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Parental Views on COVID-19 Vaccines for Children

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Abstract

Within only a year, there have been over 150 million cases of the Coronavirus disease 2019 (COVID-19) worldwide. Mask wearing and social distancing is a public health measure enforced to prevent the spread of the disease. However, not everyone follows it. As of June 2021, three vaccines have been approved for people 16 and older in the United States, including one that allows for children as young as 12 to receive it. Despite existing data demonstrating the COVID-19 vaccines' safety and efficacy, there is a portion of the population that is unwilling to receive it. Transparency and information are key to the population's trust of the vaccine. The purpose of this study was to elicit opinions from parents in New Jersey so as to gauge their vaccine hesitancy. We conducted a random and anonymous survey in New Jersey for three weeks. We posed the question, "What percent of parents in New Jersey are hesitant to give their child the COVID-19 vaccine and what factors influence vaccine hesitancy?" We hypothesized that gender and education level would be significant variables. Fisher Exact Tests were performed to identify a correlation between specific variables and vaccine hesitancy. We found significance in gender, education level, and whether one knew someone with severe COVID-19 symptoms.

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Introduction

Coronavirus disease 2019 (COVID-19) is a disease caused by the SARS-CoV-2 coronavirus, a positive-sense RNA virus (1). According to the John Hopkins Coronavirus Resource Center Database, the COVID-19 pandemic thus far has resulted in over 3 million deaths worldwide (2) has also led to financial (3) and social (4 & 5) ramifications that will take years to mend. While there have been several coronavirus outbreaks in the past, including MERS-CoV and SARS-CoV, SARS-CoV-2 led to a widespread pandemic because of its ability to transmit more rapidly in humans (6).

Coronaviruses are single-stranded viruses that are coated with membrane proteins that give it a crown-like appearance. One type of membrane protein that is essential for Sars-CoV-2 to infect humans is the spike protein, which binds to the Angiotensin-Converting Enzyme 2 (ACE2) receptor on the surface of host cells. Upon binding, the virus fuses with the host cell and injects its viral genome. Once inside, the virus utilizes the host cell protein-making machinery to replicate. The newly formed viruses are then released to invade other healthy cells (1).COVID-19 may present with symptoms of a respiratory infection such as fever, cough, fatigue and shortness of breath. However, in some cases, it can also lead to more serious complications like respiratory failure and acute respiratory distress syndrome (ARDS) (7).

For over a year now, COVID-19 has been a major concern around the world. It has ravaged through hundreds of countries and tested health care systems to their highest capacity. Fortunately, the development and approval of vaccines against SARS-CoV-2 has also been accomplished at record speed. With a concerted effort from scientists all over the world, new available technology, and government funding, several companies have developed successful vaccines within months (8). Three pharmaceutical companies have developed effective COVID-19 vaccines and have been given emergency use authorization by the Food and Drug Administration (FDA). The three approved COVID-19 vaccines available for use in the United States are the Pfizer-BioNTech, Moderna, and Johnson & Johnson's Janssen vaccines (9).

COVID-19 vaccines offer protection by allowing our bodies to develop immunity to the virus. The T-lymphocytes and B-lymphocytes, which are produced after vaccination, memorize how to fight off COVID-19 if exposed to it in the future. Common side effects include pain, redness, and swelling on

the arm of the site of the shot. Throughout the rest of the body, persons may experience tiredness, headache, muscle pain, chills, fever, and nausea (9). The disease, itself, causes similar side effects. Clinical trials have shown that the second dose of the COVID-19 vaccine causes a stronger reaction than the initial dose in most people (10). Most of the rare, severe allergic reactions to these vaccines have occurred in people with a history of allergies. A substantial number of these people had previously experienced a life-threatening allergic reaction called anaphylaxis (11).

