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Research Article

Attitudes Towards Vaccines And Intention to Vaccinate Against Covid-19: A Statistical Analysis

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ABSTRACT: Present study aims to analyze the attitude towards Covid 19 vaccine in Kocaeli province and the factors that may cause this attitude. Data were applied to 248 people via an online survey. The survey consists of three parts: demographic data, data on vaccine attitude and level of knowledge about the vaccine. The association between the idea of being vaccinated and demographic variables were examined with Pearson chi-square analysis and a significant relationship was found only in terms of age and marital status variables. Pearson's correlation analysis was used to determine the relationship between the vaccine attitude scores and the level of knowledge about the vaccine. It was concluded that the relationship between age and marital status with the idea of vaccination was statistically significant. (P<0,01) T-test was used to determine whether it differentiated according to chronic illness and it was determined that it did not. (P>0,05) One-way ANOVA was used for the relationship between fear level against Covid 19 and attitude towards a vaccine and it was observed that there was a significant difference. The effect of seeing social media and television as a source of information on the idea of vaccination was examined using Ordinal Logistics Regression according to the determined reference values and it was seen that there was a significant difference. Also, domestic vaccine positively affects the attitude towards a vaccine.

Keywords: Covid 19, Vaccine attitude, Vaccination misinformation, Statistical analyze.

1. INTRODUCTION

The main purpose of health services is to ensure the continuity of health. Vaccination is one of the most important methods to protect against diseases.

According to the statement made by the Ministry of Health in December 2017, the number of families who refused vaccination exceeded 10,000.

It is very important to examine the fears and concerns of individuals against the vaccine and the factors that may cause this situation and to create a vaccine policy in this direction. Providing accurate information about the vaccine has become an important issue in this process. Otherwise, there will be an increase in epidemic diseases. When the literature is examined, the reasons for not being vaccinated are fear and insecurity against the side effects of vaccines that may occur soon or in the long term. In December 2019, China announced the first cases of coronavirus Disease (COVID-19) due to a new Coronavirus: Severe Acute Respiratory Syndrome-Coronavirus 2 (SARS-CoV 2). The world is currently fighting a serious pandemic,

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with more than 61 million people infected with this virus worldwide, cases have been reported from more than 200 countries, and more than 1.43 million people have died by the date of this study [1]. Vaccination is the only viable way to keep this pandemic under control.

In the current covid-19 pandemic, the public's attitude to the vaccine, which is uncertain, is critical for mass immunity. For this reason, in this study, the attitudes and reasons of people living in different occupational groups and regions in Kocaeli, which is among the top five provinces in the country with a high number of cases, will be examined. In the study, a questionnaire including demographic, socio-economic variables, examining the reasons for not being vaccinated, and measuring virus and vaccine information was applied to the participants. The significance of the obtained data and the relationships of independent variables with vaccine attitude will be examined in the findings section.

The literature research conducted is summarized in Table 1, Table 2, Table 3, Table 4 and Table 5.

Table 1. Literature Research Table Summary 1

YEAR	PURPOSE	AUTHOR	INDEPENDENT VARIABLES	TEST STATISTICS	SAMPLE SIZE
2007	Parents' attitude towards vaccines	Benford, Lansley [2]	Economic situation, Ethnicity	One Way ANOVA	2326
2011	Attitudes of people living in Hungary towards HPV vaccine	Marek et al. [3]	Age, gender, region, cost attitude to the HPV vaccine, health information of the participants	Pearson Chi Square Test	298
2012	Attitudes of dentists living in Germany towards seasonal flu vaccine and pandemic flu vaccine	Wicker et al. [4]	Age, gender, acceptance of H1N1 vaccine at the time of 2010-2011	Pearson Chi Square	242
2015	Attitudes of female students in a school in Lebanon towards HPV vaccine	Danny et al. [5]	Demographic information such as smoking, age, sexual experience, education	ANOVA, Paired T Test,	512
2016	In a study conducted in 67 countries, the relationship between religion and vaccine attitude was examined.	Larson et al. [6]	Economic situation, geographical location	Regression Analysis, T test	65.819
2016	The impact of policy changes on the flu vaccine	Slaun white [7]	The social and economic status of the person	T Ttest	202
2017	The attitudes of elderly people living in Singapore towards flu and pneumonia vaccine have been examined	Chow et al. [8]	Age, gender, chronic illnesses, type of housing, income status, ethnicity	T Test, Wilcoxon Test, McNemar Test, Ordinal Logistic Regression	655

