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RESEARCH ARTICLE

Approach to COVID-19 vaccine hesitancy based on some psychological symptoms and attachment theory: A web-based community survey

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ABSTRACT

Objective: The aim of this study is to investigate the effects of psychiatric symptoms such as anxiety, obsession, hostility, and attachment styles, which may be associated with COVID-19 vaccine hesitancy.

Method: A total of 504 adult participants were included in the study. The sociodemographic data form, including questions on information about participants' COVID-19 infection history and concerns about COVID-19 vaccines, was filled out by the participants. The participants were evaluated with the anxiety, obsessive–compulsive disorder (OCD), hostility, and paranoid ideation subscales of the Symptom Checklist – Revised 90 scale and the Adults Attachment Style Scale (AASS). The participants were divided into three groups: "vaccinated group (VG)," "nonvaccinated but intend to get vaccinated group (IGV)," and "nonvaccinated group and not intend to get vaccinated group (NIGV)."

Results: The mean score of the AASS secure subscale was higher (p=0.009), while the SCL-90 anxiety subscale was lower (p=0.003) in the NIGV group. The mean score of the SCL-90 OCD subscale in the NIGV group was lower than that in the IGV group (p=0.040). Regression analysis showed that concerns about the safety of vaccines (OR: 140, p<0.001) and having secure attachment style (OR: 1.787, p=0.019) increase the intention to not be vaccinated. However, it was found that high anxiety scores decreased the intention not to be vaccinated (OR: 0.966, p=0.035).

Conclusion: The findings of the current study indicate that secure attachment style and clinical psychiatric entities such as anxiety and obsession were effective on vaccine hesitancy. However, this interaction needs to be interpreted carefully in the context of the perceived level of COVID-19 threat, more detailed information about the safety and necessity of vaccines, the relationship of individuals with their social environment, and the predominance of vaccine hesitancy in their social environment.

Keywords: Vaccine hesitancy, adult attachment, anxiety, obsessive–compulsive behavior, COVID-19

INTRODUCTION

The novel coronavirus, severe acute respiratory syndrome coronavirus 2 has caused more than 5 million deaths since the start of the pandemic. Despite the continued efforts of researchers, an effective drug for COVID-19 has not yet been found. However, vaccines are known to reduce the devastating effects of infectious diseases (1). The COVID-19 pandemic is expected to be brought under control with the development of a safe and effective vaccine. Currently, there are approximately 300 candidate vaccines formulated against COVID-19, of which more than 70 have entered clinical evaluation (2).

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Achieving widespread immunization with the COVID-19 vaccine involves challenges such as mass production, global distribution, and cost issues (3). Additionally, vaccine hesitancy seems to be a serious obstacle. In 2019, the World Health Organization reported that vaccine hesitancy – the reluctance or refusal to be vaccinated despite the availability of vaccines – is among the top 10 public health threats (4). A cross-sectional, population-based online survey to evaluate the willingness or hesitancy toward the COVID-19 vaccine among the Chinese population reported that 27% were hesitant while 9% were resistant toward accepting the COVID-19 vaccination (5). In a study conducted just before the mass vaccination program in Turkiye, 29.2% of the general population was willing to be vaccinated, 19.0% unwilling, and 51.8% undecided (6–8).

Knowing the attitudes of individuals toward COVID-19 vaccines as well as the underlying causes of vaccine hesitancy in the general population is essential for combating the pandemic and for public health overall (9). A recent literature review demonstrated that the most common reasons that contributed to COVID-19 vaccine acceptance, hesitancy, or refusal were related to perceived risks and benefits, as well as sociodemographic factors such as age, gender, education level, race, and ethnicity (10).

