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Views on COVID-19 vaccination of young children in Ireland, results from a cross-sectional survey of parents

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ABSTRACT

Vaccination of children aged 5 years and older is recommended as part of a multifaceted strategy to protect children against SARS CoV-2 infection and serious disease, and to control the spread of infection. COVID-19 vaccine trials in children aged less than5 years are underway, however, parental acceptance of vaccines for this age group is unknown. Between June and August 2021, a cross-sectional national survey of parental attitudes towards childhood vaccination in Ireland was conducted. Parents of children aged 0–48 months were surveyed to determine their attitudes towards COVID-19 vaccines for their children. A total of 855 parents were surveyed. Overall, 50.6 % reported that they intend to vaccinate their child, 28.7 % reported that they did not intend to vaccinate and 20.2 % were unsure. Among those who stated that they did not intend to vaccinate their child, concern about risks and side effects of vaccination was the primary reason reported (45.6 %). The most frequently reported information needs related to side effects of the vaccine (64.7 %) and vaccine safety (60.3 %). Results of the multivariable analysis showed that believing COVID-19 can be a serious illness in children was a strong predictor of parental intention to vaccinate (aOR 4.88, 95 % CI 2.68, 8.91, p-value < 0.001). In comparison with Irish-born parents, parents born in a Central and Eastern European country were less likely to report intention to vaccinate (aOR 0.21, 95 % CI 0.09, 0.47, p-value, <0.001). Parental belief in vaccine importance and safety and parental trust in official vaccine information sources were associated with increased parental intention to vaccinate. Understanding parental attitudes to vaccination of young children against COVID-19 is important to tailor the provision of information to parents' needs, and to inform the development of vaccination information and communication campaigns for current and future COVID-19 immunisations programmes for children.

1. Introduction

The COVID-19 vaccination programme in Ireland has resulted in high uptake amongst recommended age groups, with 94.4 % of the adult population aged 18 years and older having completed a primary immunisation course [1]. Acceptance of COVID-19 vaccination for children by parents has also been high, with 77.7 % of children aged 12–17 years completing a primary immunisation course [1,2].

Internationally, there is variation in COVID-19 vaccine acceptance rates between different countries [3]. Studies have reported parental acceptance of childhood COVID-19 vaccination rates of 48 % to 73 % [4]. Higher parental acceptability of COVID-19 vaccinations has been associated with positive parental attitudes towards COVID-19 vaccinations, exposure to positive vaccine information and parents accepting COVID-19 vaccination for themselves [5,6]. Trust in scientists has also been reported as a key factor in parental vaccine acceptance [7]. A perception that vaccination is not necessary due to low risk of complications as well as concern about vaccine side effects have been reported as reasons for parents not intending to vaccinate children [8].

In Ireland, vaccination of children aged 5–11 years began in late December 2021, following regulatory approval by the European

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Medicines Agency (EMA) and recommendations by the National Immunisation Advisory Committee (NIAC) [9,10]. Uptake to date has been much lower than for other age cohorts; an estimated 23 % of children of this age group have completed vaccination to date. Vaccine trials of younger children, from the age of 6 months are underway, with results expected in 2022. The majority of published studies reporting on the acceptability of COVID-19 vaccines in children focus on children aged 5 years and older [8,11–13]. Parental acceptance of vaccines for younger children is largely unknown as are the factors influencing parental intention to receive the COVID-19 vaccine for children in Ireland.

The time period for this study was June to August 2021 which coincided with the beginning of the fourth wave of COVID-19 in Ireland which began in late June 2021, driven by the emergence of the delta variant [14]. During this time, population level public health restrictions had eased and significant progress had been made by the COVID-19 vaccination programme with high vaccination uptake in all age cohorts that had been offered vaccination [15]. By September 2021, in Ireland, 4.0 % of all COVID-19 cases nationally had occurred among those aged 0–48 months [16]. The aim of this study was to determine parental attitudes towards COVID-19 vaccination among parents of children aged 0–48 months living in Ireland and to examine the factors associated with parental intention to vaccinate.

2. Methods

2.1. Study design

This study is part of a larger cross-sectional national survey of parental attitudes towards childhood vaccination in Ireland. Between 7th June and 27th August 2021, parents of children aged 0–48 months were surveyed, to determine their attitudes towards COVID-19 vaccines for their children, should these be approved for this age group. A telephone survey was carried out using computer-assisted telephone interviews (CATI) [17]. Random digit dialling (RDD) was used to generate telephone numbers for mobile/cell phones. This RDD sampling methodology involved generating a random selection of national telephone numbers using number stems (e.g., 087 246XXXX) that the Commission for Communications Regulation has issued to mobile providers. While phone numbers were generated randomly, the contact protocol did not require interviewers to fully exhaust all phone numbers in the sample or to re-contact non-responding numbers on multiple occasions. Phone numbers were called for at least 15–20 seconds, and the option to reschedule the interview was offered to responders. When respondents refused to participate in the survey, no data were collected, therefore it was not possible to identify the characteristics of those who refused. Sampling and CATIs were carried out by a contracted market research company. The interviews were carried out by professional interviewers employed by the market research company, who were trained on how to conduct this survey. Ethical approval for this study was granted by the Royal College of Physicians in Ireland Research Ethics Committee.

