Northern Ireland [21]. Children and families were drawn from 398 randomly selected electoral wards in the UK. The first survey (MCS1) took place when children were nine months old and included a total of 18,552 families. Children were followed up at ages three (MCS2; 14,898 families interviewed), five (MCS3; 14,678 families interviewed) and 14 (MCS6; 11,173 families interviewed)[1]. 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 all children.

Procedure

All data used in the present study were collected by parental report and direct cognitive testing of the child.

Identification of Children with Intellectual Disabilities

Intellectual disability was primarily identified from the results of assessments of child cognitive ability at ages seven, five and three years. At ages five and seven we extracted the first component ('g') from a principal component analysis of all age-standardised subscale/test scores [cf., 22, 23-25]. We identified children as having intellectual disability if they scored two or more standard deviations below the mean on the first principal component at age seven.

If cognitive test scores were missing at age seven, we identified children as having intellectual disability using an identical method at age five. For children without cognitive test scores at age seven and five, we identified intellectual disability on the basis of cognitive test scoares at age three.

For 125 children for who no cognitive test results were available at any age, we identified intellectual disability on the basis of parental report of receipt of special education services and child attainment.

Finally, we used normalised test scores at age 11 to attempt to address potential errors in classification. Specifically, all children who had been identified as having intellectual disability who scored at or above the population mean at age 11 were reclassified as not having intellectual disability. Similarly, all children identified as not having intellectual disability but who scored three or more standard deviations below the population mean at age 11 were reclassified as having intellectual disability. Further details of these procedures are available in a paper previously published in BMC Public Health [24].This procedure led to the identification of 671 of 18,552 (3.6%) children. As expected, boys were significantly more likely than girls to be identified as having intellectual disability (4.3% vs 2.6%; OR=1.67, 95% CI 1.42-1.96).

[1] Vaccination information was not collected at MCS waves 4 (age 7) and 5 age (11).

Vaccination Uptake

The UK universal[2] vaccination schedule relevant to the MCS cohort was as follows: (1) Due at age 8-16 weeks, primary vaccines (Diphtheria, Tetanus and Pertussis (DTP); Haemophilus influenzae type b (Hib); Oral Polio; Meningococcal group C (Men C)); (2) due at age 1, Measles, Mumps and Rubella (MMR); (3) due at age 3 years, 4 months, preschool booster (DTP; Polio - oral or inactivated; MMR); (4) due at age 12-13 human papillomavirus (HPV).

Uptake

Vaccination uptake was based on primary parental informant report. At all Waves informants were requested to consult parent-held child vaccination records in order to answer questions about vaccinations. At Wave 1 information was only recorded on whether the target child had no, some or all recommended vaccinations. At Waves 2 and 3 information was recorded on the uptake of each recommended vaccination. We used Wave 1 to 3 data to generate two binary summary variables at each Wave (fully or partially vaccinated vs not vaccinated, fully vaccinated vs partially or not vaccinated). At Wave 6 information was only recorded on whether the target child, if female, had received HPV vaccination. Vaccination coverage data was available for 18,528 children at age 9 months (99.9% of participating children), 14,776 children at age 3 years (99.2% of participating children), 14,650 children at age 5 years (99.8% of participating children) and 5,488 girls at age 14 years (98.6% of participating girls).

Reasons Given for Non-Uptake

At each wave (and at Waves 2 and 3 for each vaccine) parental informants were asked open ended questions about the reason for non-vaccination. Responses were coded into categories that varied across waves both in content and number of categories (up to 44 at Wave 3) Given the small numbers involved specific reasons were grouped into seven categories: parental choice (e.g., concerns about side effects, preference for homeopathic treatments); service/administration errors (e.g., vaccine not available); child unwell at time of vaccination; Adverse reactions to previous vaccinations or health-related contra-indication; family disorganisation (e.g., not keeping or making appointment); appointment pending; other (e.g., don't know, vague or irrelevant answer).

Potential Confounding Variables

Given the strong association between immunisation uptake at age 9 months (Wave 1) and subsequent immunisation practices [7, 26], potential confounding variables were selected from Wave 1 data. Selection was based on availability in MCS data and evidence from previous studies that potential confounders were associated with immunisation uptake and may be more or less common among families of children with intellectual disability when compared to other families. We identified two broad groups of potential confounding variables; indicators of family socio-economic position and other factors associated with family composition and country of residence.

