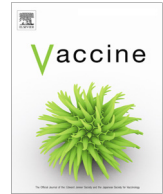




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Should COVID-19 vaccines be mandated in schools? - an international caregiver perspective



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ABSTRACT

Objectives: Caregiver attitudes toward mandating COVID-19 vaccines for their children are poorly understood. We aimed to determine caregiver acceptability of COVID-19 vaccine mandates for schools/daycares and assess if opposition to mandates would result in removal of children from the educational system.

Study Design: Perform a cross-sectional, anonymous survey of adult caregivers with children ≤ 18 years presenting to 21 pediatric emergency departments in the United States, Canada, Israel, and Switzerland, November 1st through December 31st, 2021. The primary outcome was caregiver acceptance rates for school vaccine mandates, and the secondary outcomes included factors associated with mandate acceptance and caregiver intention to remove the child from school.

Results: Of 4,393 completed surveys, 37% of caregivers were opposed to any school vaccine mandate. Caregiver acceptance was lowest for daycare settings (33%) and increased as the child's level of education increased, college (55%). 26% of caregivers report a high likelihood (score of 8–10 on 0–10 scale) to

Abbreviations: COVID-19, Severe acute respiratory syndrome coronavirus 2; EUA, Emergency Use Authorization; US, United States; FDA, Food and Drug Administration; ED, Emergency department; IRB, Institutional Review Board; REDCap, Research Electronic Data Capture; SD, Standard deviations; ACIP, US Advisory Committee on Immunization Practices; VAERS, Vaccine Adverse Event Reporting System; MIS-C, Multisystem inflammatory syndrome in children.

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remove their child from school if the vaccine became mandatory. Child safety was caregivers' greatest concern over vaccine mandates. A multivariable model demonstrated intent to vaccinate their child for COVID-19 (OR = 8.9, 95% CI 7.3 to 10.8; $P < 0.001$) and prior COVID-19 vaccination for the caregiver (OR = 3.8, 95% CI 3.0 to 4.9; $P < 0.001$) had the greatest odds of increasing mandate acceptance for any school level.

Conclusions: Many caregivers are resistant to COVID-19 vaccine mandates for schools, and acceptance varies with school level. One-fourth of caregivers plan to remove their child from the educational system if vaccines become mandated.

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1. Introduction:

Given the threat of the Severe Acute Respiratory Syndrome Coronavirus 2 (COVID-19), pandemic, the development and approval of multiple COVID-19 vaccines has been expedited. The Pfizer-BioNTech COVID-19 vaccine received Emergency Use Authorization (EUA) from the United States (US) Food and Drug Administration (FDA) for individuals ≥ 16 years on December 11th, 2020, with later expansion to ages 12–15 years (May 2021).[1,2] Children ages 5–11 years became eligible for vaccination by November 2021 in the US, Canada, and Israel, and by January 2022 in Switzerland.[1,3–5] The vaccine was shown to be 90–97% effective in preventing symptomatic laboratory confirmed COVID-19 infection after 2 and 3.3 months of follow up in children 12–15 years of age and 5–11 years of age respectively.[1,2].

Despite prior studies demonstrating 47–65% of caregivers (parents or guardians) intended to vaccinate their child against COVID-19;[6–9] caregiver interest in vaccination has waned over the course of the pandemic.[10] As of June 2022, pediatric COVID-19 2-dose vaccine completion rates were significantly lower than expected: US 12–17 years (59%) and 5–11 years (29%) [11], Canada 12–17 years (86%) and 5–11 years (43%) [12], Israel 12–15 years (54%) and 5–11 years (18%) [13], and Switzerland 10–19 years (49%), and 5–9 years (2.8%).[14] To improve herd immunity in the setting of rising COVID-19 cases, the US, Canada, and Israel implemented COVID-19 vaccine requirements in the workplace, thus setting a precedent to rapidly require vaccines with or without full government approval.[15–17] Requirements for school vaccines currently exist in all 50 states of the US and a few provinces in Canada; in contrast, vaccines are only recommended for school entry in Switzerland and Israel.[18–20] Given that current pediatric vaccination rates are low,[21], the question of whether to mandate COVID-19 vaccines for children is likely imminent.[18].