The attachment theory suggests that attachment patterns developed in the early stages of life are important in determining an individual's social–emotional competence at later stages (11). Attachment styles have been shown to influence participants' level of trust and satisfaction with physicians as well as their perceptions and behavior toward health care providers (12). Considering that attachment styles have a decisive effect on organized behavior and coping with stress, especially during stressful periods of life (13), it has the potential to have an impact on vaccine decisions during this unprecedented uncertainty of the pandemic. To the best of our knowledge, there is solely one study examining the relationship between attachment style and vaccine hesitancy (14). The aim of the present study is to examine the relationship between vaccine hesitancy and attachment style as well as psychiatric clinical symptoms related to attachment. At the initial stage of the study, we hypothesized that individuals with high anxious/ambivalent attachment, high anxiety and obsession scores, and low secure attachment scores would avoid being vaccinated.

METHOD

Participants and Sample Size

A total of 504 adult participants were recruited for the study. Participants were reached via online communication applications, which included an announcement on the social media accounts of the research team and the sharing of the study with relatives of students at the relevant institute between August 2021 and October 2021. The criteria for recruitment included age of 18 years and above, voluntary participation, and answering all questions in the questionnaires provided. Participants who were under 18 years old, over 70 years old, diagnosed with schizophrenia or bipolar affective disorder, illiterate, and doctors or nurses were not included in the study. The sample size was calculated by evaluating the effect size as 0.25, α-err as 0.05, and power as 0.85 with G Power of 3.1.9.

Ethical Approval

The Turkish Ministry of Health, General Directorate of Health Services, approved the study protocol (Approval Number: 2021-08-17T20_12_13). The local Ethics Committee on human research also approved the study (IRB Date/Number: 03.09.2021/2021-3394).

Data Collection Tools

Sociodemographic Data Form

A personal information form was created to obtain demographic information about the participants. The form included questions about age, education level, income level, occupation, and information about the participants' COVID-19 infection history. Therewithal, a dichotomized question was asked whether the participants had been vaccinated with any COVID-19 vaccine. However, there was also a dichotomized item in the form that questioned whether the participants intended to get vaccinated.

Symptom Checklist – Revised 90 (SCL-90-R)

The Symptom Checklist is a 90-item measurement tool that determines the level of various self-reported psychological symptoms in individuals and to which areas they have spread. For each question, the scale gives a 5-point measurement option by marking (0) "not at all," (1) "very little," (2) "moderately," (3) "quite a lot," and (4) "extremely." The scale has 9 subscales that include somatization (SOM), obsessive–compulsive (O–C), interpersonal sensitivity (INT), depression,

Table 1: Comparison of sociodemographic variables and data on COVID-19 infection of vaccinated and unvaccinated groups

	Vaccinated group (n=392)		Unvaccinated group (n=112)		z/χ^2	p
	n	%	n	%		
Age (median)	31.2±11.8(26)		29.6±8.9 (27)		-0.044	0.965
Gender					1.733	0.188
Female	244	62.2	62	55.4		
Male	148	37.8	50	44.6		
Education level					0.313	0.576
High school or below	68	17.3	22	19.6		
University and above	324	82.7	90	80.4		
Marital status					2.132	0.144
Single	223	56.9	55	49.1		
Married	169	43.1	57	50.9		
Having children						
Yes	152	38.8	49	43.8	0.899	0.343
Number of children	0.83±1.19		0.92±1.19		0.690	0.490
Occupational status					1.002	0.317
Employed	182	46.4	58	51.8		
Unemployed	210	53.6	54	48.2		
Occupation					4.936	0.085
Housewife	32	8.2	17	15.2		
Student	128	32.7	35	31.2		
Others	232	59.2	60	53.6		
Level of income					0.061	0.805
5000 TL or below	250	63.8	70	62.5		
5000 TL and above	142	36.2	42	37.5		
History of COVID-19 infection						
Yes	106	27	49	43.8	11.421	<0.001*
History of COVID-19 infection in a close relative						
Yes	200	51	68	60.7	3.288	0.070
Death due to COVID-19 infection in close relative						
Yes	12	3.1	1	0.9	1.630	0.202
Hospitalization due to severe COVID-19 infection						
Yes	4	3.7	0	0	1.842	0.175
Change in income					0.297	0.586
Unchanged or increased	248	63.3	74	66.1		
Reduction	144	36.7	38	33.9		

*: P<0.05; Chi-squared and Mann–Whitney U tests were used.

anxiety (ANX), anger–hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR), and psychotism (PSY) scores. A Turkish validity and reliability study was conducted by Kiliç (15). Only the O–C, ANX, HOS, and PAR subscales of SCL-90-R were used in the present study.

