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Factors influencing COVID-19 vaccination intention among parents of children aged 5-11 years in South Korea: a cross-sectional study

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Purpose: The purpose of this study was to identify factors affecting parents' intentions to have their children aged 5-11 years vaccinated against coronavirus disease 2019 (COVID-19). **Methods:** The participants of the study were 298 parents with children aged 5-11 years in South Korea. Data collection took place from October 20 to October 26, 2022 and used an online survey (Google Forms). Data were analyzed using descriptive statistics, the t test, analysis of variance, the Scheffé test, Pearson correlation coefficients, and hierarchical regression in IBM SPSS version 26.0. **Results:** The factors influencing participants' vaccination intentions for their children aged 5-11 years were cognitive behavioral control (β=.40, p<.001), attitudes (β=.37, p<.001), subjective norms (β=.20, p<.001), and awareness of whether their child could receive the COVID-19 vaccine (β=.07, p=.016). The explanatory power of the regression equation was 89%. **Conclusion:** Parents' intentions to vaccinate their children against COVID-19 are influenced by their attitudes, subjective norms, and perceived behavioral control toward vaccines. Since parents are concerned about vaccine side effects, it is important to establish a trusted line of communication to keep them informed about vaccinations.

Key words: COVID-19; Vaccination; Intention; Attitude; Behavior control

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INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) originated in China in December 2019 and then caused the coronavirus disease 2019 (COVID-19) pandemic [1]. According to the Korea Disease Control and Prevention Agency (KDCA), from the first case of COVID-19 in Korea on January 20, 2020 to June 5, 2023, the cumulative number of confirmed cases of COVID-19 was 31,789,625 and the cumulative number of deaths was 34,827. Children and adolescents aged 19 years or younger accounted for 7,099,665 (22.3%) of these confirmed cases, specifically 3,155,000 (9.9%) children aged 0-9 years and 3,944,665 (12.4%) adolescents aged 10-19 years [2].

South Korea initiated COVID-19 vaccinations for 12- to 17-year-old in October 2021 to curb infection rates in adolescents [3]. Initially, it was observed that children aged between 5 and 11 years tended to experience asymptomatic infections and a lower rate of severe cases when infected with COVID-19. However, with the emergence and predominance of the Omicron variant, the infection rate has risen substantially in the 5- to 11-year-old group, which was previously ineligible for vaccination. Moreover, serious consequences such as death and multisystem inflammatory syndrome in children have been reported among pediatric patients with severe COVID-19 [3]. Consequently, South Korea began administering COVID-19 vaccines to children aged 5-11 years on March 31, 2022 [4]. High-risk children with underlying medical conditions, such as pediatric diabetes, obesity, and chronic lung disease, are more likely than healthy children to become severely ill with COVID-19, so the KDCA has recommended aggressive vaccination. For healthy children, information about the effectiveness and safety of the vaccines was provided so

that parents could make an autonomous decision about vaccination [4]. However, as of June 5, 2023, only 33,387 Korean children aged 5-11 years had received COVID-19 vaccination, representing a mere 1.1% of the demographic [5]. In contrast, in the United States, 32.9% of children aged 5-11 years had received their primary COVID-19 vaccination, with an additional 4.8% having also received a COVID-19 booster shot [6].

Vaccination is one of the most effective tools among many ways to prevent pandemics [7]. Vaccination against COVID -19 prevents both symptomatic and asymptomatic infections, reduces severity and hospitalization rates among people with COVID-19, and reduces mortality [8]. Children aged 5-11 years, who often gather in groups at daycare centers and elementary schools and who may be less consistent about personal hygiene, are highly susceptible to infectious diseases. Until reaching middle-school age, children typically rely on their parents for health management. As such, vaccinating 5- to 11-year-old against COVID-19 is expected to play a crucial role in decreasing the virus's incidence among this high-risk group. This strategy will also reduce the severity and mortality of COVID-19 in infected children. The Centers for Disease Control and Prevention reported that children in the United States aged 5-11 years who were not vaccinated against COVID-19 were 1.5 times more likely to be hospitalized than those who were vaccinated [9]. A second dose of the COVID -19 vaccine also prevented 84% of pediatric multisystem inflammatory syndrome infections in children aged 5 to 18 years in the United States [10]. However, most children ages 5-11 cannot make the decision to get a COVID-19 vaccine on their own. Parents play a pivotal role in their children's vaccination process, often being the most influential figures in executing such healthcare decisions [11]. Therefore, to understand the low COVID-19 vaccination rates among children aged 5-11 years, it is important to understand parental intentions to vaccinate their children against COVID-19.

Ajzen's theory of planned behavior (TPB), an extension of the theory of reasoned action, posits three determinants of behavioral intention: attitude toward the behavior, subjective norms, and perceived behavioral control [12]. Attitudes, subjective norms, and perceived behavioral control each influence each other and also affect the intention to act, and intention directly affects behavior. Previous research has demonstrated the utility of the TPB in predicting and elucidating specific health behaviors. Notably, the TPB has been used for studies investigating motivations and influencing factors in carrying out vaccinations, including those for human papillomavirus (HPV) and influenza [13,14]. Most studies using the TPB to understand COVID-19 vaccination intentions have focused primarily on adults [15,16]. Investigations into COVID-19 vaccinations for children have largely concentrated on discerning parents' intentions regarding vaccinating their children [17-20]. While previous studies have utilized the TPB to analyze parents' intentions to vaccinate their children against COVID-19 [18,19], these studies targeted parents with offspring younger than 18 and 13 years, respectively, and did not specifically focus on the age group of 5-11 years. Research has been conducted on factors influencing elementary school children's COVID-19 vaccination intentions based on the health belief model [20]. However, other studies [19,21] have found that the TPB is more suitable for predicting COVID-19 vaccination intention than the health belief model, and there is a need for a Korean study to identify, using the TPB, factors affecting parents' intention to vaccinate their children against COVID-19.

