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*Article*

# The Predictors of COVID-19 Vaccine Hesitancy among Turkish Cypriot Parents

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**Abstract:** Although WHO declared the end of the pandemic based on the report by International Health Regulations Emergency Committee on May 4th 2023 the health authorities stresses that COVID-19 is still an ongoing health issue and especially the populations in the high-priority risk need booster doses to sustain the gains. However the vaccination rates decrease all around the world according to WHO's Strategic Advisory Group of Expert's on Immunization (SAGE). One of the main reasons of this dramatic decrease can be vaccine hesitancy or refusal. Vaccine hesitancy is defined as refusal or delay in vaccination, although there is a sufficient supply available (SAGE working group, 2014). MacDonald (2015) stated that vaccine hesitancy is higher among the people who has lack of confidence or trust both to the vaccines themselves and health authorities within the country. However hesitancy can be towards specific vaccines or selective. One of the most salient selective vaccine hesitancy is the childhood vaccine hesitancy. In the current study we examined the predictors of vaccine hesitancy for children and their parents. A total of 199 parents (age range: 26-58; Mean Age: 35) have been recruited by using an online survey. Seventy six percent of the parents who responded were mothers. Education level of the sample was relatively high; 48% of the participants had bachelor degree while %32 had postgraduate degrees. Results indicated that ruminative thinking about Covid-19 was the strongest predictor and decreased the risk for childhood vaccine hesitancy. Surprisingly, lower poor supervision predicted higher vaccine hesitancy/refusal for children. On the other hand conspiracy thoughts about the pandemic increased the refusal of COVID-19 vaccines three times. For parents conspiracy thoughts and ruminative thinking predicted vaccine hesitancy/refusal similar to the previous model. Positive parenting was found to be negatively related with vaccine hesitancy/refusal for the parents themselves. One unit increase in this variable decreased the vaccine hesitancy/refusal for almost five-folds.

**Keywords:** vaccine hesitancy; conspiracy thinking; ruminative thinking; parenting

## 1. Introduction

World Health Organization (WHO) declared that COVID-19 epidemic returned to pandemic on March 11th, 2020 [1]. Until 26 July 2023 there were 768,560,727 confirmed cases of COVID-19, including 6,952,522 deaths globally. WHO reports indicated that there was a significant decrease in deaths after December 2021. Although hand hygiene, mask-wearing and physical distancing was proved to be effective in mitigating the spread of the virus especially before the COVID-19 vaccine administration all around the world [2], it is obvious that significant decreases in the daily cases and deaths could only be achieved through vaccine acceptance [3]. The authors also mentioned that vaccination increases the probability of herd immunity which means that 70% of the population was immunized. A lot of studies indicated that COVID-19 vaccines were effective and safe [4–6]. Although WHO declared the end of the pandemic based on the report by International Health Regulations Emergency Committee on May 4th 2023 the health authorities stresses that COVID-19 is still an ongoing health issue and especially the populations in the high-priority risk need booster doses to sustain the gains. However the vaccination rates decrease all around the world according to WHO's Strategic Advisory Group of Expert's on Immunization (SAGE). One of the main reasons of this dramatic decrease can be vaccine hesitancy or refusal.

Vaccine hesitancy is defined as refusal or delay in vaccination, although there is a sufficient supply available [7]. A relatively recent review study indicated that vaccine hesitancy is higher among the people who have lack of confidence or trust both to the vaccines themselves and health authorities within the country [8]. Subjective risk perception of vaccine acceptance, fear of side effects, questioning the legitimacy of science, and trust/mistrust to health organizations have been found as some of the cognitive, social and contextual factors which predict hesitancy or refusal of vaccines [9–11]. Another strong predictor of vaccine hesitancy (both for previous vaccines and COVID-19 vaccines) is conspiratorial thinking [12,13] which we will cover in detail below. A report by WHO identified vaccine hesitancy as one of the top 10 global threats to public health [54]. Accordingly a recent study indicated that a refusal rate more than 10% will diminish the benefits of vaccination in a population [14]. Accordingly another research stressed that the success of mass vaccination programs depends heavily on low rates of vaccine hesitancy not for COVID-19 pandemic but for all possible future pandemics [15]. It has been reported that reappearance of previously eradicated diseases such as polio and measles and increase in the prevalence rate of preventable deaths because of these diseases was directly or indirectly related with vaccine hesitancy/refusal [16]. However hesitancy can be towards specific vaccines or selective [17]. One of the most salient selective vaccine hesitancy is the childhood vaccine hesitancy [18]. We will cover this in detail below.