2.2. Study population

The study population was parents or legal guardians of a child aged 0–48 months living in Ireland. Parents aged less than 16 years, those not living in Ireland, or those unable to complete the questionnaire due to language difficulties were excluded. When eligible respondents had more than one child in this age category, they answered the survey in respect of their oldest child aged under 48 months. A precision-based sample size of 792 was calculated based on the findings of the Vaccine Confidence Project which reported 15.2 % of the Irish population would express some level of vaccine hesitancy, a confidence interval of 95 % and a precision of +/- 2.5 % [18]. An effective sample size of 800 was then calculated based on the assumption that 15 % of all mobile numbers would be eligible to participate in the survey (i.e., have a child aged between 0 and 48 months) and that the response rate to the survey would be 15 % (based on previous experience of conducting national surveys).

In completing this survey, 347,385 telephone numbers were contacted of which 8,451 (2.4 %) were answered by a potential respondent. From these 8,451 known working telephone numbers, 855 (10.1 %) successfully completed the survey. The remaining 7,596 individuals were either ineligible (i.e., did not have a child aged 0-48 months or fit the exclusion criteria) or refused to participate in the survey (Fig. 1). The interviews were conducted in English.

2.3. Questionnaire design

A standardised questionnaire to assess parental attitudes towards childhood immunisation in Ireland was developed. This questionnaire had 42 questions in total; 19 baseline demographic questions; 19 questions on childhood immunisations; and four questions specifically about COVID-19 vaccination. Responses to the COVID-19 questions were prompted and unprompted as outlined in Appendix A. The design and development of the questionnaire was informed by similar studies carried out in other countries identified in the literature, from the vaccine confidence scale from the London School of Hygiene and Tropical Medicine (LSHTM) and the Parent Attitude about Childhood Vaccines (PACV) survey [19–24]. The language used in the questionnaire was developed using National Adult Literacy Agency guidance [25]. Initial cognitive testing of the survey was undertaken (N = 5). Cognitive testing is a qualitative approach which for this study involved testing quantitative questions during in depth interviews with respondents (mothers and fathers of children of various ages aged 0–48 months) to assess how respondents understood, retrieved information for, decided upon and ultimately arrived at responses to the questions [26]. Following cognitive testing, a pilot study (N = 21) was conducted in June 2021. Following the pilot study, some statements with a negative sentiment were changed to be presented using positive language to ensure consistency across all statements read out to respondents.

2.4. Data collection

Parents provided informed consent verbally. Data entry took place contemporaneously during the interview process. All data were handled with compliance to General Data Protection Regulation (GDPR)[EU] 2016/679 and Health Service Executive (HSE) policy [27].

2.5. Weighting

To create a representative sample of the target population, survey weights for age, gender and educational attainment were used to align the sample with the known population estimates based on Census 2016 data [28]. Probability weights were used for the analysis.

2.6. Statistical analysis

Parental attitudes towards a COVID-19 vaccine (if approved and available for this age groups) were analysed. All parents (N = 855) were asked if they intended to vaccinate their child against COVID-19. Responses (yes/no/don't know) were recoded to create a binary 'intention to vaccinate' variable (intend to get the vaccine

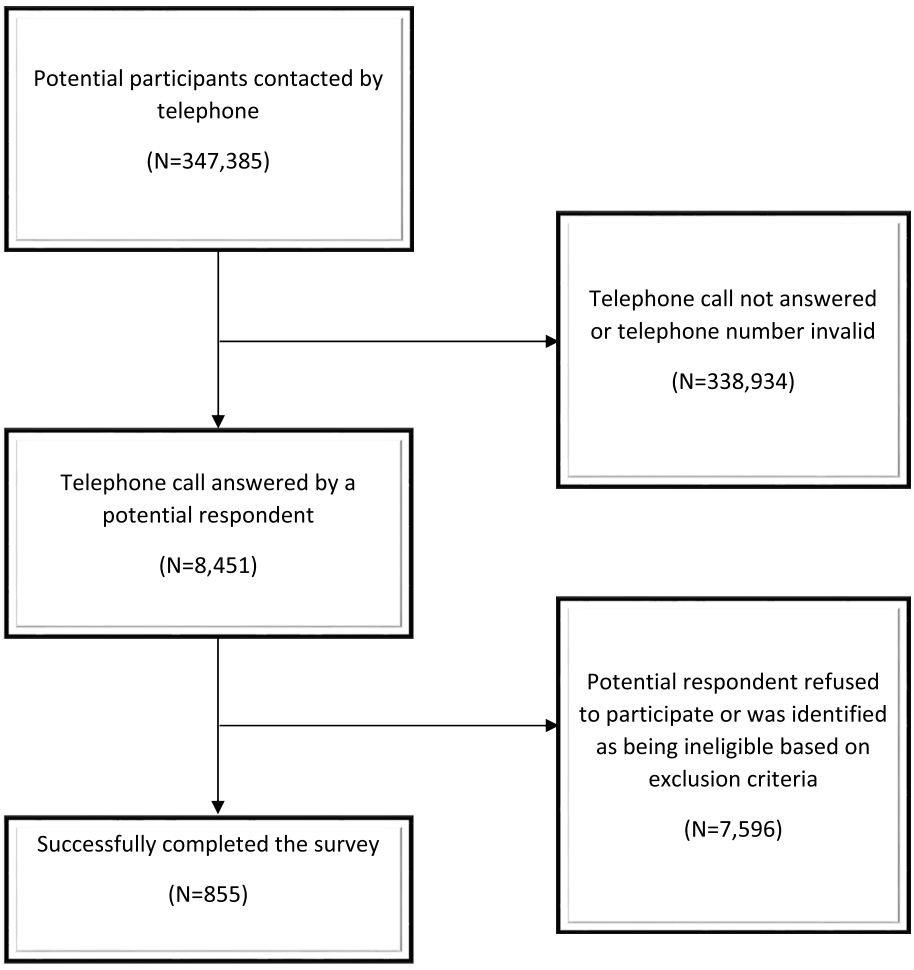

Fig. 1. Flowchart of participant selection.

or do not intend/don't know). The association between responses and variables relating to parental characteristics and attitudes and behaviours towards vaccination between the groups was examined. A chi-squared test for comparing proportions was used to test the null hypothesis that there was no difference in the characteristics of parents who intended to vaccinate their child and those who did not intend to vaccinate/were unsure. Univariate and multivariable logistic regression models were constructed to identify the association of parental characteristics which could affect the parental decision to vaccinate against COVID-19. Demographic variables which had a p-value of < 0.05 following a chi-squared test and those which have a known association with vaccine hesitancy were included in a univariable regression model. Two multivariable regression models were created. In the first, the demographic variables which, following univariate analysis, had a p-value of < 0.05 were included. For the second model, vaccine attitude scales were created.