We have witnessed a compression of pandemic cycles in the 21st century, with sporadic outbreaks ranging from severe acute respiratory syndrome (SARS) in 2002, to influenza A (H1N1 virus) in 2009, Middle East respiratory syndrome coronavirus (MERS-CoV) in 2015, and most recently, COVID-19 in December 2019 [22]. It is crucial to understand the factors affecting parents' choices regarding COVID-19 vaccinations for their 5- to 11-year-old children. Thus, utilizing TPB as a framework, this study sought to identify the principal variables related to parents' intentions to have their 5- to 11-year-old children vaccinated against COVID-19. The goal was to pinpoint the factors that influence these parental decisions. In doing so, the study aimed to provide primary data to inform nursing practices and strategize responses, not only for COVID-19 but also for potential future pandemics.

METHODS

Ethics statement: This study was approved by the Institutional Review Board (IRB) of Catholic Kwandong University (No. CKU-22-01-0409). Informed consent was obtained from all participants.

1. Study Design

This cross-sectional, descriptive research study used TPB to investigate factors influencing the intentions of parents to have their children aged 5-11 years vaccinated against COVID -19. Figure 1 shows the theoretical framework. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines [23].

2. Participants

The participants of this nationwide study were 298 parents of children between the ages of 5 and 11 years in Korea. The

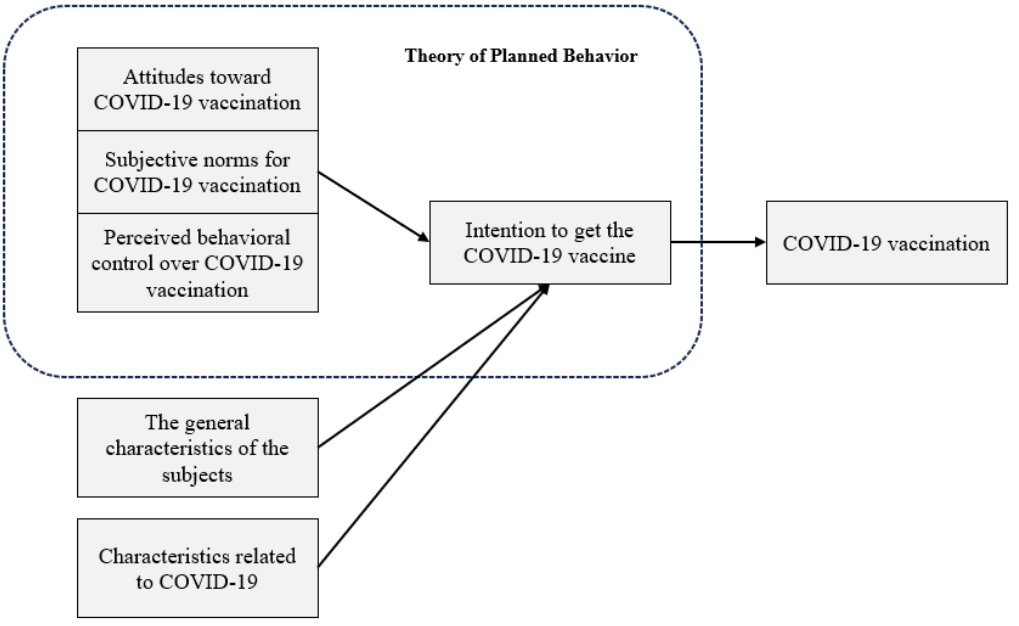

Figure 1. Framework for studying the factors that influence COVID-19 vaccination intention among parents of children aged 5–11 years.

number of participants that would be required was calculated using G*Power version 3.1.9.7, with reference to the National Statistical Office's population ratio by administrative district (si/gun/gu) as of September 2022 [24]. To prevent respondent selection bias, a non-probability quota sampling method was applied. The country was divided into Seoul, Gyeonggi/ Incheon, Chungcheong, Gyeongsang, Jeolla, Gangwon, and Jeju, and data were collected according to the population composition ratio of each region. There were 55 (18.6%) participants from Seoul, 91 (30.5%) from Gyeonggi/Incheon, 34 (11.4%) from Chungcheong, 60 (20.1%) from Gyeongsang, 37 (12.4%) from Jeolla, 15 (5.0%) from Gangwon, and 6 (2.0%) from Jeju. In the F-test regression analysis, a total of 32 independent variables, including eight general characteristic variables, 11 COVID-19 -related characteristic variables, and 13 TPB factor variables, were set as the factors influencing parental COVID-19 vaccination intention. With a significance level of .05, an effect size of .15, and a power of .95, the calculated sample size was 204. This is supported by previous research [25] with similar designs to this study. However, the online questionnaire was distributed 305 people in consideration of the potential dropout rate for a questionnaire-based study. Excluding seven duplicate or incomplete responses, 298 records were used for the final data analysis. The criteria for selecting specific participants were as follows: those with children who were aged 5-11 years and not yet vaccinated against COVID-19; and those who understood the purpose of the study and agreed voluntarily to participate.