Adults Attachment Style Scale (AASS)

This scale consists of 2 parts. The first section, developed by Hazan and Shaver, consists of 3 different statements, each of which is used to classify adults as secure, anxious/ambivalent, and avoidant, and includes definitions of childhood parental

relationship characteristics and general behavioral characteristics. The second part of the scale consists of 15 items, each of which is scored between 1 and 7. Each attachment style is represented by 5 items, and the score obtained determines the attachment style of the individual. The Turkish validity and reliability study was conducted by Kesebir et al. (16).

Procedure

The study was carried out with online questionnaires. Before the scales were presented online, an informed consent form was presented to the participants, and the participants who volunteered by approving the form were included in the study. The participants were divided into 3 groups: "vaccinated (VG)," "nonvaccinated but intend to get vaccinated (IGV)," and "nonvaccinated and not intend to get vaccinated (NIGV)." Considering the previous community-based COVID-19 vaccine studies, it was predicted that 20%–30% of the individuals who participated in the current study would be unvaccinated.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) for Windows version 16.0 (SPSS, Inc., Chicago, IL, USA) was used to assess the data acquired from our study. Descriptive variables were reported as mean±SD, median (range), number (n), and percentage. To evaluate whether the variables had a normal distribution, visual (histogram and probability graphs) and analytical (Kolmogorov–Smirnov and Shapiro–Wilk) tests were conducted. The sociodemographic data, Attachment Style scores, and Symptom Checklist scores of the vaccinated and nonvaccinated groups were compared with appropriate statistical analyses related to the research hypotheses. Student's t-test was used to compare parametric numerical data. The Chi-squared test was used to compare categorical data between two independent groups, while Pearson's correlation analysis was used to examine the correlation between AASS scores and SCL-90-R subscale scores. A one-way ANOVA test was used to compare parametric numerical data between three independent groups. For one-way ANOVA, homogeneity was determined with Levene's Statistic test, and Tukey's test was applied if the data showed homogeneous distribution. The factors affecting vaccine hesitancy were then examined by creating logistic regression models using enter model. For statistical significance, a total type-1 error level of 5% was used.

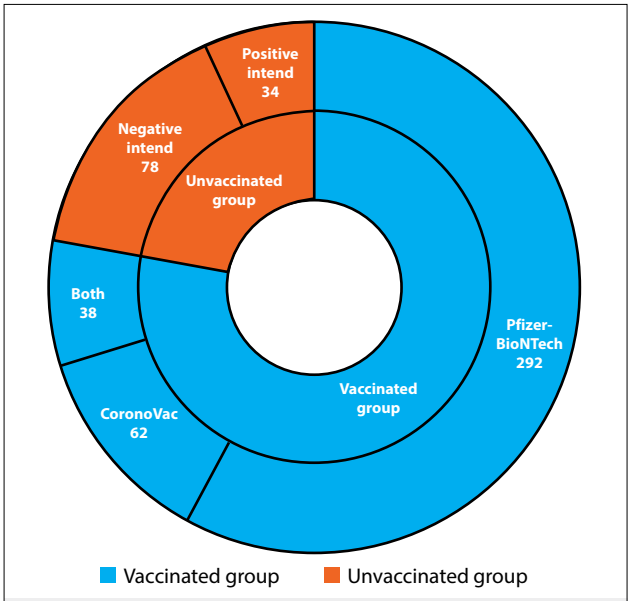

Figure 1. Rates of vaccination and intention to be vaccinated.