Table 2. Literature Research Table Summary 2

YEAR	PURPOSE	AUTHOR	INDEPENDENT VARIABLES	TEST STATISTICS	SAMPLE SIZE
2017	Flu vaccine against the attitude of the parents of allergic rhinitis and asthma patients and doctors living in Turkey	Kaya et al. [9]	Demographic and health variables	Pearson Chi Square Test	189-183
2017	Public attitude towards childhood vaccinations in New Zealand	Lee et al. [10]	Gender, marital status, employment status, age, number of children and annual household income	Multiple Regression Analysis	16.642
2017	Influence of race against vaccination attitude	Quinin et al. [11]	Economic situation, age	T Test	1657
2018	Healthcare professionals' hesitation about vaccination	Succi [12]	Geographical location, ethnicity	Regression Analysis	168
2018	Attitude to hepatitis B vaccine	Liu [13]	Hospital policy, size	ANOVA	929
2019	The effect of superstitions on attitude to the flu vaccine	Lu et al. [14]	Education level, Economic status	Pearson Chi Square Test	668

Table 3. Literature Research Table Summary 3

YEAR	PURPOSE	AUTHOR	INDEPENDENT VARIABLES	TEST STATISTICS	SAMPLE SIZE
2019	Ebola vaccine acceptability in West Africa	Jalloh et al. [15]	Social status, Age, Education	Qualitative and quantitative analysis	316
2019	Attitude towards HPV vaccine in India	Dagarege et al. [16]	Religion, social factors, education	Regression Analysis	1609
2020	Australian residents' attitude towards mumps, measles and rubella vaccines	Toll et al. [17]	Demographic, socioeconomic and health-related variables	Multiple Regression Analysis	4779
2020	The attitude of pregnant women towards flu vaccine in Kenya	Otieno et al. [18]	Education level, age, marital status, income status, religion, region of residence, number of children	Fisher Chi Square Test	507
2020	The attitudes of pregnant women towards pediatric vaccination in Greece	Maltezou et al. [19]	Age, gestational age, education level, current childbearing, prior flu vaccination and vaccination beliefs of women	Logistics Regression	814
2020	Flu vaccine knowledge and attitude of parents of children hospitalized for flu in Australia	Carlson et al. [20]	Child's age, length of stay hospital, by region of residence, gender, pregnancy vaccination	ANOVA	27

Table 4. Literature Research Table Summary 4

YEAR	PURPOSE	AUTHOR	INDEPENDENT VARIABLES	TEST STATISTICS	SAMPLE SIZE
2020	Flu vaccine attitudes of teachers living in Poland.	Ganczak [21]	Gender, residence (city, rural), marital status, socioeconomic status, belief that they will be in the high risk group for influenza	Fisher Chi Square Test	277
2020	The role of the digital platform in vaccination	Franscella et al. [22]	Age, economic situation, religion	ANOVA	919
2020	The effect of doctors on patients who do not want to be vaccinated	Deml et al. [23]	The social life of the person, Education	Regression Analysis	20
2020	Access and acceptance of the vaccine	Spana [24]	Social and behavioral communication, Human factors	Experimental Suggestion Provided	23
2020	Whether HPV is applied by human rights or not	Kruese et al. [25]	Age, gender	Statistical Data Analysis	154
2020	Vaccination attitudes have been examined on social media	Chan et al. [26]	Social features, Age	Correlation Analysis	3005