3. Study Tools

The questionnaire for this study consisted of general characteristics, COVID-19-related characteristics, attitudes toward COVID-19 vaccination in parents with children aged 5-11 years, subjective norms, perceived behavioral control, and tools to measure vaccination intention. In this study, attitudes, subjective norms, perceived behavioral control, and vaccination intention measures for vaccination of children against COVID-19 were based on a tool developed by Lee [13] to measure female college students' intentions for HPV vaccination. The questionnaire's developer approved the TPB measurement tool used in this study through email in advance, and then the researcher modified it for use in this study. In order to strengthen the validity of the tool, two professors of pediatric nursing who had experience in developing or testing tools were consulted to check the validity of the survey's content.

1) The general and COVID-19-related characteristics of the participants

The participants' general characteristics consisted of age, sex, educational background, occupation, monthly income, religion, and number of children between the ages of 5 and 11 years. Participants' COVID-19-related characteristics included whether and how many doses of COVID-19 vaccine parents had received, whether parents had experienced side effects and symptoms, whether and how many times parents had

been diagnosed with COVID-19, whether and how many times children were diagnosed with COVID-19, and whether they were aware of the availability of a pediatric COVID-19 vaccine for their child. In addition, participants were asked how they knew about the availability of COVID-19 vaccines for their children. Furthermore, for parents who knew their child was eligible for vaccination, we asked why they had not yet vaccinated their child.

2) Attitudes toward COVID-19 vaccination

Attitudes toward COVID-19 vaccination refer to parents' positive or negative evaluation of the concept of their child's COVID-19 vaccination, and an 8-item scale was used to evaluate these attitudes. The tool consisted of 8 pairs of adjectives. "How would I feel about my child having the COVID-19 vaccine?" was measured by the semantic differential scale. This tool was scaled from a negative rating (1 point) to a positive rating (7 points). A higher score indicated a more positive attitude toward the child's COVID-19 vaccination. In Lee's study [13], Cronbach's α was .98; in this study, Cronbach's α was .97.

3) Subjective norms for COVID-19 vaccination

Subjective norms for COVID-19 vaccination refer to the degree to which parents perceived pressure from those around them to vaccinate their child against COVID-19. This tool consisted of 2 items and was measured on a 7-point Likert scale. The two items were "People around me think I will make sure my children are vaccinated against COVID-19" and "People around me wish I had gotten my children vaccinated against COVID-19." Each item ranged from "strongly disagree" (1 point) to "strongly agree" (7 points), with higher scores indicating stronger subjective norms for the child's COVID-19 vaccination. In Lee's study [13], Cronbach's α was .74; in this study, Cronbach's α was .90.

4) Perceived behavioral control over COVID-19 vaccination

Perceived behavioral control of COVID-19 vaccination refers to the degree of difficulty or ease with which parents regard their child's COVID-19 vaccination. This tool consisted of 3 items and was measured on a 7-point Likert scale. The 3 items were "I can have my child vaccinated against COVID-19 in at least 6 months," "It is very difficult for me to have my child vaccinated against COVID-19 within 6 months," and "The decision to have my child vaccinated against COVID-19 is entirely up to me." Each item ranged from "strongly disagree" (1 point) to "strongly agree" (7 points), with higher scores indicating the subject's stronger sense of behavioral control over their child's COVID-19 vaccination. In Lee's study [13], Cronbach's α was .89; in this study, Cronbach's α was .83.

5) Intention to receive the COVID-19 vaccine

COVID-19 vaccination intention refers to parents' degree of willingness to exert effort toward having their children vaccinated against COVID-19. This instrument consisted of 3 items and was measured on a 7-point Likert scale. The 3 items were "I intend to have my child vaccinated against COVID-19," "I will make every effort to make sure my child is vaccinated against COVID-19," and "I have decided to make an effort to have my child vaccinated against COVID-19." Each question ranged from "strongly disagree" (1 point) to "very much so" (7 points), with higher scores indicating firmer intentions for the subject's child's COVID-19 vaccination. In Lee's study [13], Cronbach's α was .97, and in this study it was .97.

4. Data Collection

Data collection was conducted using an online survey (Google Forms; Google LLC) from October 20 to October 26, 2022, and targeted parents of children aged 5-11 years across South Korea. The participants were recruited using an online café (Naver). First, we posted a recruitment announcement on the online café bulletin board that fully explained the purpose and content of the survey, participation in the study, and withdrawal from the survey. An online survey link was sent to those who agreed voluntarily to participate. The questionnaire was automatically set up so that only the required number of participants in each region could respond. Completing the questionnaire took 10-15 minutes. Survey participants were given an online gift certificate.

5. Data Analysis

The collected data were analyzed using IBM SPSS version 26.0 (IBM Corp.). Frequency and percentage were used for general characteristics and COVID-19-related characteristics of the participants, and attitudes, subjective norms, and perceived behavioral controls and intentions of parents of children aged 5-11 years toward their children's COVID-19 vaccination were analyzed in terms of the mean and standard deviation. The t test and analysis of variance were used to analyze differences in attitudes, subjective norms, perceived behavioral control, and intentions toward participants' children's COVID-19 vaccination according to their general characteristics, followed by post-hoc analysis with the Scheffé test. Hierarchical regression analysis was conducted on factors explaining the parents' intentions for their children's COVID-19 vaccination.

RESULTS

1. Whether Parents Knew that Their Children Were Eligible to Have a COVID-19 Vaccine

There were 177 (59.4%) parents who were aware that their child was able to have a COVID-19 vaccine, compared to 121 (40.6%) who were unaware. Of the 177 parents who were aware that their child was eligible to receive a COVID-19 vaccine, internet and social network services constituted the most common media pathway through which they became aware of this information, with 130 (73.4%) responses to this multiple-choice question. When parents who knew their child was eligible for COVID-19 vaccination were asked in a multiple-response item why their child had not yet been vaccinated, 143 (80.8%) reported that the reason was concerns about side effects and adverse events (Table 1).