RESULTS

Descriptive Statistics

A comparison of the sociodemographic variables and data on COVID-19 infection of the study groups is shown in Table 1. While 392 (77.8%) participants were vaccinated against COVID-19, 112 (22.2%) participants had not yet been vaccinated. The proportion of participants with a history of COVID-19 in the unvaccinated group was found to be significantly higher (χ^2=11.421, p<0.001).

Among the participants who were vaccinated, 292 (74.5%) individuals had been vaccinated with the BioNTech vaccine, 62 (15.8%) with the CoronaVac vaccine, and 38 (9.7%) participants had received a combination of both vaccines. In the unvaccinated group, 78 (69.6%) participants reported that they absolutely did not intend to be vaccinated, while 34 (30.4%) participants reported that they were considering getting vaccinated (Fig. 1). Of the total participants, 101 stated that "the vaccine is not safe," 40 stated that the "vaccine is for commercial purposes," and 23 stated that "COVID-19 infection is not a fatal disease." The distribution of the participants' concerns about the vaccine is shown in Figure 2.

Comparison of AASS and SCL-90 Scores between the Vaccinated and Unvaccinated Groups

No statistically significant difference was found in the mean AASS and SCL-90 subscale scores between the vaccinated and unvaccinated groups. Next, according

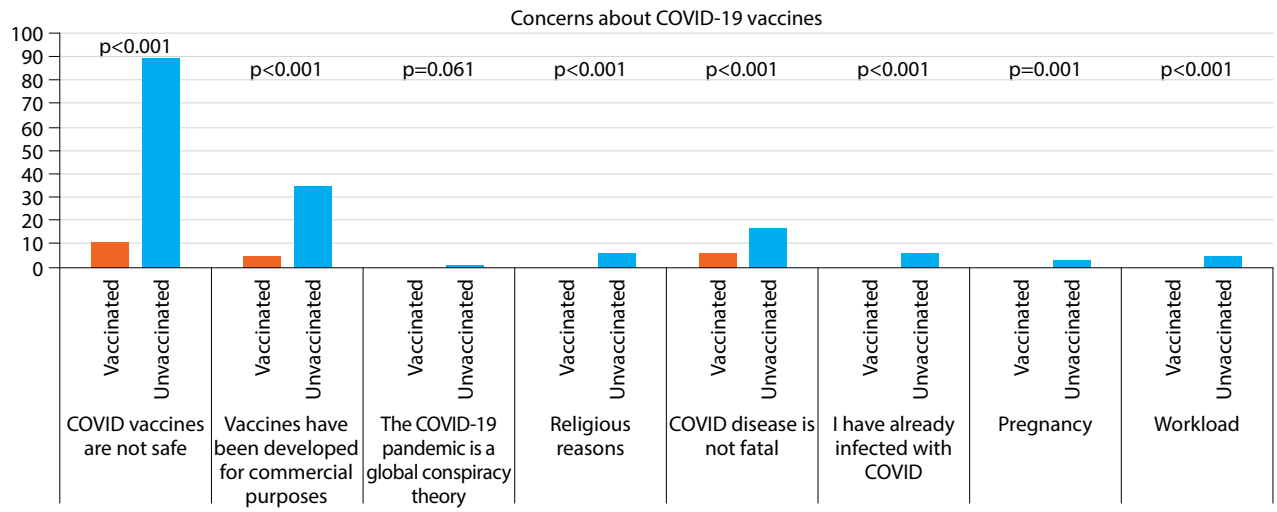

Figure 2. Distribution of the participants' concerns about the vaccine.