### *1.1. Parental Attitudes and Vaccine Hesitancy for the Children*

The reasons of childhood vaccine hesitancy/refusal are similar to general vaccine hesitancy/refusal. Past research indicated that parents are hesitated or refuse to give consent about vaccination of their children because they don't believe in the efficacy of vaccines, they are afraid of the side effects and they have misinformation or lack of information about the vaccines [19,20]

United Nations Convention on the Rights of the Child Article 24 mentions that: "States Parties recognize the right of the child to attain the best possible standard of health and to benefit from institutions providing medical care and rehabilitation services. States Parties shall endeavor to ensure that no child is deprived of such medical care." Accordingly not approving the vaccination (i.e., immunization) of the child is counted as a child neglect in some states of USA [21].

### *1.2. Conspiratorial Thinking and Vaccine Hesitancy*

Conspiratorial thinking is the predisposition to interpret the phenomena in the lens of conspiracies [22]. A lot of studies indicated that conspiracy suspicions were one of the strongest predictors of vaccine hesitancy/refusal [23–25]. A cross-national study which was conducted across 24 countries indicated that the link between conspiratorial thinking about vaccines was consistently related with vaccine hesitancy [26]. Therefore it can be suggested that this link is global. However there was a limited number of studies which focused on conspiracy thoughts about COVID-19 pandemic and vaccine hesitancy towards COVID-19 vaccines specifically [13,22,23,56]. The results were echoing the findings of pre-pandemic studies.

Increased vaccine hesitancy because of conspiratorial thinking may have its roots in the circulation of misinformation in the web sites and social media [27]. Past research showed that exposure to negative or false information about vaccines for 5 to 10 minutes increased the risk of vaccine hesitation [28]. Another study found that exposure to misinformation about vaccines online decreased the intentions of vaccination 6.2% and 6.4% in UK and US respectively [29]. An infodemic is the fast and widespread circulation of too much information which vastly include false or misleading information especially in digital environments [30]. A total of 132 member states of United Nations signed "Cross-Regional Statement on Infodemic" of WHO which declared that infodemic is as dangerous as pandemic itself. In North Cyprus, just like to the other parts of the world, vaccine hesitants are generally organized in the social media under specific groups such as Plandemic (which states that pandemic was actually a planned scenario) and conspiracy theories are spreaded so fast via this kind of groups and other digital platforms. Even before the COVID-19 pandemic the anti-vaccination websites were full of misinformation and misinterpretation of scientific studies about the effectiveness/side effects of the vaccines [31].

### *1.3. Ruminative Thinking and Vaccine Hesitancy*

Apart from conspiracy thoughts, ruminative thinking can result in vaccine acceptance. Rumination is a type of coping mechanism that requires self-focused concentration to negative events or negative emotions [32]. According to another study, rumination is a type of distress response that entails focusing on symptoms of discomfort and the likely origins and implications of these feelings repeatedly and passively [33]. Rumination is proposed to be divided into two different subtypes; concrete and abstract rumination [34]. Abstract rumination is suggested to lead to people forming unfavorable opinions about themselves, leading to a negative attitude and a tendency for depression [35]. On the other hand, concrete rumination typically involves processing information in a more clear thought content [36]. Individuals with concrete rumination try to understand the event and they are found to report low levels of emotional nervousness [37]. Compared to abstract rumination, individuals with concrete rumination have been found to experience embellished problem-solving skills and evaluate themselves and the events around them more positively [38].

It has been hypothesized that patterns of abstract thinking are associated with higher degrees of negative emotion and physiological excitement that lasts longer and abstract rumination is suggested to not result in active problem-solving to modify the circumstances that are causing these symptoms [39]. Instead, ruminators remain obsessed with the problems and their thoughts about them without taking any action [34]. However, in concrete rumination, people experience low levels of anxiety and hopelessness [35]. According to a recent study conducted by concrete rumination promotes proactive action, which may be crucial for reducing depression symptoms [40].

In regards to the COVID-19 pandemic, excessive negative ruminations has lead to individuals having lower levels of well-being [41]. However, in the current study, our aim is to focus on rumination as acting as a protective factor against vaccine hesitancy. In line with previous research, we suggested that rumination will act as an opportunity to individuals to cope with vaccine hesitancy very well by not focusing on the problematic or anxiety provoking situation [42].