Currently, the Pfizer-BioNTech vaccine is approved for use in people 12 years old and up, and the other two COVID-19 vaccines are approved for use 18 years old and up. However, clinical trials are underway to study the efficacy and safety of the COVID-19 vaccines in children. (12, 13). Although many children who contract SARS-CoV-2 are asymptomatic, there exists a small group who experience life-threatening systemic inflammatory disease (13). Additionally, those who are asymptomatic can still transmit the virus (14). Thus, it is crucial to study the potential use of the vaccine in children for their safety and for the efforts of achieving herd immunity. However, availability of the vaccine does not always correlate with its administration and more efforts are needed to gauge vaccine skepticism among parents. Herein, we describe an anonymous survey-based study to give parents an opportunity to share their opinions on the administration of the COVID-19 vaccines in children. Similar to studies done in the past that surveyed vaccine hesitancy in adults, this study aims to survey parents in New Jersey on their views towards allowing their child to get the vaccine if and when it becomes available (15). Our hypothesis is that gender and education level would be significant variables in vaccine hesitancy. Key determinants that could influence vaccine hesitancy will also be collected, such as level of education, ethnicity, and socioeconomic class.

Materials and Methods

We conducted an anonymous survey using Google Forms to examine the attitudes parents in New Jersey have towards allowing their child to get the vaccine if it becomes available. We distributed the survey by posting flyers on social media, in Facebook groups, and in community mailboxes. The survey contained 20 questions: 10 multiple choice, 3 check all that apply, and 7 short answers. The form started with the consent statement: “I give consent to allow my responses to be reported anonymously in aggregate form,” with “yes” or “no” answer options. Only responses that gave

consent were included in the study. As an incentive, we held a raffle for two $25 Amazon gift cards. Participants who wanted to enter the raffle submitted their emails at the end of the survey. In total, we received 216 responses from parents with children under the age of 16 years of age. Only submissions with unique emails were used in the study, and duplicate submissions were deleted, which left us with 123 responses. We had a high proportion of low-income parents enter the raffle, indicating that the sample of 123 parents was over-represented in these categories when compared to their proportion in the population.

Results

After about 3 weeks of data collection from people in New Jersey, we closed the survey with 123 responses from parents with children under the age of 16. We asked 20 questions and analyzed data from 11 of those questions.

A Fisher Test, with a p-value of 0.0296, showed that there was a significant relationship between gender and vaccine hesitancy (Figure 1). 2.8% of males showed hesitancy and 97.2% did not. For females, 14.6% were hesitant, while 85.4% were not. According to the data, females tend to be more skeptical than males to allow their child to get the vaccine once approved. Another Fisher Test, with a p-value of 0.0475, showed that there was a significant relationship between education level and vaccine hesitancy (Figure 1). People who had a GED or less were more hesitant to let their child receive the vaccine than those with a higher level of education. Specifically, 13.6% of people with a GED or less were hesitant, and 86.4% were not. Participants with a bachelor's or more were less hesitant, with 2.2% hesitant, and 97.8% not hesitant. A Fisher's Exact Test comparing hesitancy in people with GED or less verus a Bachelor's degree or more yielded a significant difference in hesitancy depending on the education level (p-value = 0.0475).

Participants were asked about what news sources they obtained their health information from. The most common answers were CNN, NBC, FOX, and ABC (Figure 2). 33.4% of people did not completely trust the news channels they watched (Figure 2).

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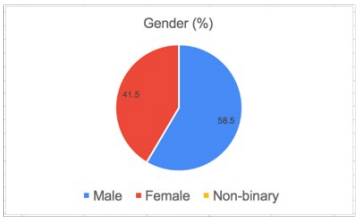

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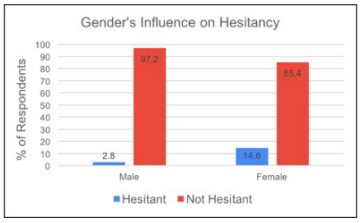
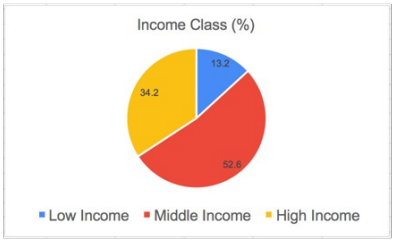


C.