2. Parents' Attitudes, Subjective Norms, and Perceived Behavioral Control about Having Their Children Vaccinated Against COVID-19

The itemized scores of parents' attitudes, subjective norms, perceived behavioral control, and intention to vaccinate their children against COVID-19 are shown in Table 2.

The mean score for parental attitudes toward having their child vaccinated against COVID-19 was 3.26 out of 7, and that for subjective norms was 3.31 out of 7. Parents' perceived behavioral control over their child's COVID-19 vaccination had a mean score of 3.19±1.25 out of 7, and the mean score for parents' intention to have their child vaccinated was 2.96 out of 7. These findings show that the participants' attitudes, subjective norms, perceived behavioral control, and intention to have their children vaccinated against COVID-19 were all lower than moderate.

3. Differences in Intention to Arrange COVID-19 Vaccination for Children According to Participants' General and COVID-19-related Characteristics

Table 3 shows the differences in vaccination intention for children according to participants' general and COVID-19-related characteristics.

Vaccination intention showed a significant difference according to participants' educational level, with those holding a high-school diploma or lower more likely to express intent (4.02±1.66 points) (F=7.60, p=.001). Employed participants (3.15±1.58 points) were significantly more likely to intend to vaccinate their children than unemployed participants (2.40±1.82 points) (t=3.13, p=.002). A significant difference in intent was also found according to monthly income (F=4.18, p=.003). However, there was no significant difference according to participants' age, sex, religion, or number of children. A stronger intent to vaccinate children was significantly associated with having received only one COVID-19 vaccine (F=5.29, p=.006), not experiencing side effects post-vaccination (t=-4.33, p<.001), having no prior COVID-19 infection (t=-3.95, p<.001), and being unaware of the availability of COVID-19 vaccines for children (t=-7.24, p<.001). Participants whose children had not been infected with COVID-19 had a significantly stronger intent to vaccinate their children (3.26±1.72 points) than those whose children had been infected (2.38±1.41 points).

Table 1. Whether Parents Knew that Their Children Were Eligible to Have a COVID-19 Vaccine (N=298)

Variables	Categories	n (%)
Awareness of the availability of pediatric COVID-19 vaccines for children	Yes	177 (59.4)
	No	121 (40.6)
Media pathways (n=340)[a)]	Newspaper	23 (13.0)
	TV	130 (73.4)
	Radio	9 (5.1)
	Internet, social network services	132 (74.6)
	Promotional flyers	2 (1.1)
	Daycare, preschool, and school announcements	33 (18.6)
	Hospital	10 (5.6)
	Other	1 (0.6)
Reasons for not having their child vaccinated against COVID-19 (n=309)[a)]	Concerns about adverse events and side effects of vaccines	143 (80.8)
	Younger age at vaccination	72 (40.7)
	Poor effectiveness of vaccination	72 (40.7)
	Government quarantine easing	14 (7.9)
	The idea that children are safe from COVID-19 infection	5 (2.8)
	Other	3 (1.7)

[a)]Multiple responses.

Table 2. Parental Attitudes, Subjective Norms, Perceived Behavioral Control, and Intentions to Vaccinate Their Children Against COVID-19 by Items (*N*=298)

Variables	Items	M±SD
Attitudes toward COVID-19 vaccination	How would I feel about my child having the COVID-19 vaccine?	
	1. Bad - Good	3.33±1.66
	2. Harmful - Beneficial	3.16±1.51
	3. Unpleasant - Pleasant	3.26±1.62
	4. Not worthy - Worthy	3.28±1.50
	5. Not important - Important	3.09±1.63
	6. Useless - Necessary	3.33±1.59
	7. Undesirable - Desirable	3.22±1.62
	8. Foolish - Wise	3.41±1.52
	M±SD	3.26±1.45
Subjective norms for COVID-19 vaccination	1. People around me think I will make sure my children are vaccinated against COVID-19	3.40±1.77
	2. People around me wish I had gotten my children vaccinated against COVID-19	3.22±1.65
	M±SD	3.31±1.63
Perceived behavioral control over COVID-19 vaccination	1. I can have my child vaccinated against COVID-19 in at least 6 months	3.07±1.77
	2. It is very difficult for me to have my child vaccinated against COVID-19 within 6 months[a)]	2.53±1.04
	3. The decision to have my child vaccinated against COVID-19 is entirely up to me	3.98±1.42
	M±SD	3.19±1.25
Intention to receive the COVID-19 vaccine	1. I intend to have my child vaccinated against COVID-19	3.07±1.81
	2. I will make every effort to make sure my child is vaccinated against COVID-19	2.86±1.62
	3. I have decided to make an effort to have my child vaccinated against COVID-19	2.97±1.74
	M±SD	2.96±1.67

[a)]Reverse question; M, mean; SD, standard deviation.

4. Factors Influencing the Intention of Participants to Arrange COVID-19 Vaccination for Their Children

Table 4 shows the results of the hierarchical regression analysis to identify the factors influencing participants' intentions to arrange COVID-19 vaccination for their children.

Among the general characteristics of the participants, significant differences in vaccination intention were found according to educational background and monthly income. The COVID-19-related characteristics that showed significant associations were the number of COVID-19 vaccinations, the presence or absence of side effects, presence or absence of a confirmed infection, the presence or absence of a confirmed infection in children, and awareness that children can be vaccinated against COVID-19. Hierarchical regression analysis was performed with those variables included as independent variables and vaccination intention as the dependent variable. Nominal variables such as educational level, monthly income, number of vaccinations, side effects, the presence of a confirmed infection in children, and awareness of whether children could receive COVID-19 vaccination were treated as dummy variables and analyzed.