Surveys demonstrate that 48% of US respondents believe mandating COVID-19 vaccines for schools is acceptable; however, caregiver attitudes regarding mandating COVID-19 vaccines for their children are poorly understood.[22] The objective for this study was to measure emergency department (ED) caregiver acceptability of COVID-19 vaccine mandates for schools and daycares across four countries and to determine factors associated with acceptance of such mandates. A secondary outcome was to evaluate whether opposition to pediatric vaccine mandates would lead some ED caregivers to remove their children from schools and daycares and seek alternative childcare options. ED caregivers were chosen because prior work by this study team as well as others demonstrated that children without a medical home and those from vulnerable groups (especially children age 0–5 yr and those from low-income households) tend to have disproportionately high rates of ED use, thus both the Centers for Disease Control and Prevention (CDC) as well as the World Health Organization recognize the ED as an important site for engagement in vaccination efforts.[23–27].

Methods:

2. Study design and setting

This study was part of a larger ongoing COVID-19 Parental Attitude Study (COVIPAS), surveying caregivers of children presenting for emergency care, in the era of COVID-19.[6,28–30] Caregivers who arrived to 21 pediatric EDs in the US (Atlanta, Oak Lawn, Los Angeles, Louisville, Milwaukee, Pittsburgh, Portland, Minneapolis, Wilmington, Cleveland, and San Diego), Canada (Vancouver, Calgary, Montreal), Israel (Safed, Kaplan), and Switzerland (Zurich, Bern, Geneva, Ticino, and Fribourg) were asked to participate. We included caregivers of children 18 years or younger presenting to the pediatric ED between November 1st and December 31st, 2021. Surveys with significant incomplete data (<50%) were excluded. The study commenced shortly following US EUA of the COVID-19 vaccine for children 5 years and older. Caregivers were recruited using posters in waiting areas and patient rooms as well as in person by medical providers and research staff.

2.1. Survey

The anonymous online survey was available for all caregivers presenting with children to the participating EDs in English, French, German, Spanish, Italian, and Hebrew. The study was approved by the Institutional Review Board (IRB) of each site or received a waiver of consent. Surveyors requested one caregiver per child complete the survey and to focus responses on the ED patient, identifying the index child by age in the survey. Respondents completed the survey on their own smartphones or institutional I-pads by logging into Research Electronic Data Capture (REDCap®), a secured online data management platform.[31,32] All survey questions were reviewed by PEM faculty at each site in each language to ensure understanding across the four countries.

We asked caregivers to answer the question: “Do you believe the COVID vaccine should be mandatory for attendance at schools and or daycares?”. Caregivers were allowed to select “Yes” for multiple answers including daycare, preschool/kindergarten/elementary school, middle school, high school, and college/university. We also inquired about demographic characteristics, information on caregiver vaccine status, intention to vaccinate their child, and the presence of vaccine mandates in the workplace. We also asked, “Does your child have a chronic illness? (i.e. asthma, diabetes, cancer, seizures, etc.)”. Caregivers selected a single choice for “When do you believe the COVID vaccine should be mandatory for attendance at schools and daycares?”, and options included: immediately after EUA, after full approval by the local government, after it has been given to many more children, or it should never be required for attendance at school/daycare.

Multiple choices were available for “Do you have concerns about mandating COVID-19 vaccines for children?” including (concerns about safety for the child, effectiveness of the vaccine, impact on community, vaccine is not needed, freedom of choice for my child/family, and other), and “If COVID-19 vaccine becomes

mandatory for children it will...” including (protect my child, protect others, keep schools open, prevent missed work, help move away from the pandemic and return to normal, and other). Finally, a 0–10 point Likert scale was used to measure the following responses: “If the COVID-19 vaccine becomes mandatory for schools and daycares, I will remove my child from these settings and seek alternative childcare options” (0 = not at all and 10 = very likely), “Please let us know how safe school is for your child in order not to catch COVID-19” (0 = not safe at all and 10 = the most safe), and “How worried are you that your child has COVID-19?” (0 = not at all and 10 the most I have ever been).