Table 2: Comparison of AASS and SCL-90 scores of vaccinated, IGV, and NIGV groups (Mean±SD)

	Vaccinated group (n=392)	IGV (n=4)	NIGV (n=78)	F/χ^2	p
AASS avoidant	3.20±1.51	3.52±1.76	2.85±1.58	2.593	0.076
AASS anxious/ambivalent	1.75±1.65	1.76 ± 1.97	1.56±1.55	0.448	0.639
AASS secure	3.14±1.52	2.91±1.48	3.67±1.55[a,b]	4.732	0.009*
Attachment style (%)	Secure: 142 (36.2)	Secure: 8 (23.5)	Secure: 39 (50)	8.303	0.016*
	Other: 250 (63.8)	Other: 26 (76.5)	Other: 39 (50)		
SCL-90 OCD	15.95±6.87	18.38±6.50	14.80±6.73[b]	3.248	0.040*
SCL-90 anxiety	13.09±8.25	16.05±7.15	10.62±7.11[a,b]	5.874	0.003*
SCL-90 hostility	5.39±4.87	6.61±4.70	4.34±4.21	2.936	0.054
SCL-90 paranoid ideation	8.41±4.35	9.73±3.87	7.52±4.30[b]	3.207	0.01*

SD: Standard deviation; *: P<0.05; AASS: Adults Attachment Style Scale; SCL: Symptom Checklist; IGV: Nonvaccinated but intend to get vaccinated group; NIGV: Nonvaccinated and not intend to get vaccinated group; OCD: Obsessive–compulsive disorder. One-way ANOVA test and Chi-squared test were performed. For one-way ANOVA, homogeneity was determined with Levene's statistic test, and Tukey's test was applied if the data showed homogeneous distribution. [a]p<0.05 (compared to the vaccinated group). [b]p<0.05 (compared to the intending to get vaccinated group).

to participants' answers to the dichotomous question about the intention to be vaccinated in the data form, the participants were divided into 3 groups: "vaccinated (VG)," "nonvaccinated but intend to get vaccinated (IGV)," and "nonvaccinated and not intend to get vaccinated (NIGV)." Such a classification resulted in significant differences between the groups. A comparison of the mean AASS and SCL-90 subscale scores between the 3 independent groups is shown in Table 2. The mean score of the AASS secure subscale of the NIGV group (M=3.67, SD=1.55) was higher than those in the VG group (M=3.14, SD=1.52) and IGV group (M=2.91, SD=1.48) (p=0.009). The mean score of the SCL-90 anxiety subscale in the NIGV group (M=10.62, SD =7.11) was lower than those in the VG group (M=13.09, SD=8.25) and IGV group (M=16.05, SD=7.15) (p=0.003). The mean scores of SCL-90 OCD (M=14.80, SD=6.73) and paranoid ideation subscales (M=7.52, SD=4.30) in the NIGV group were lower than those in the IGV group (M=18.38, SD=6.50 for OCD and M=9.73, SD=3.87 for paranoid ideation). There was no significant difference in the mean score of the other subscales of AASS and SCL-90 between the groups.

Relationship between AASS Scores and SCL-90 Subscale Score

The relationship between AASS scores and SCL-90 subscale scores is shown in Table 3. The AASS avoidant and AASS anxious/ambivalent scores were found to be positively but modestly correlated with all SCL-90 subscale scores. A modest negative correlation was identified between the AASS secure subscale score and all SCL-90 subscale scores.

Table 3: Relationship between AASS scores and SCL-90 subscale score

	AASS avoidant	AASS anxious/ ambivalent	AASS secure	SCL-90 OCD	SCL-90 anxiety	SCL-90 hostility	SCL-90 paranoid ideation
AASS avoidant	–						
AASS anxious/ambivalent	0.334***	–					
AASS secure	-0.461***	-0.005	–				
SCL-90 OCD	0.274***	0.336***	-0.147***	–			
SCL-90 anxiety	0.304***	0.436***	-0.121**	0.721***	–		
SCL-90 hostility	0.347***	0.382***	-0.147***	0.542***	0.672***	–	
SCL-90 paranoid ideation	0.418***	0.427***	-0.204***	0.621***	0.691***	0.679***	–

*: P<0.05; **: P<0.01; ***: P< 0.001; Pearson's correlation analysis was used; AASS: Adult Attachment Style Scale; SCL: Symptom Checklist; OCD: Obsessive–compulsive disorder.