Before conducting the regression analysis to identify factors influencing vaccination intention, the tolerance limits and variance inflation factor (VIF) were reviewed to confirm the absence of multicollinearity. The tolerance limits ranged from 0.25 to 0.98 (i.e., within the recommended range from 0.1 to 1.0), and the VIF ranged from 1.02 to 3.97 (i.e., not exceeding 10), so there was no problem with multicollinearity. The Durbin-Watson test value was 1.84 (i.e., close to 2), indicating that there was no problem with autocorrelation.

In model Ⅰ, the general and COVID-19-related variables were included as control variables as factors potentially influencing vaccination intention. Model I showed an explanatory power of 31%. In model II, variables of the theory of deliberate action, such as attitude, subjective norm, and perceived behavioral control, were added to model I, and the regression analysis showed significant results for perceived behavioral control (β=.40, $p<.001$), attitude (β=.37, $p<.001$), and subjective norms (β=.20, $p<.001$). A significant result was also found for unawareness that children could be vaccinated against COVID-19 (β=.07, $p=.016$). Model Ⅱ had a 58% increase in explanatory power over model I; thus, overall the model had 89% explanatory power (F=144.87, $p<.001$).

DISCUSSION

This study aimed to identify the factors influencing parents' intentions to vaccinate their children aged 5-11 years against COVID-19 through a TPB-based analysis. The goal was to pro-

Table 3. Comparison of Parents' Intentions to Vaccinate Their Children against COVID-19 by General and COVID-19-Related Characteristics (*N*=298)

Variables		Categories	n (%)	M±SD	t or F	*p*	Scheffé
General characteristics	Age (year)	20–29	7 (2.4)	2.29±1.27	1.00	.368	
		30–39	189 (63.4)	3.05±1.71			
		40–49	102 (34.2)	2.86±1.61			
	Sex	Male	81 (27.2)	3.20±1.49	1.50	.134	
		Female	217 (72.8)	2.88±1.73			
	Educational level	High school[a]	19 (6.4)	4.02±1.66	7.60	.001	a > b, c
		College & University[b]	256 (85.9)	2.97±1.65			
		Graduate school[c]	23 (7.7)	2.04±1.36			
	Employment status	Working	225 (75.5)	3.15±1.58	3.13	.002	
		Not working	73 (24.5)	2.40±1.82			
	Monthly income (10,000 KRW)	<200	10 (3.4)	2.73±1.85	4.18	.003	
		200–299	40 (13.4)	3.37±1.51			
		300–399	84 (28.2)	2.76±1.59			
		400–499	88 (29.5)	3.41±1.78			
		≥500	76 (25.5)	2.50±1.55			
	Religion	Protestant	66 (22.1)	2.95±1.85	0.06	.980	
		Catholic	26 (8.7)	2.96±1.64			
		Buddhist	19 (6.4)	3.12±1.70			
		None	187 (62.8)	2.95±1.62			
	Number of children	1	243 (81.5)	3.02±1.67	1.60	.203	
		2	50 (16.8)	2.63±1.56			
		3	5 (1.7)	3.67±2.55			
COVID-19-related characteristics	Parental characteristics						
	COVID-19 vaccination	Yes	205 (68.8)	2.98±1.71	0.25	.803	
		No	93 (31.2)	2.93±1.59			
	COVID-19 vaccination (times) (n=205)	1st[a]	8 (3.9)	4.50±1.23	5.29	.006	a > b, c
		2nd[b]	109 (52.2)	3.13±1.63			
		≥3rd[c]	88 (42.9)	2.66±1.75			
	Experience of side effects (n=205)	Yes	72 (35.1)	2.36±1.32	-4.33	<.001	
		No	133 (64.9)	3.32±1.80			
	Diagnosed with COVID-19	Yes	115 (38.6)	2.51±1.50	-3.95	<.001	
		No	183 (61.4)	3.25±1.71			
	Diagnosed with COVID-19 (times) (n=115)	1st	110 (95.7)	2.55±1.51	1.28	.202	
		2nd	5 (4.3)	1.67±1.03			
	Awareness that availability of a pediatric COVID-19 vaccine for children	Yes	177 (59.4)	2.43±1.49	-7.24	<.001	
		No	121 (40.6)	3.75±1.61			
	Children's characteristics						
	Diagnosed with COVID-19	Yes	100 (33.6)	2.38±1.41	-4.69	<.001	
		No	198 (66.4)	3.26±1.72			
	Diagnosed with COVID-19 (times) (n=100)	1st	95 (95.0)	2.40±1.41	0.51	.609	
		2nd	5 (5.0)	2.07±1.48			

KRW, South Korean won; M, mean; SD, standard deviation.