2.6.1. Creating vaccine attitude scales

Variables reporting parental attitudes towards childhood vaccination were examined using a correlation matrix which calculated Spearman's Rho correlation coefficient (Appendix B). These variables were grouped into categories of questions related to vaccine importance, vaccine safety, trust in official sources of vaccine information and convenience of getting childhood vaccines. The grouping of variables was informed by a research-based *a-priori* knowledge of the factors influencing parental intention to vaccinate and was also informed by the correlation matrix (Appendix B). Official sources of vaccine information were defined as vaccine information from the government and from the Health Service Executive (HSE), which is the national healthcare body with responsibility for implementing national immunisation programmes. Attitude to vaccination questions were assessed using Likert scales which had six answer options; strongly disagree-coded as 1, disagree-coded as 2, neither agree nor disagree-coded as 3, agree-coded as 4, strongly agree-coded as 5, non-response/I don't know coded as missing values. Using the Likert scale scores from these variables, median scores were calculated to create four attitudes to vaccination scales (importance, safety, trust in official sources and convenience). Median scores were included in a second univariate and multivariable logistic regression model to examine whether parental attitudes were associated with intention to vaccinate against COVID-19. All the variables included in the demographic multivariable regression model were also included in the model with the vaccine attitude scales. For each model, odds ratios (ORs) and adjusted odds ratios (aORs) with 95 % confidence intervals (CIs) were calculated. All statistical analysis was carried out using SPSS version 26.0 with complex samples and STATA version 17, with 95 % confidence intervals around estimates presented.

3. Results

3.1. Characteristics of the participants

There were 855 respondents to the survey. Within the study population, the majority of parents were in the 30–39-year age

category (63.3 %), were married (68.2 %), had one or two children (75.6 %), were working (77.6 %) and were of white ethnicity (94.2 %). The characteristics of the study population (N = 855) are included in Table 1, unweighted and weighted analysis is presented. The results for the weighted and unweighted analysis are similar and therefore for the remain-

Table 1
Descriptive characteristics of the study population.

Key descriptive characteristics	Unweighted		Weighted	
Total N=855	N	%	N	%
Age category child				
Less than 3 months old	41	4.8	43	5.0
3 to 17 months	216	25.3	206	24.1
18 to 48 months	598	69.9	606	70.9
Age Category Parent				
16–29 years	99	11.6	111	13.0
30–39 years	523	61.2	541	63.3
40 years and over	228	26.6	194	22.7
Missing	5	0.6	9	1.0
Gender				
Male	298	34.9	419	49.0
Female	557	65.1	436	51.0
Geographic Area				
Dublin	261	30.5	231	27.0
Rest of Leinster	270	31.6	298	34.9
Munster	210	24.6	219	25.6
Connaught/Ulster	111	13.0	104	12.2
Missing	3	0.3	3	0.3
Relationship Status				
Single	59	6.9	71	8.3
Married	611	71.5	583	68.2
Co-habiting	166	19.4	185	21.6
Separated/Widowed/Divorced	13	1.5	12	1.4
Missing	6	0.7	4	0.5
Number of Children				
1	323	37.8	320	37.5
2	304	35.5	326	38.1
3	157	18.4	135	15.8
4+	71	8.3	74	8.6
Highest level of Education				
Upper secondary or less	165	19.3	419	49.0
Vocational or certificate	174	20.4	31	3.6
Bachelor's degree	317	37.1	214	25.1
Postgraduate qualification/PhD	191	22.3	183	21.4
Missing	8	0.9	8	0.9
Occupational Status				
Working for payment	666	77.9	664	77.6
Not working	32	3.7	39	4.6
Full time homemaker/maternity leave	151	17.7	149	17.4
Missing	6	0.7	3	0.4
Annual Household Income				
Less than €50,000	180	21.1	205	23.9
€50,000 or more	285	33.3	245	28.7
Did not report income	390	45.6	405	47.4
Country of Birth				
Ireland	687	80.3	688	80.5
Northern/Southern/Western Europe*	43	5.0	38	4.4
Central and Eastern Europe*	53	6.2	50	5.8
Rest of World	69	8.1	75	8.8
Missing	3	0.4	4	0.5
Ethnicity				
White	811	94.8	806	94.2
Black or Black Irish	10	1.2	12	1.4
Asian or Asian Irish	23	2.7	25	2.9
Other	11	1.3	12	1.5
Religious				
Yes	694	81.2	699	81.8
No	127	14.8	125	14.6
Missing	34	4.0	31	3.6
Child with chronic health problem				
Yes	52	6.1	58	6.8
No	797	93.2	791	92.5
Missing	6	0.7	6	0.7
Vaccine Decision Making				
One parent makes decisions	231	27.0	233	27.2
Both parents make decision	621	72.6	618	72.3
Missing	3	0.4	4	0.5

* As defined by the OECD [20].