Results			
	Male	Female	***Marginal Row Totals***
Hesitant	2	7	9
Not Hesitant	69	41	110
Marginal Column Totals	71	48	119 (Grand Total)

D.



E.

Results			
	Low Income	Middle & High Income	***Marginal Row Totals***
Hesitant	3	7	10
Not Hesitant	12	92	104
Marginal Column Totals	15	99	114 (Grand Total)

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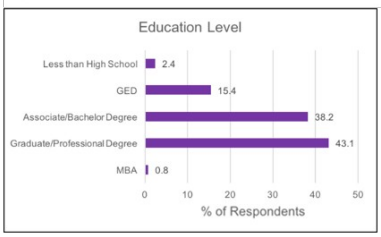

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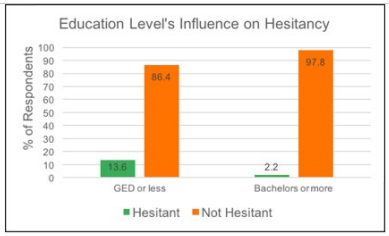


H.

Results			
	GED or less	Bachelors or more	***Marginal Row Totals***
Hesitant	3	2	5
Not Hesitant	19	91	110
Marginal Column Totals	22	93	115 (Grand Total)

Figure 1: Demographics. (A) Pie chart of gender distribution from 123 responses to the multiple-choice question, "What is your gender?". **(B)** Graph of the correlation between gender and vaccine hesitancy. **(C)** Contingency table of the correlation between gender and vaccine hesitancy. A Fisher's Exact Test was calculated with a significant resulting p-value of 0.0296. **(D)** Pie chart of income class distribution from 114 responses to the multiple-choice question, "[Optional] What bracket do you consider yourself in?". **(E)** Contingency table of the correlation between income level and vaccine hesitancy. A Fisher's Exact Test was calculated with an insignificant resulting p-value of 0.1254. **(F)** Graph of education level distribution from 123 responses to the multiple-choice question, "What is your education level?". **(G)** Graph of the correlation between education level and vaccine hesitancy. **(H)** Contingency table of the correlation between education level and vaccine hesitancy. A Fisher's Exact Test was calculated with a significant resulting p-value of 0.0475.