Table 4. Factors Influencing COVID-19 Vaccination Intention among Parents

Variables	Model I					Model II					
	B	SE	β	t	*p*	B	SE	β	t	*p*	VIF
General characteristics & COVID-19-related characteristics											
(Constant)	1.39	0.26		5.37	< .001	-1.10	0.13		-8.43	< .001	
Educational level (high school)[a]	1.17	0.41	.17	2.89	.004	0.16	0.17	.02	0.95	.342	1.07
Employment status (working)[b]	0.74	0.23	.19	3.21	.002	0.15	0.09	.04	1.55	.124	1.08
Monthly income (400–499)[c]	0.16	0.23	.04	0.69	.489	-0.14	0.09	-.04	-1.46	.147	1.04
COVID-19 vaccination (times) (1st)[d]	0.47	0.55	.05	0.86	.393	0.12	0.22	.01	0.55	.584	1.10
Experience of side effects (no)[e]	0.50	0.23	.14	2.24	.026	0.05	0.09	.01	0.56	.578	1.17
Diagnosed with COVID-19 (no)[f]	0.05	0.27	.01	0.18	.861	0.03	0.11	.01	0.23	.815	1.88
Awareness that availability of a pediatric COVID-19 vaccine for children (no)[g]	1.26	0.25	.34	5.00	< .001	0.26	0.11	.07	2.43	.016	1.47
Diagnosed with COVID-19 (children) (no)[h]	0.32	0.28	.09	1.12	.263	0.06	0.11	.02	0.53	.596	1.96
Theory of planned behavior											
Attitudes toward COVID-19 vaccination						0.45	0.06	.37	7.93	< .001	3.97
Subjective norms for COVID-19 vaccination						0.20	0.04	.20	5.09	< .001	2.61
Perceived behavioral control over COVID-19 vaccination						0.52	0.06	.40	9.59	< .001	3.08
R^2	.31					.89					
Adj R^2	.28					.89					
ΔR^2	.31					.58					
F (*p*)	10.94 (< .001)					144.87 (< .001)					
Δ F	10.94					347.33					

[a]Dummy variables (Ref. graduate school); [b]Dummy variables (Ref. not working); [c]Dummy variables (Ref. ≥500); [d]Dummy variables (Ref. ≥3rd); [e]Dummy variables (Ref. yes); [f]Dummy variables (Ref. yes); [g]Dummy variables (Ref. yes); [h]Dummy variables (Ref. yes); SE, standard error; VIF, variance inflation factor.

vide primary data to improve the pediatric COVID-19 vaccination rate.

The study found that parents' attitudes, subjective norms, and perceived behavioral control towards their children's COVID-19 vaccination were significantly influential factors. These factors accounted for 89% of the explained variance in vaccination intention. These results are consistent with the study of Zhang et al. [18], which found that parental attitudes, subjective norms, and perceived behavioral control affected children's COVID-19 vaccination intentions. Similarly, Li et al. [19] showed that attitudes and subjective norms had significant effect on vaccination intentions, with an explanatory power of 73.9%. The findings of Zhou et al. [26] are also partially consistent with the current study.

In this study, perceived behavioral control had the strongest influence on parental vaccination intention. A study by Zhou et al. [26] also reported that perceived behavioral control, rather than attitudes, had a higher effect on parents' intention to vaccinate their children. However, the study participants scored below the midpoint (3.19 out of 7 points) on perceived behavioral control, which indicates the perceived ease or difficulty of vaccination. To improve this, it would be necessary to address difficulties that parents may encounter when planning to vaccinate their children against COVID-19. Simplifying the vaccination scheduling procedure, improving access to vaccines, and preparing parental leave systems nationally could contribute to this effort. However, this study did not identify the actual factors that affected parents' perceived behavioral control for having their children vaccinated against COVID-19. Therefore, follow-up studies are needed in the future.

The study found that participants' attitudes towards COVID-19 vaccination were the second most influential factor on vaccination intention. A previous study [19] has identified parental attitudes toward having their children vaccinated against COVID-19 as the most significant factor affecting parents' intentions to have their children vaccinated against COVID-19. However, the attitude score was also lower than the midpoint

(3.26 out of 7 points), indicating the need for ongoing education on the scientifically proven benefits of COVID-19 vaccination.

Subjective norms were the third most influential among the factors examined. No previous studies identified subjective norms as affecting the intention to receive the COVID-19 vaccine. In a previous study that investigated the intention of mothers with boys in elementary school to arrange HPV vaccination for their children, it was observed that vaccination intention was affected by the parents' subjective norms regarding vaccination [27], which is consistent with the results of this study. However, the subjective norm score of the current study's participants was 3.31 out of 7 points, lower than the midpoint. To raise subjective norms, ongoing support from family members and society for COVID-19 vaccination is needed. Therefore, accurate information on the importance of pediatric COVID-19 vaccination needs to be disseminated to foster a supportive social atmosphere.

Notably, the intent of the participants to vaccinate their children against COVID-19 was lower than the midpoint (2.96 out of 7 points). Parents have a stronger influence on their children's vaccination status than anyone else in their children's lives, and it is important to understand their intentions to have their children vaccinated against COVID-19. Several previous studies [19,28] have also found that parents' intentions to vaccinate their children against COVID-19 were low. A study in Hong Kong [19] found that parents' intention to vaccinate their children against COVID-19 was 1.55 out of 5, and in the United States, 40.6% of parents with children aged 5-11 years refused to vaccinate their children against COVID-19 [28]. In the present study, of the 177 parents who knew their child was available for a COVID-19 vaccine, 80.8% responded (to a multiple-response item) that they did not vaccinate their child because of adverse events and side effects. In previous studies, a high percentage of parents expressed similar concerns as a primary reason for their low intent to vaccinate their children [29,30].