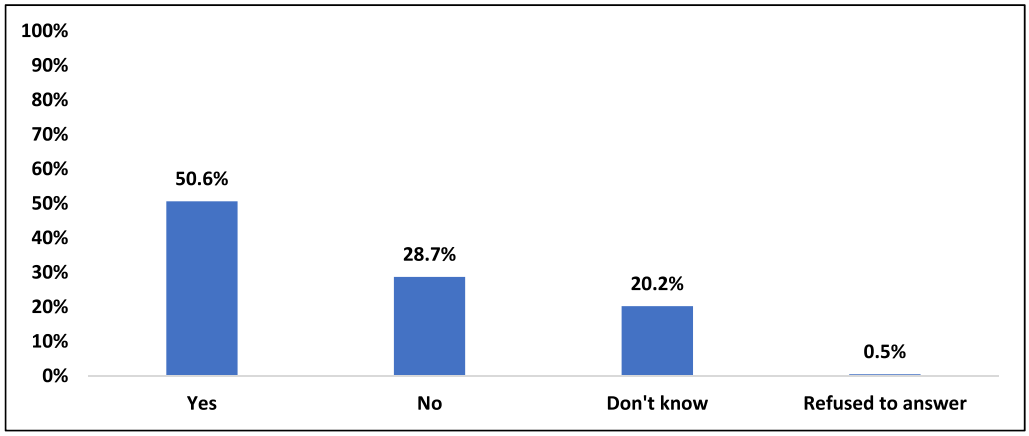

Fig. 2. Parental intention to get the COVID-19 vaccine if available (N = 855).

Table 2
Demographic characteristics of those expressing intention to vaccinate child against COVID-19.

Intention to vaccinate child against COVID-19	Yes		No/Don't know		Total		p-value
	N	%	N	%	N	%	
Age Category Parent (N=841)							
16 to 29 years	39	35.5	71	64.5	110	100.0	0.005
30–39 years	266	49.6	270	50.4	536	100.0	
40 years and older	121	62.1	74	37.9	195	100.0	
Gender (N=850)							
Male	239	57.3	178	42.7	417	100.0	0.008
Female	194	44.8	239	55.2	433	100.0	
Geographic Area (N= 848)							
Dublin	123	53.0	109	47.0	232	100.0	0.400
Rest of Leinster	161	54.6	134	45.4	295	100.0	
Munster	101	46.1	118	53.9	219	100.0	
Connaught/Ulster	46	45.1	56	54.9	102	100.0	
Urban vs. Rural area (N=847)							
Capital (Dublin)	123	53.0	109	47.0	232	100.0	0.431
Urban	153	53.7	132	46.3	285	100.0	
Rural	155	47.0	175	53.0	330	100.0	
Relationship Status (N=848)							
Single	36	50.7	35	49.3	71	100.0	0.006
Married	326	56.2	254	43.8	580	100.0	
Co-habiting	69	37.3	116	62.7	185	100.0	
Separated/widowed/divorced	2	16.7	10	83.3	12	100.0	
Number of Children (N=850)							
1	172	54.6	143	45.4	315	100.0	0.203
2	161	49.4	165	50.6	326	100.0	
3	56	41.5	79	58.5	135	100.0	
4+	44	59.5	30	40.5	74	100.0	
Highest level of Education (N=840)							
Upper secondary or less	186	44.7	230	55.3	416	100.0	0.001
Vocational or certificate	13	43.3	17	56.7	30	100.0	
Bachelor's degree	112	52.6	101	47.4	213	100.0	
Postgraduate degree/PhD	118	65.2	63	34.8	181	100.0	
Occupational Status (N=847)							
Working full or part time	343	52.0	316	48.0	659	100.0	0.287
Full time homemaker	74	49.7	75	50.3	149	100.0	
Not working currently	13	33.3	26	66.7	39	100.0	
Annual Household Income (N=449)							
Less than €50,000	100	49.0	104	51.0	204	100.0	0.336
€50,000 or more	135	55.1	110	44.9	245	100.0	
Region/Country of Birth (N=848)							
Ireland	360	52.3	328	47.7	688	100.0	0.005
Northern/Southern/Western Europe*	21	55.3	17	44.7	38	100.0	
Central and Eastern Europe*	10	20.0	40	80.0	50	100.0	
Rest of World	39	54.2	33	45.8	72	100.0	
Religion (N=821)							
Had a religion	356	50.9	343	49.1	699	100.0	0.900
Did not have a religion	63	51.6	59	48.4	122	100.0	
Chronic health problem (N=845)							
Yes	24	43.6	31	56.4	55	100.0	0.406
No	409	51.8	381	48.2	790	100.0	

* As defined by the OECD [20].

der of this paper, the results of the weighted analysis are presented.

3.2. Attitudes to COVID-19 vaccination

Just over half of respondents (50.6 %, 433/855) reported that they would like their child to receive the COVID-19 vaccine, while 28.7 % (245/855) reported that they did not intend to get the COVID-19 vaccine for their child and 20.2 % (173/855) were unsure (Fig. 2). Almost two-thirds (64.8 %, 554/855) of parents reported that they believe that children can get severely ill from COVID-19, 11.8 % (101/855) reported that they did not know.