[2] The UK also has several targeted vaccination programmes (e.g., hepatitis B vaccination for infants born to hepatitis B surface antigen positive mothers, BCG immunisation recommended at birth for all children that live in an area that has a TB incidence of higher than 40 per 100,000 population). While immunisation is recorded in MCS, it is not possible to define the subpopulation of children who would have been offered these vaccinations. As a result, uptake/coverage cannot be calculated.

Indicators of Family Socio-economic Position

Previous research using the MCS has indicated that lower uptake of immunisations was associated with a number of variables indicative of family socio-economic position including residence in a disadvantaged neighbourhood, lone or teenaged parenthood, maternal smoking in pregnancy, maternal educational attainment, maternal employment status and ethnicity [6-8]. Low family socio-economic position is also associated with an increased risk of intellectual disability [16]. As a result, we included the following indicators of family socio-economic position in our analyses:

- Income poverty: operationalised as living in a household with equivalised income lower than 60% of the national median [27].
- Low household assets: operationalised as lacking two or more household assets from a list of eight common household assets (e.g., fridge, freezer, washing machine, microwave, home computer).
- Living in workless household: operationalised as no adult in the household being in paid employment.
- Maternal educational attainment: operationalised on the basis of parental informant report as degree/diploma level, GCSE grade C or above, lower than GCSE grade C or above.
- Residence in a disadvantaged neighbourhood: operationalised as living in an area in the lowest national quintile on a measure of multiple deprivation [e.g., 28].
- Lone parenthood: operationalised as not cohabiting with another parent figure.

Other Potential Confounders

Previous research using the MCS has indicated that lower uptake of immunisations was associated with a number of other variables not necessarily associated with family socio-economic position including living with siblings, younger and older mothers, minority ethnicity, child born in England (as opposed to other home countries), maternal smoking in pregnancy and child hospital admission in first 9 months of life [6-8]. While the association between most of these variables and risk of intellectual disability is unknown, we included them in our analyses (primarily as binary variables) based on parental informant report at Wave 1. The one exception to their inclusion as binary variables was maternal age which was included as a four-level ordinal variable based on population quartiles (14-23, 24-28, 29-32, 33+).

Approach to Analysis

All analyses were undertaken in Stata 10 SE using svy command to take account of the initial sampling design and biases in recruitment and retention at each Wave [29]. 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.

First, bivariate descriptive analyses were undertaken to estimate vaccination coverage rates (with 95% confidence intervals) for children with and without intellectual disabilities. Chi Square was used to test the statistical significance of between group differences in coverage rates.

In the second stage of analysis we used Poisson regression to calculate prevalence rate ratios (PRRs) to estimate the strength and statistical significance of differences in vaccination coverage rates between children with and without intellectual disabilities [30, 31]. The base for these analyses was children without intellectual disability. The dependent variable was the probability of not being vaccinated. PRRs

were estimated under three conditions: (1) simple unadjusted; (2) adjusted for potential confounding variables associated with family socio-economic position; (3) adjusted for all potential confounding variables.

All analyses used the Stata 'syv' commands to address the complex clustered sample design and utilised supplied sampling weights to take account of biases in initial recruitment and retention.

Results

Vaccination coverage rates and prevalence rate ratios for non-uptake of vaccinations are presented in Table 1. For all ages and for both groups of children complete coverage rates are high (range 84.9% - 95.2%). However, with one exception (MMR coverage at age 5) coverage rates were lower for children with intellectual disabilities. Complete coverage rates were significantly lower for children with intellectual disabilities at ages nine months (unadjusted PRR = 2.20 (1.64-2.94), $p<0.001$) and three years (unadjusted PRR = 1.52 (1.18-1.96), $p<0.01$), but not at age five years (unadjusted PRR = 1.18 (0.91-1.51). Adjusting PRRs for between group differences in family socio-economic position and other factors associated with coverage significantly reduced the strength of association between intellectual disability and coverage at age 9 months and non-significantly reduced the strength of association between intellectual disability and coverage at ages three and five years.