Parents need to be provided with accurate information about the risks and side effects of COVID-19 vaccination, which is why it is important to communicate scientific and systematic information about COVID-19 vaccines. However, information about COVID-19 can be distorted or biased depending on the method of communication and the type of media used. Interestingly, parents who were aware that children could be vaccinated against COVID-19 had a significantly lower intention to vaccinate, possibly due to inadequate or one-sided information about vaccination campaigns [30,31]. The study also found that awareness of the availability of COVID-19 vaccines for children affected parents' intentions to have their children vaccinated against COVID-19. Parents who were aware of the availability of COVID-19 vaccines for children had lower intentions to have their children vaccinated than those who were not (Table 1). This could have resulted from improperly executed campaigns to encourage COVID-19 vaccination. One-way information and messaging about the COVID-19 vaccine can often create fear or resistance in recipients [30]. In a previous study [30], the intention to have their child vaccinated against COVID-19 was 5.88 out of 10 for parents who received information about COVID-19 vaccines from the internet, compared to 6.21 out of 10 for parents who obtained information about COVID-19 vaccines from non-internet sources. In this study, when asked to provide multiple responses to the media of awareness of the availability of COVID-19 vaccines for children, 74.6% of parents reported that they obtained information about COVID -19 vaccines from the internet and social network services (Table 1). Parents may have been exposed to biased information about COVID-19 vaccines, resulting in lower intentions to have their children vaccinated against COVID-19. Therefore, it is crucial to maintain a reliable single communication system for accurate information delivery and to educate parents to be cautious of unverified information about COVID-19 vaccination on the internet or social media [32].

On May 5, 2023, about 3 years and 4 months after the COVID-19 pandemic was declared, the WHO declared COVID -19 an endemic disease [33]. However, endemicity does not mean the end of SARS-CoV-2, and since it can recur annually like the flu, COVID-19 quarantines and the response of the healthcare system will continue. Based on the factors that this study has identified which affect parents' intentions to vaccinate their children against COVID-19, systematic education about the safety and long-term effects of vaccines should be delivered through a reliable communication system. Such efforts may extend to other types of vaccination and contribute to overcoming future pandemics.

Finally, the sample population of this study may not be fully representative, since its research participants were recruited through online cafes. The results may reflect online communities' group tendencies. Furthermore, due to the limitations of online surveys, there was no way to verify that the respondents actually belonged to the intended study population. Hence, the findings may not be generalizable and should be interpreted with caution.

CONCLUSION

This study used the TPB to analyze the survey responses of 298 parents of children aged 5-11 years across South Korea to identify the factors influencing their vaccination intention regarding COVID-19.

In this study, the COVID-19 vaccination intention of parents of children aged 5-11 years old was investigated using the TPB, and the factors significantly affecting vaccination intention were identified. In the future, to clarify these factors, it is necessary to conduct more research on parents' vaccination intention regarding illnesses other than COVID-19 that affect children. In addition, parents should be provided with a variety of educational opportunities about the vaccines available for their children, and public outreach should be conducted to ensure that accurate information is communicated. In light of parents' significant concerns about vaccine side effects, it is important to continue to provide accurate information about vaccination by establishing a trusted communication system.

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Conflict of interest

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Data availability

Please contact the corresponding author for data availability.

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REFERENCES

1. World Health Organization (WHO). Coronavirus disease (COVID-19) pandemic [Internet]. 2022 [cited 2022 October 12]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019
2. Korea Disease Control and Prevention Agency. Cases of COVID-19 in Korea [Internet]. 2023 [cited 2023 June 5]. Available from: https://ncov.kdca.go.kr/bdBoardList_Real.do?brdId=1&brdGubun=11&ncvContSeq=&contSeq=&board_id=&gubun
3. Choe YJ, Lee YH, Choi JH. Delphi survey for COVID-19 vaccination in Korean children between 5 and 11 years old. Pediatric Infection & Vaccine. 2022;29(1):37-45. https://doi.org/10.14776/piv.2022.29.e6
4. Korea Disease Control and Prevention Agency. Primary vaccination for children (5-11 years old) [Internet]. 2022 [cited 2022 October 12]. Available from: https://ncov.kdca.go.kr/tcmBoardView.do?brdId=3&brdGubun=31&dataGubun=&ncvContSeq=6513&contSeq=6513&board_id=312&gubun=BDJ
5. Korea Disease Control and Prevention Agency. Vaccinations by age [Internet]. 2023 [cited 2023 June 5]. Available from: https://ncv.kdca.go.kr/allAgerateStatus.es?mid=a11718000000
6. Centers for Disease Control and Prevention (CDC). Trends in demographic characteristics of people receiving COVID-19 vaccinations in the United States [Internet]. 2023 [cited 2023 June 5]. Available from: https://covid.cdc.gov/covid-data-tracker/#vaccination-demographics-trends
7. Choi EK. Ethical debates surrounding the development of vaccines during COVID-19 pandemic. Bio, Ethics and Policy. 2020;4(2):1-18. https://doi.org/10.23183/konibp.2020.4.2.001
8. Choi WS. Comprehensive understanding and field application of COVID-19 vaccine. Korean Journal of Medicine. 2021;96(3):155-159. https://doi.org/10.3904/kjm.2021.96.3.155
9. Centers for Disease Control and Prevention (CDC). Rates of laboratory-confirmed COVID-19 hospitalizations by vaccination status [Internet]. 2022 [cited 2022 October 12]. Available from: https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalizations-vaccination
10. Zambrano LD, Newhams MM, Olson SM, Halasa NB, Price AM, Orzel AO, et al.; Overcoming COVID-19 Investigators. BNT162b2 mRNA vaccination against Coronavirus disease 2019 is associated with a decreased likelihood of multisystem inflammatory syndrome in children aged 5-18 years-United States, July 2021 - April 2022. Clinical Infectious Diseases. 2023;76(3):e90-e100. https://doi.org/10.1093/cid/ciac637
11. Hockenberry MJ, Rodgers CC, Wilson D. Study guide for Wong's essentials of pediatric nursing. 11th ed. Elsevier; 2021. p. 399-418.
12. Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes. 1991;50(2):179-211.