2.2. Data analysis

Descriptive statistics, including means and standard deviations (SD) for continuous variables and counts and frequencies for categorical variables, were used to characterize relevant demographics. Several questions regarding caregiver’s opinions of vaccines and vaccine mandates were plotted and assessed descriptively. The primary outcome was favouring school or childcare related mandates at all educational levels, and the secondary outcome was likelihood to remove child from the school/daycare setting. These outcomes were evaluated for all respondents as well as by country of origin. A logistic regression model was used to assess possible predictors of parental acceptance of vaccine mandates, and results are presented as odds ratios and 95% confidence intervals. This analysis was conducted using R statistical software version 4.0.3.

3. Results:

A total of 4,393 ED caregiver surveys were completed between November 1st and December 31st, 2021. Nine surveys were excluded prior to analysis due to incomplete data or patient (child) completion of survey. Table 1 demonstrates characteristics for participating caregivers and their child, as well as COVID-19 vaccination status, and COVID-19 requirements at work. Caregivers were

primarily mothers (68%), average age 38 years, with education beyond high school (73%). The majority had received the COVID-19 vaccine (80%), and vaccines were infrequently mandated in the workplace (26%). Fifty seven percent of caregiver’s intended to vaccinate their child for COVID-19 once available for the child’s age.

Overall, 37% (n = 1,613) of caregivers opposed vaccine mandates at all levels of education, and only 29% (n = 1,259) accepted mandates at all educational levels. Vaccine mandate acceptance was lowest for the daycare setting (33%), and acceptance increased with rising school level, preschool-elementary schools (41%), middle schools (48%), high schools (53%), and college/university (55%) (Fig. 1). Regarding timing, 44% of caregivers believed vaccines should never be mandated for daycares/schools and only 20% reported immediately accepting vaccine mandates. Some caregivers reported they would consider accepting mandates after the vaccine was given to more children (10%) or after full local government approval (26%). Finally, of 4,111 respondents, 26% (n = 1,053) of caregivers reported a high likelihood (score 8–10 on 0–10 scale) of removing their child from daycare/school setting if the COVID-19 vaccine became mandatory in schools; however, caregivers were relatively split on this issue as 58% (n = 2,376) reported a low likelihood (score of 0–2 on 0–10 scale) (Fig. 2).

In Table 2, country specific data demonstrates that Canadian caregivers had the greatest acceptance of mandates (37%) compared to Swiss caregivers with the lowest acceptance (19%). US caregivers reported the highest likelihood to remove the child from school or daycare (28%) and Canadian caregivers had the lowest likelihood (18%).

Table 3 describes the results of the multivariate model predicting willingness of caregivers to accept vaccine mandate at any educational level. We found that caregivers were more likely to accept vaccine mandates if they had younger children (0–4 years) (OR = 1.7, 95% CI 1.3 to 2.2; P < 0.001) and if they intended to vaccinate the child for COVID-19 (OR = 8.9, 95% CI 7.3 to 10.8; P < 0.001). Caregivers also were more likely to agree

Table 1 Demographics.

	[ALL]	Does not support mandates	Supports at least one mandate
	N = 4393	N = 1613	N = 2780
Caregiver’s Child (Patient)			
Ave Age (years)	6.9 (5.3)	7.0 (5.1)	6.8 (5.3)
Age Category; No (%)			
0–4 yr	1989 (45)	703 (44)	1286 (47)
12 + yr	1096 (25)	388 (24)	708 (26)
5–11 yr	1292 (30)	518 (32)	774 (28)
Gender; No (%)			
F	2122 (49)	754 (48)	1368 (49)
M	2207 (51)	824 (52)	1383 (50)
NO-binary/other	20 (1)	4 (0)	16 (1)
Presence of chronic illness; No (%)	644 (15)	247 (16)	397 (14)
Caregiver			
Caregiver Role; No (%)			
Father	1249 (29)	433 (27)	816 (30)
Mother	2966 (68)	1116 (70)	1850 (67)
Other	141 (3)	43 (3)	98 (4)
Age (years)	38.4 (8.3)	37.4 (8.0)	38.9 (8.4)
Education; No (%)			
High school and below	1174 (27)	420 (27)	754 (27)
Beyond high school	3157 (73)	1144 (73)	2013 (73)
Received COVID-19 vaccine	3441 (80)	858 (55)	2583 (93)
Intent to vaccinate child for COVID-19	2447 (57)	339 (22)	2108 (77)
COVID-19 vaccine mandated at workplace			
Yes	1136 (26)	283 (18)	853 (31)
No	2442 (57)	1004 (65)	1438 (52)
I am not employed now	644 (15)	223 (14)	421 (15)
Other	100 (2)	42 (3)	58 (2)