Table 4: Effect of a psychometric test score and sociodemographic and clinical data on individuals not intend to get vaccinated using logistic regression analysis

Independent variables	Not intend to get vaccinated					
	Univariate			Multivariate		
	exp(B)	95.0% CI for β coefficient	p	exp(B)	95.0% CI for β coefficient	p
Constant				0.003		<0.001*
Gender (1=male)	2.504	1.535–4.083	<0.001*	3.134	1.368–7.177	0.007*
Marital status (1=married)	1.897	1.166–3.087	0.010*			
History of COVID-19 infection in a close relative (1=positive)	1.443	0.884–2.355	0.143	0.377	0.154–0.920	0.032*
Education level (1=high)	0.691	0.386–1.239	0.215			
Level of income (1=high)	1.148	0.701–1.880	0.583			
Concern that vaccines are not safe (1=yes)	140	59–332	<0.001*	246	86–699	<0.001*
AASS avoidant	0.975	0.843–1.129	0.739			
AASS anxious/ambivalent	0.863	0.738–1.008	0.064			
AASS secure	1.291	1.099–1.517	0.002*	1.557	1.187–2.042	0.001*
Attachment style (1=secure)	1.787	1.102–2.90	0.019*			
SCL-90 OCD	1.05	0.941–1.011	0.166			
SCL-90 anxiety	0.966	0.935–0.998	0.035*			
SCL-90 hostility	0.959	0.908–1.012	0.127			
SCL-90 paranoid ideation	0.954	0.901–1.010	0.108			

*: P≤0.05; logistic regression analysis was performed; CI: Confidence interval; OCD: Obsessive–compulsive disorder; AASS: Adults Attachment Style Scale; SCL: Symptom Checklist. Cox & Snell R^2 = 0.413; Nagelkerke R^2 = 0.712; p≤0.001. Hosmer and Lemeshow test, p=0.946.

The effect of sociodemographic variables, data on COVID-19 infection, and psychometric characteristics on nonintention to be vaccinated

Multivariate and univariate logistic regression models, which included whole participants, were created for the effect of gender, marital status, presence of a history of COVID-19 infection in a close relative, education level, level of income, and presence of concerns that vaccines were not safe on the psychometric characteristics of the participants not intending to get vaccinated (Table 4). Univariate regression analysis revealed that concerns about the safety of vaccines, being male and married, and secure attachment style increased the intention not to be vaccinated. However, in the univariate regression analysis, it was found that high anxiety scores decreased the intention not to be vaccinated. Considering the same variables, a meaningful multivariate regression analysis model was created including gender, a previous history of COVID-19 infection in a close relative, concerns about the safety of vaccines, and secure attachment style. It was observed that a previous history of COVID-19 infection in a close relative decreased the intention not to be vaccinated, while other variables increased the intention not to be vaccinated.

DISCUSSION

The major findings of the current study are the following: (i) The incidence of a history of previous COVID-19 infection was higher in the unvaccinated group, (ii) individuals who did not intend to get vaccinated were more securely attached than those who were vaccinated and those who intended to get vaccinated showed less psychiatric symptoms such as obsession, anxiety, and paranoid ideation, (iii) being married and being male, a previous history of COVID-19 infection, concerns about safety of vaccines, having a secure attachment style, and anxiety level had an effect on the intention not to be vaccinated.

Since the onset of the COVID-19 pandemic, there has been a great deal of research demonstrating psychiatric influences in both community- and participant-based populations (17). Psychiatric symptoms such as anxiety, obsession, and irritability may increase in individuals due to many reasons directly or indirectly related to the pandemic (18) and may even cause exacerbation of clinical symptoms in participants with OCD or anxiety disorders (19). However, it should be noted that the psychometric features evaluated in our study were not clinically related to the severity of the disorder but were considered within the scope of the symptom dimension. Anxiety is an inevitable condition that can be experienced during the course of life (20). However, nonexaggerated and low-level anxiety causes the individual to work more actively to be successful and to take necessary precautions on dangerous issues that may prevent them from continuing their existence (21). In this context, it is expected that a certain level of anxiety or obsessions can make it easier to take precautions against the COVID-19 epidemic, as well as have a positive effect on vaccination. In addition, recent studies showed that the perceived threat of a COVID-19 infection was strongly associated with vaccine acceptance (22). Although the perceived threat of COVID-19 and anxiety levels related to COVID-19 were not investigated in the present study, these parameters may explain the relationship between the levels of anxiety and obsessive symptoms and vaccine acceptance. In addition, these psychiatric clinical entities, which reduce functionality during the normal course of life, make life difficult, and cause unnecessary and exaggerated precautions and avoidance behaviors, may have a protective feature during this extraordinary epidemic period, which includes unprecedented levels of uncertainty.