Differences in the demographic characteristics of parents who intended to vaccinate their child and those who did not or were unsure are outlined in Table 2. There were differences by age group and relationship status with parents in older age groups (p-value 0.005) and parents who were married (p-value 0.006) more likely to state that they would vaccinate their child. Men were more likely to state they would vaccinate their child compared to women (p-value 0.008) and those with a post-graduate degree or PhD expressed a higher intention to vaccinate than those with lower levels of education (p-value 0.001) (Table 2).The majority of parents who were born in a Central and Eastern European Country as classified by the Organisation for Economic Co-operation and Development (OECD) [29], were born in Romania, Poland and Croatia (70.0 %, 35/50). Parents who were born in a Central or Eastern European country were less likely to state they would get their child vaccinated. One in five stated they would vaccinate their child compared with one in two parents born in all other geographic regions including Ireland (p-value 0.005). The proportion of parents of children with a chronic illness, who stated that they would get their child vaccinated was lower than parents of children with no underlying condition although this difference did not reach statistical significance (p-value 0.406). In addition, there were no significant differences between those living in different geographic areas in Ireland, between urban and rural areas and no differences based on occupational status, household income, or whether the parent had a religion (Table 2).

One in two parents whose children had received all routine childhood vaccines intended that their child would receive a COVID-19 vaccine. This compares to one in four parents of children who did not receive routine childhood vaccines (p-value < 0.006). A greater proportion of parents who believed that COVID-19 could be a serious illness in children stated that they would vaccinate their child compared who did not believe that COVID-19 could be a serious illness in children or who were unsure (64.7 % vs 25.3 %, p-value < 0.001). Parents who agreed that routine childhood vaccines were safe and important were more likely to state they would vaccinate their child compared to those who disagreed with these statements, (55.1 % vs 3.1 %, p-value < 0.001 and 53.3 % vs 5.9 %, p-value < 0.001) respectively. Those who agreed that generally getting childhood vaccines are convenient were also more likely to state that they intended to vaccinate their child (54.2 % vs24.5 %, p-value, 0.002) (Fig. 3). A lower proportion of parents who were born in a Central and Eastern European country agreed that routine childhood vaccines were safe compared to parents born in all other geographic regions including Ireland (87.4 % vs, 96.5 %, p-value 0.017).

Levels of trust in all vaccine information sources were higher among those who stated an intention to vaccinate their child against COVID-19. Trust in vaccine information from healthcare workers (HCWs) and from official vaccine information sources (HSE and government) was strongly associated with a higher intention to vaccinate; no parent who reported not trusting HSE information stated that they would vaccinate their child (Fig. 4). Trust in vaccine information from HCWs was significantly lower among parents born in Central and Eastern European countries compared to parents born in all other geographic regions including Ireland (77.4 % vs, 92.5 %, p-value 0.003).

Demographic predictors of parental intention to vaccinate are outlined in Table 3. Women had a lower odds of stating that they intended to vaccinate their child compared to men (aOR 0.59, 95 % CI 0.40, 0.89, p-value 0.011). Those who were co-habiting had a lower odds of intending to vaccinate compared to those who were married (aOR 0.55, 95 % CI 0.32, 0.94, p-value, 0.029). Those born in a Central and Eastern European country had a lower odds of intending to vaccinate (aOR 0.21, 95 % CI 0.09, 0.47, p-value, <0.001), while those with a postgraduate degree or PhD had a higher odds of intending to vaccinate compared to those who had completed secondary education or less (aOR 1.80, 95 % CI 1.10, 2.96, p-value, 0.020) (Table 3).

Vaccine attitude predictors of parental intention to vaccinate are outlined in Table 4. A strong predictor of parental intention to vaccinate was the belief that COVID-19 could be a serious illness in children (aOR 4.88, 95 % CI 2.68, 8.91, p-value < 0.001). A belief in the importance and safety of childhood vaccination in general was associated with a positive parental intention to vaccinate against COVID-19. For every unit increase in the median vaccine importance score there was a 2.25-fold increased odds of a parent intending to vaccinate (aOR 2.25, 95 % CI 1.28, 3.95, p-value 0.005).

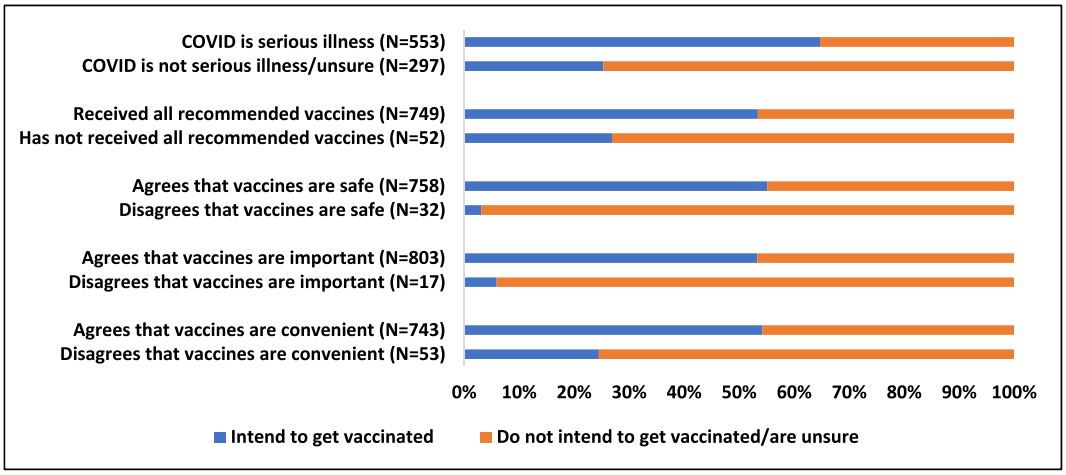

Fig. 3. Parental attitudes and intended action for all childhood vaccines by intention to vaccinate child against COVID-19.