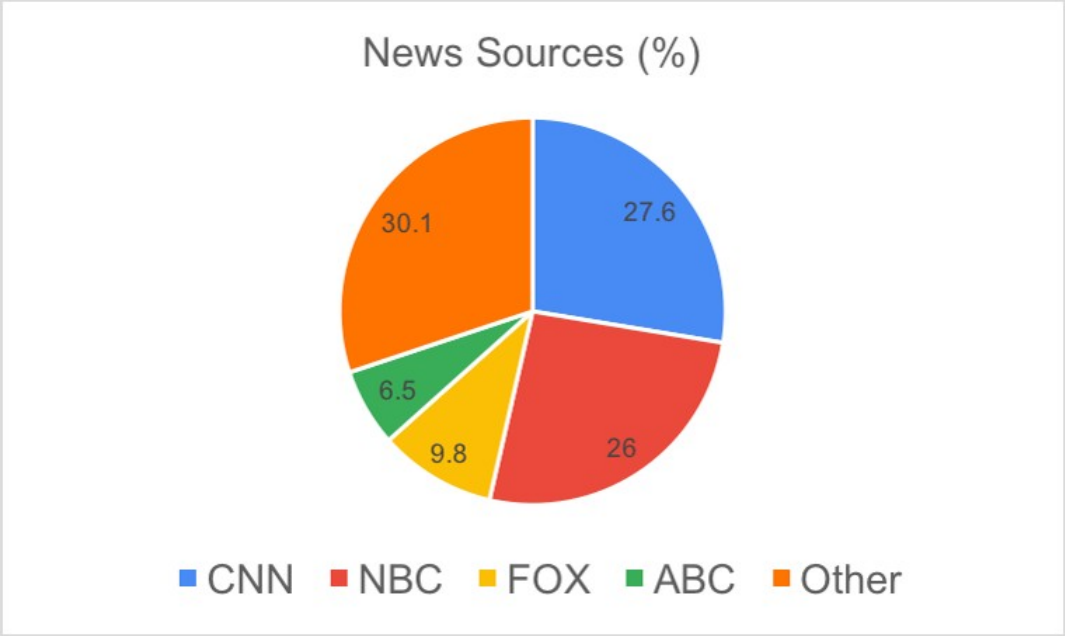


Figure 2: Info Sources. Pie chart of the distribution of the most common news sources from 123 responses to the open-ended question, "What news channel(s) do you watch?". 27.6% of people had 'CNN' in their response, 26% had 'NBC' in their response, 9.8% had 'FOX' in their response, 6.5% had 'ABC' in their response, and 30.1% of people didn't include these news channels in their responses. There was a follow-up multiple-choice question, "Do you trust the information shared about the COVID-19 vaccines from news outlets?", with options 'Yes', 'No', and 'Sometimes'. From the 123 responses, 66.7% responded 'Yes', 4.9% responded 'No', and 28.5% responded 'Sometimes'.

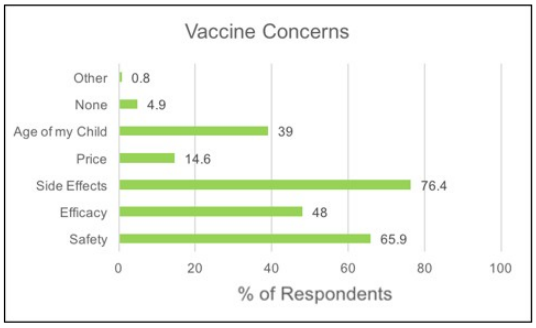
One of the questions was based on the person's personal life: "Have you or anybody you know been diagnosed with COVID-19? If so, how harsh were the symptoms (mild, moderate, severe)?" A Fisher Test, with a p-value of 0.0344, showed that there was a significant relationship between the symptoms and vaccine hesitancy (Figure 3). Those who themselves had, or knew someone who had severe symptoms of COVID-19, showed a tendency of more hesitancy towards the vaccine, compared to those who did not know anyone who had been diagnosed with COVID-19 (Figure 3). When we asked people to select their main concerns of the vaccine, more than 50% selected 'Safety' and 'Side Effects' (Figure 3). Additionally, 15% of the respondents marked 'Price' as a concern. A majority of participants

indicated that more trials to test the efficacy and side effects of the vaccine would increase their trust in the vaccine.

In total, 34.1% of the participants were hesitant to let their child get the COVID-19 vaccine (Figure 4). 65.9% of the respondents answered 'Yes, even if it's optional', 23.6% answered 'Yes, only if required by the school', 7.3% answered 'No', and 3.2% answered 'Other'.

The significance of certain variables were analyzed through Fisher Exact Tests. The correlation between whether people trusted news outlets they watched and vaccine hesitancy was significant with a resulting p-value of 0.0346. Additionally, there was a significant relationship between having a price concern and income levels with a resulting p-value of 0.0002. However, the correlation between having a concern of vaccine safety and gender was not significant with a resulting p-value of 0.3286 (Figure 5).

A.