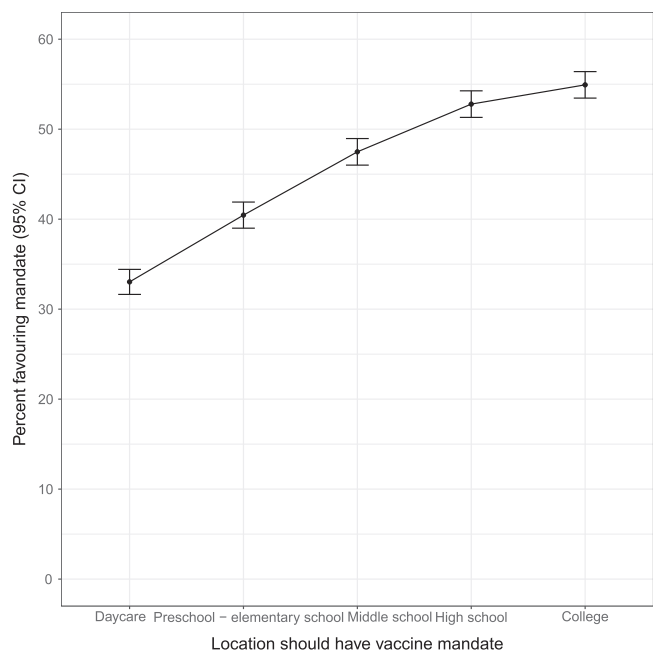


Fig. 1. Caregiver Acceptance of Vaccine Mandates. Percent of surveyed caregivers who support COVID-19 vaccine mandates for each educational level. Vaccine mandate acceptance was lowest for the daycare setting (33%), and acceptance increased with rising school level: preschool-elementary schools (41%), middle schools (48%), high schools (53%), and college (55%).

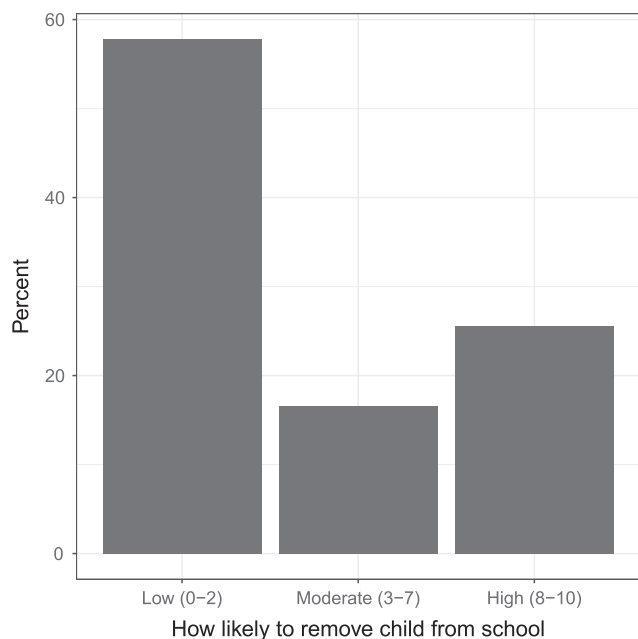


Fig. 2. Intentions of Caregivers to Remove their Child from School/Daycare settings. Likelihood to move to remove child from school/daycare settings if COVID-19 vaccines become mandated, 26% of caregivers report a high likelihood to remove child from school (score 8–10 on 0–10 scale) and 58% reported a low likelihood (score of 0–2 on 0–10 scale).