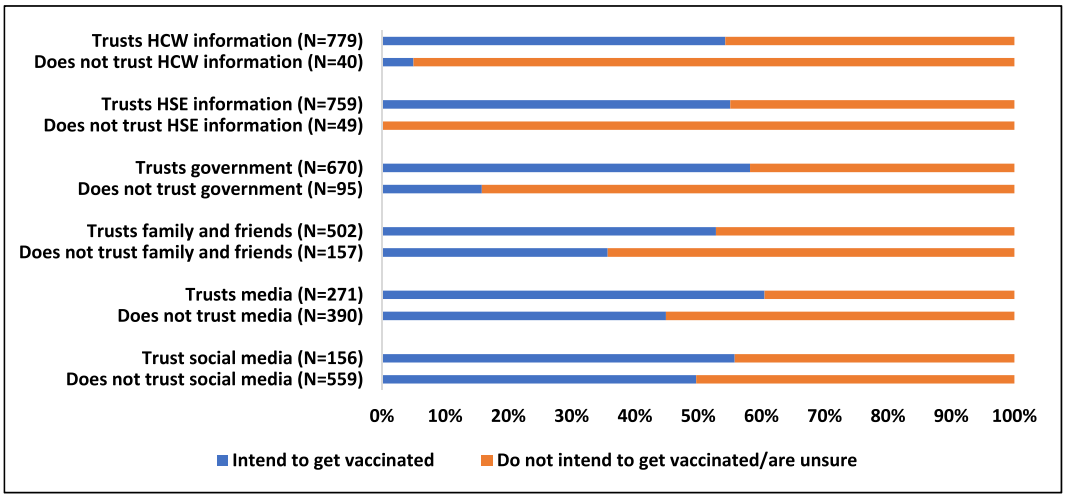

Fig. 4. Trust in information sources by intention to vaccinate child against COVID-19.

Table 3
Demographic predictors of parental intention to vaccinate.

	Unadjusted				Adjusted[a]			
	OR	CI Lower	CI Upper	p-value	aOR	CI Lower	CI Upper	p-value
Age Category Parent								
18–29 years[**]	–	–	–	–	–	–	–	–
30–39 years	1.79	0.96	3.31	0.067	1.34	0.69	2.77	0.357
Over 40 years	2.96	1.51	7.72	0.002	1.92	0.89	4.12	0.095
Gender Parent								
Male[**]	–	–	–	–	–	–	–	–
Female	0.60	0.41	0.88	0.008	**0.59**	**0.40**	**0.89**	**0.011**
Level of Education								
Upper secondary or less[**]	–	–	–	–	–	–	–	–
Vocational or Certificate	0.94	0.60	1.47	0.798	1.09	0.68	1.73	0.730
Bachelor's degree	1.37	0.90	2.10	0.145	1.22	0.78	1.91	0.390
Postgraduate or PhD	2.32	1.47	3.67	<0.001	**1.80**	**1.10**	**2.96**	**0.020**
Region/Country of Birth								
Ireland[**]	–	–	–	–	–	–	–	–
Northern/Western/Southern Europe[*]	1.17	0.53	2.58	0.705	0.70	0.32	1.54	0.375
Central/Eastern Europe[*]	0.23	0.10	0.53	<0.001	**0.21**	**0.09**	**0.47**	**<0.001**
Rest of World	1.09	0.56	2.11	0.792	1.13	0.54	2.30	0.764
Relationship status								
Married[**]	–	–	–	–	–	–	–	–
Single	0.81	0.40	1.64	0.559	1.22	0.55	2.71	0.950
Co-habiting	0.47	0.28	0.77	0.003	**0.55**	**0.32**	**0.94**	**0.029**
Separated/Divorced/Widow	0.21	0.03	1.20	0.078	0.20	0.04	1.06	0.060
Occupational status								
Working for payment[**]	–	–	–	–				
Not working	0.47	0.18	1.25	0.131				
Full time homemaker	0.94	0.57	1.55	0.808	Not included in the model			
Religious								
Yes[**]	–	–	–	–				
No	1.03	0.62	1.73	0.900				
Refused to answer	0.90	0.37	2.20	0.882	Not included in the model			
Annual income								
Less than €50,000[**]	–	–	–	–				
€50,000 or more	1.28	0.77	2.12	0.193				
Did not report income	1.01	0.62	1.66	0.942	Not included in the model			

[*] As defined by the OECD [29].
[**] Reference category
[a] Adjusted for age of parent, gender, level of education, region/country of birth and relationship status.

For every unit increase in the median vaccine safety score there was a 1.57-fold increased odds of a parent intending to vaccinate (aOR 1.57, 95 % CI 1.17, 2.12, p-value 0.003). Trusting in official (HSE and government) vaccine information sources was also associated with an increased odds of parental intention to vaccinate. For every unit increase in the median trust in official vaccination information sources score there was a 1.40-fold increased odds of a parent intending to vaccinate (aOR 1.40, 95 % CI 1.08, 1.85, p-value 0.017) (Table 4 and Appendix C).

Parents who reported that they would not vaccinate their child against COVID-19 (N = 245) were asked for their reasons; 45.6 % were concerned that their child might have a serious side effect from the vaccine, 28.3 % reported that they needed further information and 25.4 % stated they would not vaccinate their child as

Table 4
Vaccine attitude predictors of parental intention to vaccinate against COVID-19.