Of note, an unexpected interaction was detected between vaccine hesitancy and secure attachment style in the current study. Individuals with vaccine hesitancy were found to have more secure attachment suggesting that the latter increased the risk of antivaccination. According to the attachment theory, securely attached individuals remain relatively relaxed during times of stress, recover faster, and remain mentally healthier (23). Securely attached individuals evaluate stressful events as less threatening when compared to less securely attached individuals. These individuals have confidence in their ability to cope with a stressful situation (24). In this context, it may be possible that securely attached individuals are insensitive to perceiving the threat of the COVID-19 pandemic. Thus, such individuals may exhibit greater reluctance or opposition toward vaccination. In addition, individuals with a secure attachment style are known to be more optimistic when faced with threatening situations, actively seek help when they need assistance (25), conceive their lives to be under their control, are resistant to stressful situations, and make an effort to communicate with their environment in case of any stress or crisis (26). Such individuals are also more prone to follow the direction of their social environment. Thus, if vaccine hesitancy is dominant in the social environment, such individuals may be affected more by negative opinions about vaccination.

Concern about vaccine safety as one of the factors with the highest effect on vaccine hesitancy was another important finding of the current study. Concern about vaccine safety is a well-established factor affecting the rate of childhood vaccine acceptance by parents for their children (27). However, safety concerns for the COVID-19 vaccine are considered to be at a slightly higher level. The lack of studies that showed long-term side effects of vaccines, the development of vaccines in a relatively short time, and the use of new vaccine technologies have contributed to safety concerns in society against COVID-19 vaccines (28). Therefore, it is of great importance that studies on vaccines are interpreted and presented in a way that all segments of society can understand.

The current study has some limitations. The lack of assessment of the perceived threat of the COVID-19 pandemic is an important limitation. Therefore, the effect of the perceived threat related to the COVID-19 epidemic on the relationship between attachment styles, psychiatric symptoms, and vaccine hesitancy could not be investigated. The presence of psychiatric

disorders other than schizophrenia and bipolar disorder was not established in our study. During the design phase of this study, schizophrenia and bipolar disorder were excluded as they could significantly affect judgment and risk assessment. However, other psychiatric conditions, especially anxiety, may be related to vaccine hesitancy or vaccine acceptance.

In conclusion, secure attachment style and clinical psychiatric entities such as anxiety and obsession were effective on vaccine hesitancy. However, this interaction needs to be interpreted carefully in the context of the perceived level of COVID-19 threat, more detailed information about the safety and necessity of vaccines, relationship of individuals with their social environment, and the predominance of vaccine hesitancy in their social environment. Currently, one of the most important factors contributing to vaccine hesitancy is safety concerns regarding the COVID-19 vaccines.

Contribution Categories		Author Initials
Category 1	Concept/Design	S.G., M.S.
	Literature review	S.G., E.C.T.
	Data analysis/Interpretation	S.G., M.S., E.C.T.
Category 2	Drafting manuscript	S.G., M.S., E.C.T.
	Critical revision of manuscript	M.S.
Category 3	Final approval and accountability	M.S.
Other	Technical or material support	E.C.T.
	Supervision	M.S.

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Informed Consent: Informed consent was obtained from all participants.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors declare that they have no conflict of interest.

Financial Disclosure: The authors declare that they have no financial support.

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