[insert Table 1]

Reasons given by informants for non-vaccination are presented in Table 2. There were few statistically significant between group differences in the probability of citing specific reasons for non-vaccination. The only consistent differences were that at age nine months and three years reasons for non-vaccination based on parental choice were significantly more frequently cited by parents of children without intellectual disability. The high rates of parental choice reasons given at age 3 were primarily driven by low uptake of, and concerns about the safety of, MMR vaccination.

[insert Table 2]

Discussion

This is the first study to report on early childhood vaccination coverage among a nationally representative sample of UK children with and without intellectual disability. The main findings are: (1) at ages 9 months, three and five years complete coverage rates are reasonably high for both groups of children; (2) with one exception (MMR coverage at age 5) coverage rates were lower for children with intellectual disabilities for all vaccinations (when compared to children without intellectual disability); (3) complete coverage rates were significantly lower for children with intellectual disabilities at ages nine months and three years, and lower (but not significantly so) at age five years; (4) while adjusting PRRs for between group differences in family socio-economic position and other factors associated with coverage reduced the strength of association between intellectual disability and coverage at all ages, incomplete vaccination remained significantly elevated for children with intellectual disabilities at ages 9 months and 3 years; (5) there were no statistically significant differences between parents of children with/without intellectual disability regarding the broad classes of reasons given for non-vaccination. These results are broadly consistent with evidence of lower coverage among children with intellectual disability from population based studies undertaken in Taiwan [13, 14] and Australia [15].

The results suggest that a significant proportion of the risk of non-uptake among children with intellectual disability is plausibly related to the association between intellectual disability and lower family socio-economic position. However, risk of non-vaccination among children with intellectual disability remained elevated when controlling for these between-group, differences. Further research including mixed methods and qualitative studies is needed to identify the reasons for non-vaccination among children with intellectual disabilities, especially in early childhood prior to school entry. At 9 months of age, less than 5% of parents of children with intellectual disability reported that non-vaccination was a matter of parental choice, while 65% reported other reasons including apparent service failures (e.g., cancelled appointment), child illness at the time of appointment, missed appointments and parents being unaware that vaccination was recommended. While dominance of other reasons was reversed at age three (with just under 50% of parents of children with intellectual disability reported that non-vaccination was a matter of parental choice), it needs to be kept in mind that these data were primarily collected in 2003 at the peak of the controversy of the association between the combined MMR vaccine and autism [6].

The results also suggested that differences in primary vaccination coverage are minimal at age 5 (an age at which all children will have entered school). That children with intellectual disabilities do appear to catch up with their peers with regards to coverage, it should be noted that children receiving vaccinations late remain susceptible to vaccine preventable diseases which may jeopardise their own health, the health of younger siblings and may also compromise herd immunity increasing the risk of disease outbreaks [32].

The primary strength of the present study lies in its use of a sizable cohort of children representative of the population of children growing up in the UK at the beginning of the new millennium. However, as in all studies, there were limitations that impact the interpretation of these findings. First, while having access to a large, longitudinal dataset is an asset, datasets (such as the MCS) that are designed for multiple purposes commonly utilise abbreviated forms of measures such as the abbreviated scales of cognitive functioning (rather than complete IQ tests) used in the MCS. While it is common practice in such instances to use the available data to derive a proxy measure of IQ [cf., 22, 23-25], the association between the proxy and full measure is unknown. Second, while the overall sample was relatively large, it was of insufficient size to examine the extent to which our results may have varied by severity of intellectual disability. It is important to keep in mind, therefore, that, given the preponderance of children with less severe intellectual disability in population-based samples, our results regarding intellectual disability primarily relate to children with mild or moderate intellectual disability. Additional research is needed to determine whether the increased risk reported in the present study generalises to children with severe or profound intellectual disability and children from different ethnic groups. Finally, while evidence in general suggests that parental report may be an unreliable measure of vaccination [33], recent research using the MCS and linked data in Wales has reported high concordance between parental reported and child health recorded MMR status [32].

Conclusions

Children with intellectual disabilities in the UK are at increased risk of vaccine preventable diseases. This may jeopardise their own health, the health of younger siblings and may also compromise herd immunity.