with mandates if the caregiver had received the COVID-19 vaccine (OR = 3.8, 95% CI 3.0 to 4.9; P < 0.001), if vaccines were mandated at their (or their spouse’s) place of work (OR = 1.4, 95% CI 1.2–1.7P < 0.001) and if he/she worried the child had COVID-19 at the time of the ED visit (OR = 1.12, 95% CI 1.09–1.15; P < 0.001).

Most caregivers felt school was moderately safe (score of 4.7) and few worried that their child had COVID-19 during the ED visit (score of 2.8). Caregivers expressed concerns over mandates due to: vaccine safety for their child (49%), caregiver freedom of choice (42%), vaccine effectiveness (33%), vaccine necessity (25%), and impact on the community (17%) (Fig. 3). Caregivers supporting vaccine mandates believed mandates would: help protect their child (53%), return life to normal (52%), protect others (49%), keep schools open (41%), and prevent missed work (34%).

4. Discussion:

The majority of caregivers believed COVID-19 vaccines should not be immediately mandated in schools or daycares. Acceptance was lowest for children in the youngest school levels; additionally, only half of caregivers accepted vaccine mandates in the middle school through college settings. Furthermore, one-fourth of caregivers considered removing their child from the educational system if vaccines became mandated. The most common concern among caregivers regarding vaccine mandates was child safety. Interestingly the multivariable analysis demonstrated that caregivers were more likely to accept vaccine mandates if they had received the vaccine themselves and intended to vaccinate their child for COVID-19. While we do not have representative data from each country, we found, a precedent of school vaccine mandates (in the US and Canada) did predict a higher caregiver acceptance rate of COVID-19 vaccine mandates for all school levels 37% in Canada and 31% in the US. However, caregiver likelihood to remove the child from school if vaccines became mandated was unrelated.

Our findings substantiate prior parent and public surveys demonstrating less than half of participants support COVID-19 vaccine requirements for schools.[22,33,34] Our work further supports conclusions by Hamel et al, identifying caregiver acceptance of vaccine mandates is lowest for young children (28% for children age 5–11 years) and increases with age (33% for children age 12–17 years).[33] Greater opposition to mandates in young children/younger school levels may be related to a shorter duration of vaccine availability in children age 5–11 years [1] and lack of vaccine availability in children under 5 years of age at the time of the survey. Similar to prior studies, caregivers who received or planned to receive the COVID-19 vaccine are more willing to accept vaccine mandates for children compared to unvaccinated parents.[22,33] Additionally, our study uniquely identified that prior caregiver intent to vaccinate the child for COVID-19 had the highest odds of predicting school mandate acceptance. Caregivers supporting COVID-19 vaccines likely believe the vaccine is safe and necessary to prevent illness and want to ensure herd immunity in schools and daycares by mandating vaccines for those around their child.

Our study is novel in that we identify one quarter of caregivers would act upon their opposition to mandates and intend to remove their child from daycare/school in the event vaccines become mandated. While opinions of ED caregivers may not be representative of the general population, this finding could have significant impacts on the school setting and the workforce. Prior work examining school closures demonstrated that removing children from the school setting was detrimental to academic performance as well as psychological welfare.[35–37] Furthermore, if caregiver intent to remove the child from school holds true for patients with lower socioeconomic status, virtual learning or home/schooling poses the threat of widening the socioeconomic gap in education as students of lower socioeconomic status may struggle with adequate/nutritious food, safe location to study and learn, and lack of access to age-appropriate resources such as computers/books/internet.[35,38–40].

Table 2
Country Specific Descriptive Data.