	Unadjusted				Adjusted[a]			
	OR	CI Lower	CI Upper	p-value	aOR	CI Lower	CI Upper	p-value
Belief COVID-19 can be a serious illness in children								
No[**]	–	–	–	–	–	–	–	–
Yes	6.43	3.87	10.70	<0.001	**4.88**	**2.68**	**8.91**	**<0.001**
Don't know	1.60	0.79	3.25	0.192	1.40	0.64	3.12	0.397
Vaccine scores								
Vaccine importance score	4.05	2.66	6.15	<0.001	**2.25**	**1.28**	**3.95**	**0.005**
Vaccine safety score	2.09	1.67	2.62	<0.001	**1.57**	**1.17**	**2.12**	**0.003**
Trust in official sources score	2.15	1.72	2.68	<0.001	**1.40**	**1.06**	**1.85**	**0.017**
Vaccine convenience score	1.69	1.31	2.17	<0.001	0.96	0.69	1.35	0.819

[a] Adjusted for demographic predictors as per Table 3 and for belief COVID-19 can be a serious illness in children, Vaccine importance score, Vaccine safety score, Trust in official sources score, Vaccine convenience score.
[**] Reference category.

COVID-19 is not a serious illness in children. Mistrust in the vaccine, government and experts was low and reported among just 1.8 % of parents (Fig. 5).

Parents who said that they would not vaccinate their child against COVID-19 or that they were unsure (N = 422) were asked what information would be helpful for them to decide to vaccinate their child. The most frequently reported information needs cited were more information about side effects and risks of the vaccine (64.7 %) and safety information (60.3 %) (Fig. 6).

4. Discussion

4.1. Summary of key findings

In this study, over half (50.6 %) of parents with children aged 0-4 years in Ireland indicated intent to get their child the COVID-19 vaccine should it become available. One in five (20.2 %) parents were unsure and 28.7 % stated that they did not intend to vaccinate their child. At the time of this survey no authorised COVID-19 vaccine was recommended for children in this age group.

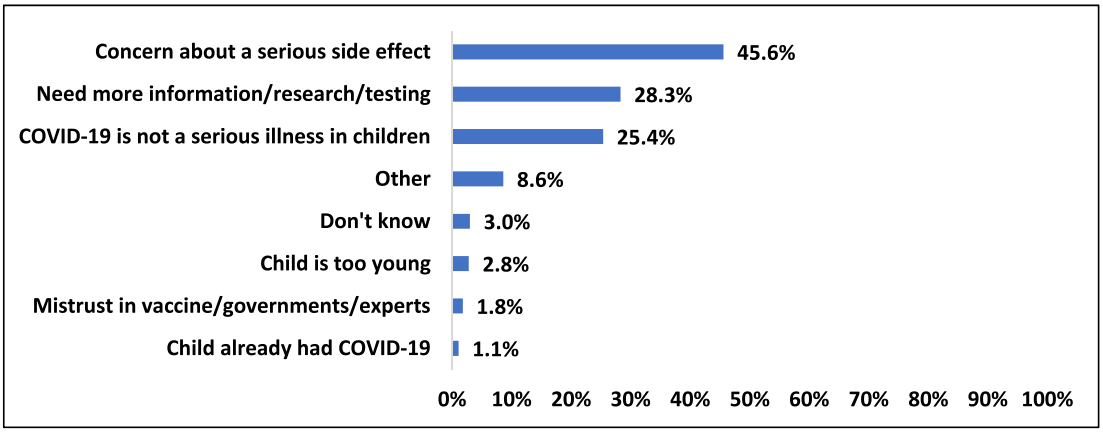

Fig. 5. Reasons for not intending to vaccinate child against COVID-19 (N = 245).

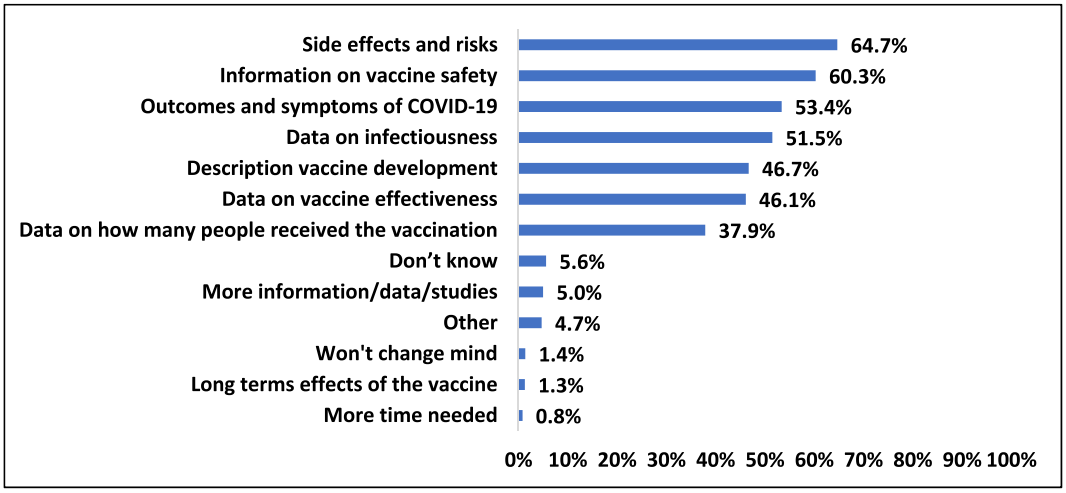

Fig. 6. Information that would assist parents with their decision for COVID-19 vaccine (N = 422).

In this study, parental belief that COVID-19 can be a serious illness was a strong predictor of intention to vaccinate. Those with postgraduate qualifications and those who agreed that vaccines generally are important and safe also reported a higher intention to vaccinate. Trust was an important factor influencing vaccine decision making. Higher levels of parental intention to vaccinate were reported among those who trust vaccination information from healthcare professionals and from national official vaccine information sources; the HSE and the government.