### *1.4. Current Situation in North Cyprus*

The last updated information about COVID-19 tests were between 12-25 April 2023. A total of 1658 tests performed and the number of positive cases detected were 58. There was no casualties. Until now Communicable Diseases High Committee reported 120656 cases and 263 deaths because of COVID-19. Highest casualties were between August 2021 and May 2022. A total of two child deaths have been reported until 2023 July. There was no information about the vaccination rates of children. Ministry of Health published the last communication about the benefits of child COVID-19 vaccination on 24 January 2022 and Cyprus Turkish Medicine Association shared two links about the issue on January and July 2022. Communicable Diseases High Committee cancelled the obligation to wear masks in the beginning of 2022-2023 academic year at schools and didn't mention at any point about vaccination.

## **2. Methods**

### *2.1. Sample*

A total of 199 parents (age range: 26-58; Mean Age: 35) have been recruited by using an online survey. Seventy six percent of the parents who responded were mothers. Education level of the sample was relatively high; 48% of the participants had bachelor degree while %32 had postgraduate degrees.

### *2.2. Procedure*

Before collecting the data ethical approval has been gotten from the departmental and university Research Ethics Boards. The data was collected in the first six months of 2022 after the Covid-19 vaccines were approved for children by the national health committee. All the data have been collected online by using Qualtrics.



### 3. Materials

*OCEANS Coronavirus Conspiracy Scale* [43]: The scale includes a total of 21 items which measure the conspiracy thoughts about Covid-19 (Ex: The virus is a hoax; The virus is human made). Five-point likert scale was used (1-do not agree, 5-completely agree). The scale was adapted to Turkish by the authors (Cronbach's Alpha:.96.)

*Alabama Parenting Questionnaire* [44]: The original questionnaire included 42 items with five sub-scales (e.g.,: Involvement, Positive Parenting, Poor Monitoring/Supervision, Inconsistent Discipline, Corporal Punishment). The scale was adapted to Turkish by Cekic et al. (2018) [45]. In our study three dimensions were found as the result of exploratory factor analysis; positive/involving parenting (ex: you have a friendly talk with your child; you let your child know when he/she is doing a good job), poor monitoring (ex: you do not tell your child where you are going; your child is at home without adult supervision) and harsh parenting (ex: you yell or scream at your child when he/she has done something wrong; you ignore your child when he/she is misbehaving). The questions were in the form of 5-point Likert scale (1-Never, 5-Always). Positive/involving parenting (Cronbach's Alpha: .81) and poor monitoring (Cronbach's Alpha: .76) has been used for the purposes of the study.

*Covid-19 Rumination Scale* [46]: The scale consists of 6 items (ex: I am worried about the coronavirus; Thoughts about coronavirus disturb my sleep) with a 5-point Likert scale (1-totally disagree to 5-totally agree). The scale was adapted to Turkish by the authors (Cronbach's Alpha:.86.)

### 4. Results

#### 4.1. Descriptive Statistics

Before conducting the inferential statistics some descriptive statistics will be given to understand better the characteristics of the sample. A minority in the sample (i.e., 17.7%) stated that they have not been vaccinated and never think to be vaccinated. Also 11.5% of the parents mentioned that they had negative life experiences related with the vaccines in their childhood. Almost the half of the parents (41.6%) stated that they didn't give approval and they will never give for the vaccination of their children (for COVID-19). Trust to the institutions and the system was relatively low. A total of 41% of the participants mentioned that they don't trust Ministry of Health. The percentages of mistrust were 42% for supreme committee for contagious diseases, 43% for hospitals and 56% for health system in North Cyprus. On the other hand trust towards health employees was relatively high (i.e., 40.6%). Lastly attitudes related with vaccines in general and COVID-19 vaccines have been examined. The results indicated that majority of the sample had positive attitudes towards both.

#### 4.2. Inferential Statistics:

Two Logistic Regression Analyses (LRA) have been conducted to test the hypotheses across two steps. This analysis was chosen because of its suitability for risk analysis [55]. Depending on previous studies age, gender, socio-economic status, trust to the health organizations and past experiences related with vaccination has been entered as control variables. Cognitive variables and parental attitudes have been entered in the second and third step respectively.

The parents who answered "No!" for the questions "Have you approved the vaccination of your kids for Covid-19?" and "If you didn't, would you think in the near future?" were categorized as the vaccine hesitants/refusals for children (coded as 2). The others were labeled as neutrals and they have been coded as 1.

The results indicated that ruminative thinking about COVID-19 was the strongest predictor and decreased the risk for nine-folds. Surprisingly, lower poor supervision predicted higher vaccine hesitancy/refusal for children. On the other hand conspiracy thoughts about the pandemic increased the refusal of COVID-19 vaccines three times (See Table 1). The interactions between poor supervision and conspiracy/ruminative thinking have not yielded significant results.