https://doi.org/10.1016/0749-5978(91)90020-T
13. Lee KE. Factors associated with intention to receive human papillomavirus vaccine in undergraduate women: an application of the theory of planned behavior. Journal of Korean Academy of Fundamentals of Nursing. 2014;21(4):457-465. https://doi.org/10.7739/jkafn.2014.21.4.457
14. You J, Yang J. Factors influencing influenza vaccination intention among health personnel in general hospitals: an application of the theory of planned behavior. Research in Community and Public Health Nursing. 2021;32(2):175-185. https://doi.org/10.12799/jkachn.2021.32.2.175
15. Hayashi Y, Romanowich P, Hantula DA. Predicting intention to take a COVID-19 vaccine in the United States: application and extension of theory of planned behavior. American Journal of Health Promotion. 2022;36(4):710-713. https://doi.org/10.1177/08901171211062584
16. Servidio R, Malvaso A, Vizza D, Valente M, Campagna MR, Iacono ML, et al. The intention to get COVID-19 vaccine and vaccine uptake among cancer patients: an extension of the theory of planned behaviour (TPB). Supportive Care in Cancer. 2022;30(10):7973-7982. https://doi.org/10.1007/s00520-022-07238-5
17. Rane MS, Robertson MM, Westmoreland DA, Teasdale CA, Grov C, Nash D. Intention to vaccinate children against COVID-19 among vaccinated and unvaccinated US parents. JAMA Pediatrics. 2022; 176(2):201-203. https://doi.org/10.1001/jamapediatrics.2021.5153
18. Zhang KC, Fang Y, Cao H, Chen H, Hu T, Chen YQ, et al. Parental acceptability of COVID-19 vaccination for children under the age of 18 years: cross-sectional online survey. JMIR Pediatrics and Parenting. 2020;3(2):e24827. https://doi.org/10.2196/24827
19. Li JB, Lau EYH, Chan DKC. Why do Hong Kong parents have low intention to vaccinate their children against COVID-19? Testing health belief model and theory of planned behavior in a large-scale survey. Vaccine. 202;40(19):2772-2780. https://doi.org/10.1016/j.vaccine.2022.03.040
20. Heo BG, Lee HY, Kim JJ, Jeong MU, Ha Y. Factors associated intention of mothers regarding COVID-19 vaccination for elementary school students based on the health belief model. Journal of the Korean Society of School Health. 2022;35(1):22-30. https://doi.org/10.15434/kssh.2022.35.1.22
21. Hossain MB, Alam MZ, Islam MS, Sultan S, Faysal MM, Rima S, et al. Health belief model, theory of planned behavior, or psychological antecedents: what predicts COVID-19 vaccine hesitancy better among the Bangladeshi adults? Frontiers in Public Health. 2021;9:711066. https://doi.org/10.3389/fpubh.2021.711066
22. Kim Y. Strategies for pediatric nursing in the post-COVID-19 era. Child Health Nursing Research. 2022;28(4):231-233. https://doi.org/10.4094/chnr.2022.28.4.231
23. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Medicine. 2007;4(10):e296. https://doi.org/10.1371/journal.pmed.0040296
24. Korean Statistical Information Service. Population ratio by administrative district [Internet]. 2022 [cited 2022 October 12]. Available from: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1B040A3
25. Park JY, Ha J. Factors influencing the COVID-19 vaccination intentions in nurses: Korea, February 2021. Journal of Korean Academy of Nursing. 2021;51(5):537-548. https://doi.org/10.4040/jkan.21110
26. Zhou M, Liu L, Gu SY, Peng XQ, Zhang C, Wu QF, et al. Behavioral intention and its predictors toward COVID-19 booster vaccination among Chinese parents: applying two behavioral theories. International Journal of Environmental Research and Public Health. 2022;19(12):7520. https://doi.org/10.3390/ijerph19127520
27. Park EY, Kim TI. Factors influencing mothers' intention to vaccinate their elementary school sons against human papillomavirus. Korean Journal of Women Health Nursing. 2020;26(1):37-48. https://doi.org/10.4069/kjwhn.2020.03.07
28. Szilagyi PG, Shah MD, Delgado JR, Thomas K, Vizueta N, Cui Y, et al. Parents' intentions and perceptions about COVID-19 vaccination for their · children: results from a national survey. Pediatrics. 2021;148(4):e2021052335. https://doi.org/10.1542/peds.2021-052335
29. Horiuchi S, Sakamoto H, Abe SK, Shinohara R, Kushima M, Otawa S, et al. Factors of parental COVID-19 vaccine hesitancy: a cross sectional study in Japan. PLoS One. 2021;16(12):e0261121. https://doi.org/10.1371/journal.pone.0261121
30. Babicki M, Pokorna-Kałwak D, Doniec Z, Mastalerz-Migas A. Attitudes of parents with regard to vaccination of children against COVID-19 in Poland. A nationwide online survey. Vaccines (Basel). 2021;9(10):1192. https://doi.org/10.3390/vaccines9101192
31. Jones AM, Omer SB, Bednarczyk RA, Halsey NA, Moulton LH, Salmon DA. Parents' source of vaccine information and impact on vaccine attitudes, beliefs, and nonmedical exemptions. Advances in Preventive Medicine. 2012;2012:932741. https://doi.org/10.1155/2012/932741
32. Park SY. Pediatric vaccination of COVID-19 vaccine: what should we prepare? Bio, Ethics and Policy. 2021;5(2):29-48. https://doi.org/10.23183/konibp.2021.5.2.002
33. World Health Organization (WHO). Statement on the fifteenth meeting of the IHR (2005) Emergency Committee on the COVID-19 pandemic [Internet]. 2023 [cited 2023 June 5]. Available from: https://www.who.int/news/item/05-05-2023-statement-on-the-fifteenth-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-coronavirus-disease-(covid-19)-pandemic