Country	N total	Oppose all Mandates (%)	Accept all Mandates (%)	Favour Immediate Mandates (%)	Highly Likely to Remove from School (8–10) (%)	Percent Vaccinated N (%)	National Vaccination Rate Estimate Nov- Dec 2021
Canada	1043	253 (24%)	390 (37%)	205 (20%)	188 (18%)	941/1024 (92%)	74–77%
Israel	257	114 (44%)	57 (22%)	40 (16%)	62 (24%)	213/247 (86%)	62–64%
Switzerland	1199	484 (40%)	229 (19%)	264 (22%)	270 (23%)	953/1182 (81%)	64–67%
United States	1894	762 (40%)	583 (31%)	363 (19%)	533 (28%)	1334/1874 (71%)	60–63%

*Each country had a small number of cases not reporting their vaccine status [13].

Table 3
Multivariable Analyses Determining Factors Associated with Mandate Acceptance.

	Caregivers Supporting At Least One School Level Mandate	
	OR	p-value
Child 0–4 yr	1.7 (1.3, 2.2)	< 0.001
Child 5–11 yr	1.3 (1.0, 1.6)	0.07
Mother	1.0 (0.8, 1.2)	0.82
Caregiver age	1.0 (1.0, 1.0)	0.60
Beyond high school education	0.7 (0.6, 0.9)	< 0.001
Child with chronic illness	1.0 (0.8, 1.2)	0.81
Parent Intent to vaccinate child	8.9 (7.3, 10.8)	< 0.001
Parent Received Vaccine	3.8 (3.0, 4.9)	< 0.001
Child is safe from COVID-19 at school	0.95 (0.92, 0.98)	< 0.001
Worry child has COVID-19	1.1 (1.1, 1.2)	< 0.001
Workplace Mandates Present	1.4 (1.2, 1.7)	< 0.001

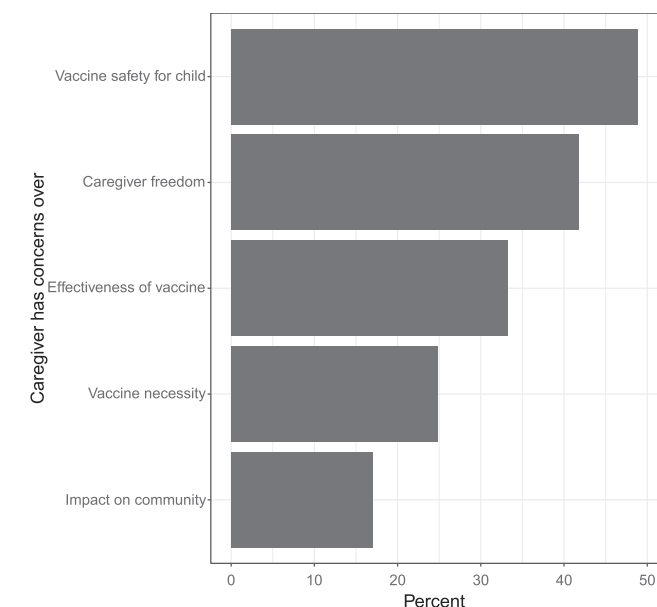


Fig. 3. Caregiver Concerns over Vaccine Mandates. Child safety was the most common concern regarding mandates. Caregivers were allowed to select multiple options.

Additionally, removing child(ren) from the school system would require caregivers/family members to provide care in the home, potentially leading to missed work, partial or complete lack of employment, or the need to pay for alternative non-public school educational programs.[41–43] This has the potential to add financial, social, and psychologic stress to caregivers in addition to stresses already endured due to the pandemic. Some may argue that what caregivers “intend” to do and what they actually do may differ; however, data from the US Census Bureau support our concerns as US homeschooling rates (unique from online

school programs) nearly doubled between spring 2020 and fall 2020 with disproportionately higher changes in homeschooling rates in Black children (3% to 16%) and Hispanic children (6% to 12%) compared with White children (6% to 10%).[44].

Should COVID-19 vaccines be mandated in schools? According to Opel et al, ensuring vaccine safety is a precondition to mandating pediatric vaccines and is fundamental to maintaining public trust in pediatric vaccines.[45] We found the most common caregiver concern regarding vaccine mandates was child safety. Similarly, prior work by this study team as well as others demonstrated that concerns for vaccine safety and side effects were the most common causes of pediatric COVID-19 vaccine hesitancy in caregivers (Baumer et al. under review).[6,46–49].