List of abbreviations

BAS	British Ability Scales
DTP	Diphtheria, Tetanus and Pertussis
GCSE	General Certificate of Secondary Education
Hib	Haemophilus influenzae type b
HPV	human papillomavirus
IQ	intelligence quotient
MCS	Millennium Cohort Study
Men C	Meningococcal group C
MMR	Measles, Mumps and Rubella
NFER	National Foundation for Educational Research
PRR	prevalence rate ratio

Declarations

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 [18, 20, 34].

Consent for publication

Not applicable

Availability of data and materials

The datasets analysed during the current study are available in the UK Data Service repository (https://discover.ukdataservice.ac.uk).

Competing interests

The authors declare that they have no competing interests.

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Public Health England funded the research, but played no role in the design of the study, analysis and interpretation of data or in the writing of the manuscript.

Authors' contributions

EE, CH, JR and SB were involved in designing and conceptualizing the study, reading and approving the final manuscript. EE analysed the data. All authors read and approved the final manuscript.

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Table 1: Vaccination coverage among children with and without intellectual disabilities in the UK					
	% Vaccination coverage (with 95% CI)		Rate ratios for *non-uptake* among children with intellectual disability (reference group = other children)		
	Children with intellectual disabilities	Other children	Unadjusted	Model 1 (SEP)	Model 2 (SEP + other factors)
Age 9 months	(n=551)	(n=17,986)			
Partially or fully vaccinated	97.6% (95.7-98.6)	98.7% (98.5-99.0)	1.93 (1.09-3.43)*	1.33 (0.69-2.57)	1.33 (0.71-2.53)
Fully vaccinated	89.5% (86.2-92.1)	95.2% (94.8-95.7)	2.20 (1.64-2.94)***	1.49 (1.11-2.00)**	1.42 (1.08-1.88)*
Age 3 years	(n=521)	(n=14,261)			
Polio complete	97.3% (95.1-98.6)	98.8% (98.6-99.0)	2.27 (1.20-4.29)*	2.22 (1.16-4.23)*	2.18 (1.13-4.19)*
Diptheria complete	98.2% (96.3-99.1)	98.8% (98.6-99.1)	1.59 (0.78-3.23)	1.48 (0.70-3.13)	1.47 (0.70-3.15)
Tetanus complete	97.7% (95.8-98.8)	98.9% (98.6-99.1)	2.02 (1.07-3.82)*	1.89 (0.97-3.66)	1.90 (0.97-3.71)
Pertussis complete	96.4% (93.8-98.0)	98.4% (98.1-98.7)	2.23 (1.27-3.92)**	2.07 (1.16-3.70)*	2.12 (1.19-3.79)*
Hib complete	96.5% (93.9-98.0)	98.2% (97.8-98.5)	1.95 (1.10-3.45)*	1.78 (0.98-3.23)	1.78 (0.98-3.23)
Meningitis complete	96.7% (94.2-98.1)	98.1% (97.7-98.4)	1.73 (0.98-3.07)	1.59 (0.87-2.92)	1.62 (0.87-3.01)
MMR	91.6% (88.1-94.2)	93.9% (93.2-94.6)	1.38 (0.96-1.09)	1.24 (0.85-1.80)	1.18 (0.81-1.72)
Partially or fully vaccinated	98.1% (96.2-99.0)	99.1% (98.8-99.3)	2.06 (1.01-4.22)*	1.77 (0.82-3.79)	1.78 (0.83-3.81)
Fully vaccinated	84.9% (80.8-88.3)	90.1% (89.2-90.9)	1.52 (1.18-1.96)**	1.33 (1.03-1.74)*	1.32 (1.01-1.72)*
Age 5 years	(n=524)	(n=14,365)			
Booster DTP	94.5% (91.9-96.3)	96.0% (95.5-96.4)	1.38 (0.92-2.06)	1.19 (0.79-1.79)	1.17 (0.77-1.77)
All 3 doses combined DTP	98.7% (97.0-99.5)	99.2% (98.9-99.4)	1.56 (0.64-3.81)	1.43 (0.54-3.77)	1.36 (0.51-3.63)
Booster polio	94.9% (92.4-96.7)	95.2% (94.6-95.7)	1.06 (0.69-1.61)	0.99 (0.64-1.94)	0.98 (0.63-1.54)
All three doses Polio	98.7% (97.1-99.5)	99.2% (99.0-99.4)	1.61 (0.68-3.79)	1.57 (0.62-4.01)	1.51 (0.60-3.84)
All 3 doses Meningitis C	97.8% (95.5-98.9)	98.4% (98.1-98.7)	1.40 (0.70-2.82)	1.33 (0.63-2.79)	1.32 (0.63-2.74)
MMR	96.9% (95.0-98.1)	96.8% (96.2-97.2)	0.96 (0.58-1.58)	1.07 (0.64-1.79)	1.01 (0.60-1.70)
Partially or fully vaccinated	99.1% (97.4-99.7)	99.5% (99.3-99.6)	1.88 (0.66-5.39)	2.01 (0.61-6.59)	1.93 (0.59-6.35)
Fully vaccinated	87.4% (83.9-90.2)	89.3% (88.4-90.1)	1.18 (0.91-1.51)	1.06 (0.81-1.38)	1.05 (0.80-1.36)
Age 14 years	(n=149)	(n=4,938)			
HPV (girls only)	87.4% (77.9-93.2)	93.1% (92.1-94.0)	1.83 (0.99-3.37)	1.59 (0.83-3.03)	1.52 (0.78-2.98)
Note: * p<0.05, ** p<0.01, *** p<0.001 N= weighted sample size					