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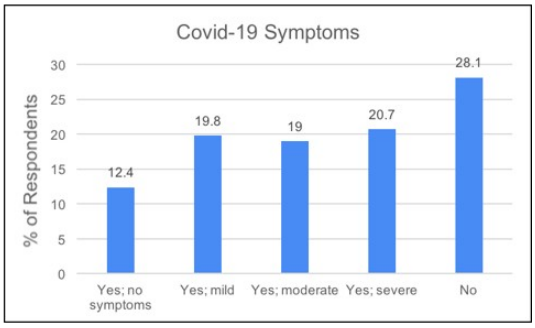

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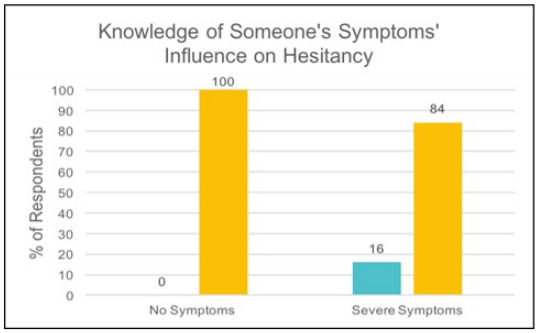

D.

Results			
	No	Severe Symptoms	***Marginal Row Totals***
Hesitant	0	4	4
Not Hesitant	31	21	52
Marginal Column Totals	31	25	56 (Grand Total)

Figure 3: Vaccine Concerns. (A) Graph of the distribution of vaccine concerns from 123 responses to the select all that apply question, "What are your concerns regarding the COVID-19 vaccine?". (B) Graph of the distribution of COVID-19 symptoms from 121 responses to a multiple-choice question, "Have you or anybody you know been diagnosed with COVID-19? If so, how harsh were the symptoms (mild, moderate, severe)?". (C) Graph of the correlation between knowing someone with COVID-19 symptoms and vaccine hesitancy. (D) Contingency table of the correlation between knowing someone with COVID-19 symptoms and vaccine hesitancy. A Fisher's Exact Test was calculated with a significant resulting p-value of 0.0344.

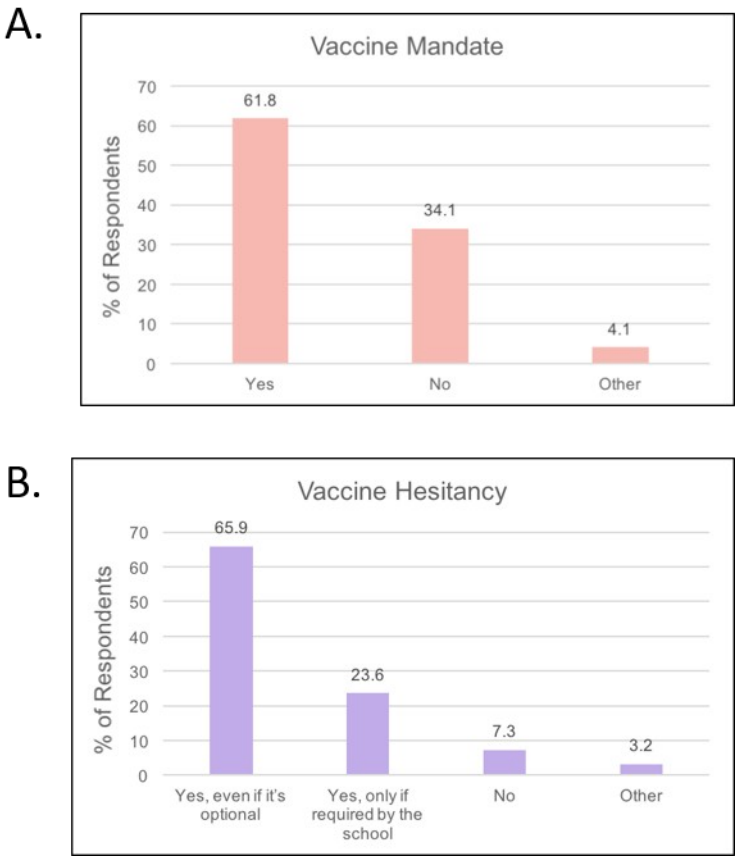

Figure 4: Vaccine Statistics. (A) Graph of the distribution of support or opposition for mandating the vaccine from 123 responses to the multiple-choice question, "Should the COVID-19 vaccine be mandated for everyone of all ages?". (B) Graph of the distribution of vaccine hesitancy among parents from 123 responses to the multiple-choice question, "If and when the COVID-19 vaccines are FDA approved for children under the age of 16, will you allow your child to get the vaccine?".