COVID-19 vaccine safety was assessed in children 5–11 years and ≥ 12 years by the US Advisory Committee on Immunization Practices (ACIP) via a single phase II/III randomized clinical trial in each group, conducted by the manufacturer. Despite high vaccine efficacy, in regard to safety, ACIP stated that this “body of evidence does not provide certainty that rare serious adverse events were captured,” due to small sample size and short follow-up.[2,50] Following administration of the vaccine to millions of children, additional adverse reactions have been identified. As of June 24, 2022, according to the US Vaccine Adverse Event Reporting System (VAERS) database, there have been 53 pediatric deaths and 362 life-threatening reactions reportedly associated with COVID-19 vaccine in children age 6 months–17 years. (VAERS is a national passive vaccine safety surveillance system, jointly managed by CDC and FDA that monitors adverse events after vaccination and accepts reports from anyone).[51,52] The vaccine has also been associated with increased risk of myocarditis/pericarditis/myopericarditis, with highest rates in 12–17 year old males, at 62.8 cases per million;[53,54] however, higher rates have been associated with COVID-19 illness as well.[55] Therefore, given emerging data on rare but serious adverse events associated with vaccination and the primary focus of caregivers to ensure child safety, it is not surprising to find that the majority of caregivers in our study were hesitant to accept immediate school mandates.

Overall, we raise several concerns regarding implementing COVID-19 vaccine mandates in children. First, parent acceptance of COVID-19 vaccine mandates is low. Second, prematurely mandating COVID-19 vaccines in schools and daycares has the potential to negatively impact the educational system and lead to workforce disruptions. Finally, parent concerns over vaccine safety have not yet been alleviated. While prior studies have debated the ethical issues regarding COVID-19 vaccine mandates in children,[45,56–58] our study uniquely adds the caregiver voice and intentions to this debate.

Limitations:

This survey is not representative of all caregivers in the participating countries, and due to the wide diversity of races and ethnicities as well as variations in household incomes and health insurances across the four countries, we were unable to assess the impact of these factors on school vaccine mandate acceptance.

Specific country campaigns may also influence caregiver decision making. We were unable to incorporate specific, local, geographic factors such as immunization rates of caregivers locally or rate of illness at the time of conducting the survey.

Survey results are dependent on accuracy of caregiver reporting, and vaccine status of the child and the caregiver was not verified. This survey was performed shortly after COVID-19 vaccines received US EUA for children age 5 years and older, and caregiver responses may change over time with new emerging variants, additional scientific evidence, higher rates of children getting vaccinated, mandates in their region, and local government recommendations/approval. As this was a convenience sample, selection bias could have been introduced as caregivers strongly favoring mandates may have opted into participation in the survey, and we found COVID-19 vaccination rates in surveyed caregivers were higher than national estimates for each country at the time of the survey. (Table 2)[13].

Finally, ED caregivers may not be representative of the general population as these caregivers may have limited access to primary care in some countries, may be more likely to demonstrate health-care seeking behavior, and their children may be at higher risk for comorbidities. The majority of caregivers sampled were female, highly educated, from large cities, and had received the COVID-19 vaccine and may not be representative of the general population. Our rates of chronic illness in ED patients (15% based on parent report) were lower than national averages (20% based on retrospective chart review).[59] Therefore, it is possible that our patient population was healthier than the general population or that caregivers did not consider their child's medical condition a "chronic" illness.

5. Conclusions:

Caregiver acceptance of COVID-19 vaccine mandates is low, and caregiver opposition to vaccine mandates is highest in the younger childcare/educational settings. Most caregivers believe COVID-19 vaccines should not be mandated immediately and 44% believe vaccines should never be mandated. The most common concern over mandates is fear regarding vaccine safety. One-fourth of caregivers intend to remove their child from school or daycare if the COVID-19 vaccine became mandated for children.

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.

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