**Table 1.** Logistic Regression Analysis for Vaccine Hesitancy of Parents for Covid-19 Vaccines for Children.

| Predictor          | $\beta$ | SE $\beta$ | Wald's $\chi^2$ | Df | p      | e $\beta$ |
|--------------------|---------|------------|-----------------|----|--------|-----------|
| Constant           |         |            |                 |    |        |           |
| Positive Parenting | -.554   | .396       | 1.963           | 1  | .161   | .574      |
| Poor Supervision   | -.593   | .690       | .740            | 1  | .390   | .552      |
| Conspiracy         | -2.720  | 1.025      | 7.049           | 1  | .008*  | .066      |
| Thinking           | 1.835   | .474       | 3.097           | 1  | .038** | 2.304     |
| Ruminative         | -1.587  | .524       | 9.159           | 1  | .002*  | .204      |
| Thinking           |         |            |                 |    |        |           |

Note. Cox and Snell R<sup>2</sup> = .361 Nagelkerke R<sup>2</sup> = .482 c-statistics: 74.5% \*p<.01, \*\*p<.05.

The parents who answered “No!” for the questions “Have you vaccinated?” and “If you didn’t, would you think in the near future?” were categorizes as the vaccine hesitants/refusals for themselves (coded as 2). The others were labeled as neutrals and they have been coded as 1.

The results showed that conspiracy thinking about COVID-19 was the strongest predictor and increased the risk for almost nine-folds. Similar to the children’s case, ruminative thinking decreased the vaccine hesitancy/refusal seven times. Positive parenting was found to be negatively related with vaccine hesitancy/refusal for the parents themselves. One unit increase in this variable decreased the vaccine hesitancy/refusal for almost five-folds (See Table 2). The interactions between positive parenting and conspiracy/ruminative thinking have not yielded significant results.

**Table 2.** Logistic Regression Analysis for Vaccine Hesitancy/Refusal of Parents for themselves.

| Predictor          | $\beta$ | SE $\beta$ | Wald's $\chi^2$ | Df | P      | e $\beta$ |
|--------------------|---------|------------|-----------------|----|--------|-----------|
| Constant           |         |            |                 |    |        |           |
| Positive Parenting | -4.661  | 1.304      | 12.768          | 1  | .000   | .009      |
| Poor Supervision   | -3.314  | 1.496      | 4.905           | 1  | .027** | .036      |
| Conspiracy         | -1.514  | 1.233      | 1.506           | 1  | .220   | .220      |
| Thinking           | 3.129   | 1.066      | 8.614           | 1  | .003*  | 22.855    |
| Ruminative         | -2.540  | .940       | 7.300           | 1  | .007*  | .079      |
| Thinking           |         |            |                 |    |        |           |

Note. Cox and Snell R<sup>2</sup> = .422 Nagelkerke R<sup>2</sup> = .721 c-statistics: 92.6% \*p<.01, \*\*p<.05.

## 5. Discussion

Socio-economic status (i.e., educational level and income) of the sample was not a significant predictor of vaccine hesitancy/refusal for the children. This result was contradicting with the past research which indicated that anti-intellectualism and low educational level was related with higher vaccine hesitancy [16,22]. It can be suggested that when the vaccination of the children is on the agenda, the highly educated individuals (such as our sample in which people with graduate and postgraduate degrees are overrepresented) may ask more scientific proof for the decision of vaccination for children. At this point it must be stressed that majority of the participants had positive attitudes towards vaccination in general and COVID-19 vaccines in specific (for themselves).

Beyond of this point, the parents can be unwilling to vaccinate their children because they don't perceive a risk or threat for them. According to Farhart et al. (2022) vaccine hesitancy can be classified into three categories: confidence (i.e., concerns about the safety and risks of the vaccine), convenience (i.e., not to be able to supply the vaccine because of geographic and/or socio-economic conditions) and complacency (i.e., not perceiving urgency for the vaccination) [22]. For COVID-19 vaccines, our results indicated that confidence could be more effective over the decision of vaccination because it seems that the parents had concerns about the safety of these vaccines for children. Complacency can also be effective in not approving the vaccination of children because this age group has not been labeled as 'under risk'. SAGE also mentions that healthy children and adolescents aged 6 months to 17 years are called as the low-priority group. As mentioned above the health authorities also has not stressed well the importance of vaccination of children. Convenience was not an appropriate category for vaccine hesitancy among Turkish Cypriot parents because the vaccines have been administered (and still administered) free by the authorities in North Cyprus.