Parents who were born in a Central or Eastern European country were 80 % less likely to state that they intend to vaccinate their child compared to those born in Ireland. Parents born in a Central or Eastern European country (Total N = 50) reported lower levels of trust in vaccine information from healthcare professionals and less belief in the safety of vaccines compared to those born in other countries including Ireland and Northern, Southern or Western European countries. Intention to vaccinate was also significantly lower among women compared to men and among those who were co-habiting compared to those who were married. For those not intending to vaccinate their child against COVID-19, concern about safety and adverse effects was identified as a key factor in the decision not to vaccinate. Parents reported that further information on vaccine side effects and vaccine safety and further information about the effects of COVID-19 infection in children would assist them in their decision making.

4.2. Public health implications

The COVID-19 pandemic has impacted children in Ireland directly and indirectly [30]. Vaccination of children aged 5 years and older is recommended as part of a multifaceted strategy to protect children against infection and serious disease and to control the spread of COVID-19 infection [31]. While this study examined attitudes of parents with children aged 0-48 months, for whom a COVID-19 vaccine is not yet authorised, these findings are important to inform the COVID-19 national immunisation programme if this age-group is included in the future. The findings are also important to inform the current national vaccination programme for children aged 5 years and older, in whom vaccine uptake is low. Information and communication to parents of children for whom COVID-19 vaccination is and may be recommended, should be tailored to take into account the findings of this survey, particularly in relation to the need for further information on vaccine side effects and safety. The findings of this survey are also important to inform the development of supporting materials for healthcare professionals who may be advising parents, particularly as one in five parents were undecided in relation to COVID-19 vaccination for their child.

During the time the survey was conducted, the COVID-19 vaccine for children aged 12–15 years was authorised and vaccination commenced in mid-August 2021. No vaccine was licenced for children aged 5–11 years old during the study period. Therefore, there was no national experience of vaccinating younger children. Parental confidence in vaccines may have increased since completion of this survey and vaccines are now being offered to all those aged 5 years and older in Ireland.

In this study, there was no significant difference in parental intention to vaccinate children with underlying illness compared to children without underlying illness. This is an important finding as children with underlying illness may be most at risk of severe disease, and likely to benefit most from vaccination. Therefore, targeted messaging for parents who have children with underlying conditions may be required to outline the rationale, risks and benefits to vaccination among this vulnerable group to allow parents to make an informed decision. As intention to vaccinate was lower among parents from Central and Eastern Europe and among mothers, targeted and tailored information and communication materials are required to address specific parental concerns including strengthening of trust in official vaccine information sources.

In Ireland, there is generally high vaccine acceptance and low levels of vaccine hesitancy for routine childhood immunisations reflecting a general trust in the immunisation programme and national recommendations [32–35]. This study is part of a larger cross-sectional national survey of parental attitudes towards childhood vaccinations which shows high vaccine confidence in routine childhood immunisations. Whether parental acceptance of COVID-19 vaccination for younger children would be high remains to be determined. However, currently just half of all parents with a child in the 0-48month age group intend to get their child vaccinated against COVID-19 should a vaccine become available, although this proportion may increase if regulatory approval is received and if vaccination of this age-group is recommended. In this survey, only 53.4 % of parents who had received all other recommended vaccines for their child, stated that they would vaccinate their child against COVID-19. This suggests specific concerns related to the COVID-19 vaccine and the findings of this study support that these concerns particularly relate to safety. Previous experience with newly introduced vaccines into the national programme has identified that initial uptake may be lower than other vaccines, but improves with time [26]. Parents have identified the need for further information about the safety of the COVID-19 vaccine in this age group to assist their decision making. Parental decision to vaccinate should be supported by the provision of accurate information to allow for informed decision making.

4.3. Strengths

This was a nationally representative survey undertaken during the second year of the COVID-19 pandemic. The results of this study can help inform the development of parental information and healthcare professional training materials for the COVID-19 vaccination programme for children in Ireland, particularly if vaccination is approved for children in younger age groups.

4.4. Limitations

This study was based on random digit dialling, and therefore sampling was random, however, interviewers were not required to reconnect non-responders, which might introduce a selection bias to the sampling process. Working parents and those who may not answer their mobile phone may also have had a lower chance of being selected to participate in this study. There is an additional risk of selection bias as parents who are hesitant about routine childhood immunisations, and other vaccines may be less likely to have participated in this survey. Individuals who do not own a mobile phone or who were not able to complete the telephone survey due to language difficulties were excluded. Additional research is required to examine vaccination attitudes within these populations which may include parents from marginalised communities with specific information needs. At the time of this study and currently, COVID-19 vaccines are not recommended for children agedless than 5 years in Ireland. If vaccines become available, the actions taken by parents may be different from their stated intention in this study. The decision to vaccinate may be influenced by factors such as convenience of access to the vaccine, the epidemiology of COVID-19 at the time vaccines are offered, the effectiveness of national vaccine information campaigns and the national experience vaccinating children in older age groups. Nonetheless, the results of this national survey of parents' views on childhood vaccination in Ireland can help inform the development of information and communication materials to support the roll out of the COVID-19 vaccination programme in Ireland.

5. Conclusion

With the recent recommendation for vaccination of children aged 5–11 years in Ireland, and the results of trials of vaccines in younger children expected shortly, understanding the attitudes of parents to vaccination of young children against COVID-19 is important. The results can assist in tailoring the provision of information to parents' needs, for current and future COVID-19 immunisations programmes for children in Ireland.

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Funding for this study was provided by the Irish Department of Health.

All authors attest they meet the ICMJE criteria for authorship.

Data availability

The authors do not have permission to share data.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2022.08.030.

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