Table 2: Parental reasons given for non-vaccination				
Reason	Child age	Children with intellectual disabilities	Other children	Adjusted F
Parental choice	9 months	1.3% (0.3-4.5)	10.2% (7.3-14.0)	14.85***
	3 years	62.5% (47.3-75.5)	76.8% (73.9-79.5)	4.40*
	5 years	16.0% (7.2-31.9)	14.8% (12.4-17.5)	0.04
	14 years	46.7% (20.1-75.4)	42.0% (35.7-48.6)	0.09
Service/administration errors	9 months	8.0% (1.9-27.7)	9.1% (6.5-12.5)	0.03
	3 years	5.1% (1.3-17.5)	3.6% (2.7-4.7)	0.27
	5 years	30.9% (18.3-47.2)	26.1% (23.1-29.3)	0.42
	14 years	14.7% (3.5-45.4)	12.8% (9.2-17.6)	0.04
Child unwell at time of planned vaccination	9 months	8.6% (3.1-21.4)	39.9% (35.1-44.8)	0.53
	3 years	8.6% (3.1-21.4)	6.3% (5.1-7.9)	0.36
	5 years	3.3% (1.1-9.4)	5.6% (4.1-7.7)	0.93
	14 years	13.5% (2.0-54.7)	9.3% (5.8-14.5)	0.15
Adverse reactions or health-related contra-indication	9 months	5.9% (1.5-20.6)	9.1% (6.6-12.4)	0.39
	3 years	8.7% (3.3-21.2)	9.3% (7.8-11.0)	0.02
	5 years	20.1% (9.9-36.5)	5.7 (4.4-7.5)	12.97***
	14 years	0.0% (0.0-16.8)	1.6% (0.6-4.3)	0.21
Family disorganisation	9 months	8.9% (2.7-26.0)	14.5% (11.3-18.4)	0.70
	3 years	3.6% (0.5-21.0)	2.9% (2.1-4.1)	0.04
	5 years	0.0% (0.0-8.0)	5.7% (4.4-7.3)	1.97
	14 years	0.0% (0.0-16.8)	11.0% (7.5-15.8)	1.42
Appointment pending	9 months	25.8% (13.2-44.4)	20.8% (17.0-25.2)	0.39
	3 years	1.8% (0.5-6.4)	3.1% (2.2-4.3)	0.65
	5 years	21.8% (10.6-39.7)	30.0% (26.8-37.5)	0.95
	14 years	Information not collected		
Other	9 months	15.4% (6.5-32.5)	12.0% (9.1-15.7)	0.32
	3 years	20.8% (11.6-34.6)	12.0% (10.1-14.2)	3.52
	5 years	14.9% (6.6-30.2)	24.4% (21.3-27.9)	1.83
	14 years	25.1% (7.8-56.9)	26.4% (20.7-32.9)	0.01
Note: Base for % is the number of parents giving one or more reason at each wave * p<0.05, **** p<0.001				