Poor supervision was found to be negatively related with vaccine hesitancy for children. In other words our results indicated that the parents' vaccine hesitancy was not related with neglecting the health conditions of their children. This was in line with previous findings which indicated that if the parents perceived a lack of confidential information about vaccination they would be less willing to give consent for their children [18,47]. The motive behind this could even be protecting the child against the possible risks of the vaccines. This can be supported by the results of LHA for the parents themselves. As reported above positive parenting predicted vaccine hesitancy/refusal negatively. In other words the parents in our sample had a motivation for vaccinating themselves but not for their children.

In both models conspiracy thinking increased the vaccine hesitancy/refusal. This was in line with previous results in the literature related with COVID-19 vaccines [22,23]. Our results indicated that this kind of thinking was not rare among highly educated individuals. Also it has also been observed (but not reported yet) by the authors that after the pandemic conditions have almost totally disappeared, the people in general started to attribute the main reason of sudden deaths in North Cyprus to the COVID-19 vaccinations. Although the vast majority of the population have been vaccinated and the country itself is categorized as safe to visit, ongoing conspiracy thoughts about the pandemic and vaccines is a risk for the possible future outbreaks.

Rumination about COVID-19 decreased the risk of vaccine hesitancy/refusal for both both children and parents. Aforementioned, we focused to the adaptive side of ruminative thinking which frequently has been linked to psychopathologies in the literature. It can be suggested that the parents in our sample had concrete ruminations about the risks of COVID-19 and this motivated them to accept vaccinations. To the best of our knowledge, the current study was the first one which reported this link empirically.

### 5.1. Limitations and Future Research Directions

The current study was self-reported and it includes all disadvantages of this method such as self-reporting bias. Also the data was collected by using an online survey as aforementioned and the parents who go online could be overrepresented in the recruited sample.

As mentioned in the Introduction of the study, vaccine hesitancy can increase because of the *misinfodemic*. However we didn't examine the parents' internet and social media use in detail. The

future (especially) qualitative studies may focus more on this link specific for COVID-19 pandemic to support the quantitative findings [48,49]. Also the content analyses of the anti-vaccination websites can be repeated for COVID-19 vaccines.

Although ruminative thinking about COVID-19 was examined as a non-pathological construct, it can also be related with anxiety. Anxious individuals have low tolerance to uncertainty and a high need for predictability [50]. It is obvious that COVID-19 Vaccines decreased the uncertainty and increased the predictability of the course of the pandemic. Therefore the individuals who had high scores on ruminative thinking could also feel anxious and stressful about the threats of COVID-19, and could be more willing to vaccinate themselves and their children. A recent study found that rumination and COVID-19 fear was associated with intolerance of uncertainty and decrease in psychological well-being. The future studies can revisit this link to get empirical proof to answer whether rumination was a part of psychopathology or not [41].

Vaccine hesitancy could be measured by reliable and valid tools such as Vaccine Hesitancy Scale [51]. However the items were not suitable to measure the vaccine hesitancy for the children. Also vaccine hesitancy as a continuous variable should be converted to a dichotomous variable to conduct LRA. Therefore specific items which measure the decisions about vaccination of the children were used. However the future studies may aim to develop a valid scale to measure vaccine hesitancy for children.

## 5.2. Implications and Conclusion

Although the findings were preliminary because of the limited sample size, the results were promising for both researchers and practitioners. A research mentioned that female care givers take an important role in decision making related with vaccination [52]. The vast majority of our parents in the sample were also women, and it can be suggested that any campaign which aims to increase the vaccination rates for children must focus on women priorily. It will not be wrong which says that women are still primary care givers among Turkish Cypriot families.

Health communicators must encourage the vaccination of children constantly by referencing scientific proof. A recent review paper argued that vaccine hesitancy/refusal is a trust (as our descriptive results also confirmed) and informational problem [53]. While trying to reduce the supply and spread of misinformation, it is a must to increase the spread of accurate information via social media, blogs, health professionals and key opinion forming people. Vaccine acceptance is also related with trust to the vaccines themselves, the producer(s) of the vaccines and health authorities [53]. Our descriptive results indicated that trust to the health system in general was very low among the participants and this must be tackled by the policy makers to build vaccine confidence especially for COVID-19 vaccines because hesitancy towards these vaccines seems to not to be related with a general vaccine refusal but indecisiveness about the direct and side effects of those.

**Conflicts of interest:** The authors declare that there is no conflict of interest

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