A.

Results			
	No	Severe Symptoms	***Marginal Row Totals***
Hesitant	0	4	4
Not Hesitant	31	21	52
Marginal Column Totals	31	25	56 (Grand Total)

B.

Results			
	Low income	Middle & High Income	***Marginal Row Totals***
Price concern	8	9	17
No price concern	7	90	97
Marginal Column Totals	15	99	114 (Grand Total)

C.

Results			
	Male	Female	***Marginal Row Totals***
Safety concern	52	28	80
No safety concern	23	19	42
Marginal Column Totals	75	47	122 (Grand Total)

Figure 5: More Correlations. (A) Contingency table of the correlation between trust of news outlets and vaccine hesitancy. A Fisher's Exact Test was calculated with a significant resulting p-value of 0.0346. (B) Contingency table of the correlation between income level and having a vaccine price concern. A Fisher's Exact Test was calculated with a significant resulting p-value of 0.0002. (C) Contingency table of the correlation between income level and having a vaccine price concern. A Fisher's Exact Test was calculated with an insignificant resulting p-value of 0.3286.

Discussion

In this study, we surveyed parents in New Jersey about their views on COVID-19 vaccines for children. We analyzed the data to see if there was a correlation between key variables, such as gender and income class, and vaccine hesitancy using Fisher's Exact Tests. We found significant differences in hesitancy with respect to gender, education level, and knowing someone with COVID-19 symptoms. The phenomenon that some individuals were vaccine hesitant even if they knew someone who experienced severe COVID-19 symptoms may be explained by people not wanting the risk of having potential side effects from the vaccine after having COVID-19 symptoms. Using census data for individuals, assuming poverty to be equal to low income responses, our sample is representative of the population of NJ (census poverty = 13.2% versus 9.2% low income and census <GED=13.6% versus 10.2% in our sample).

To ensure accuracy of the data, we attempted to remove duplicate answers from individuals

who used the same email in their submissions. There are other methods to prevent duplicate submissions, such as requiring email sign-ins to complete the survey or getting the survey filled-out in person. However, due to social-distancing guidelines during the pandemic, we decided that the online survey was more ideal, than in-person data collection. Additionally, the survey was intended to be anonymous for those who did not want to submit emails for a chance to win the incentive reward. Requiring participants to sign onto their email accounts before completing the survey would breach the anonymous aspect of the survey for those who did not wish to provide their emails. As written in the consent statement, the data is still reported in aggregate with no participant identification included.

Our data shows that about a third of the respondents sampled express hesitancy surrounding the COVID-19 vaccine for children. This indicates that even when vaccines become available to children, not all parents will have their children vaccinated. Our study is limited to a small cohort and thus has low statistical power; nevertheless, we hope that the study can provide the groundwork for future larger studies to assess the hesitancy of vaccines in larger areas and populations.

Vaccine hesitancy is influenced by education level, as shown in our study. This highlights the need to disseminate more accurate information to people of all backgrounds. In addition, 15% of the participants marked 'Price' as a concern to get the vaccine. However, the vaccine is free, regardless of insurance status, which shows the lack of transparency and the need to reiterate this fact to the public. Furthermore, scientists and researchers should take into account that a large majority of people are concerned with the safety, efficacy, and side effects of the vaccine. Once these concerns are addressed, vaccine hesitancy will decrease and we will move closer to the end of the pandemic.

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