Table 5. Literature Research Table Summary 5

YEAR	PURPOSE	AUTHOR	INDEPENDENT VARIABLES	TEST STATISTICS	SAMPLE SIZE
2020	Cancer patients' attitudes towards flu vaccine	Okoli et al. [27]	Age, education, gender, smoking, income, residency insurance, cancer type, chronic disease, year of diagnosis, occupation	I^2 test	139-41.346
2020	Parents' attitude towards childhood vaccinations in New Zealand	Lee et al. [28]	Age, race, region and educational status	Actor-Partner Mutual Dependency Model	136
2020	Flu vaccine and covid-19 vaccine attitude of healthcare professionals living in Malta	Grech [29]	Age, gender, health status, vaccine concern, effect, safety	Fisher Chi Square Test	852
2020	Parents' attitude towards covid-19 vaccine in a study conducted in the UK	Bell et al. [30]	Age, gender, household income, employment, marital status of participants, and number and age of children	Paired T Test	1252
2020	Vaccination status of children with IBH and AIH living in Germany	Cagol et al. [31]	Gender, current age, age at diagnosis, treatment and disease	ANOVA, Kruskal Wallis, Wilcoxon, Fisher Chi Square Test	329
2020	The relationship of the public's political opinion with the attitude to the covid-19 vaccine in France	Ward et al. [32]	Gender, age, education, income, Covid 19 diagnosis, political	Logistic Regression	5018
2020	Caregivers' attitude towards vaccination	Goldman et al. [33]	Cultural environment, geographic location	Pearson Chi Square Test	2557

In the study, the attitude of individuals living in Kocaeli province towards the COVID 19 vaccine was examined. The problems to be investigated in the study can be listed as follows.

1. Whether there is a relationship between demographic variables and vaccination idea
2. The relationship between seeing social media and television as a means of obtaining information and the idea of getting vaccinated
3.The effect of the domestic vaccine on attitude
4. Effect of total knowledge score on attitude towards vaccine
5. The relationship between vaccination attitude and education level
6. The relationship between the fear level and the vaccine attitude score
7. Determining the relationship between chronic illness and desire to be vaccinated

2. MATERIAL AND METHODS

2.1. Sample Group

In the study, Kocaeli, which is at the top of the number of cases during the pandemic period, was selected as the population. Self-administered online questionnaire questions were asked to 248 participants in multiple districts, different income levels and professions. Participation in the survey took place between 30 November and 3 December. The descriptive statistics of the demographic characteristics of the participants are shown in Table 6.

Table 6. The descriptive statistics of the demographic characteristics of the participants

Gender	**Frequency**	**Percent Frequency**
Woman	133	53.6
Male	115	46.4
Total	248	100
Marital status	**Frequency**	**Percent Frequency**
The married	144	58.1
Single	104	41.9
Total	248	100
Education Status	**Frequency**	**Percent Frequency**
Primary School-Secondary School	78	31.5
High school	60	24.2
University	89	35.9
Postgraduate	21	8.5
Total	248	100
Age	**Frequency**	**Percent Frequency**
18-28 Age	82	33.2
29-39 Age	33	13.4
40-50 Age	21	8.5
50-60 Age	37	15.0
60+	74	30.0
Total	247	100

2.2. Data Collection Tool and Method

In the study, the data was provided through a questionnaire that can be answered online. In the questionnaire answered by 248 participants, demographic questions such as age, gender, marital status, educational status, information obtained (TV, social media, experts, scientific

publications), presence of chronic illness consisting of yes-no answers, previous disease status, vaccination training (1-Strongly disagree, 2-Disagree, 3-Indecisive, 4-Agree, 5-Strongly Agree), questions such as income loss status, confidence of the participant against the vaccine, belief in its protection, idea of vaccination, information about the vaccine the effect of vaccine trust on the vaccine trust, the effect of the vaccine on the vaccine trust, the effect of the vaccine's institution on the vaccine attitude, the effect of the vaccination fee on the vaccination decision, the effect of the expert advice on the vaccination attitude, the effect of the vaccine's success rate on the vaccination decision, the effect of the vaccine storage conditions on the vaccination decision There are questions measuring fear, and true-false questions to measure vaccine knowledge.

Pearson chi-square analysis was conducted to examine the relationship between demographic variables and vaccination attitude, which we determined as the dependent variable. First, the hypothesis test is established, the established hypothesis is shown.

2.3. Analysis of Data on Attitude Against Vaccine

To analyze the sample group, the reliability of the data was tested first. (Tabachnick & Fidell, 2013), the skewness and kurtosis values between -1.5 and +1.5 show that they are normally distributed. A normality test was performed and kurtosis and skewness values were found to be between these values for 22 different variables, and normal distribution was appropriate. According to Özdamar (2015), Cronbach's Alpha value is between 0.70 and 0.90 shows that the scale has high reliability, it takes a value between 0.60 and 0.70, and the scale has sufficient reliability. 22 different factors of vaccination attitude, Cronbach alpha value. It was found to be 0.830**.**

3. RESULTS AND DISCUSSION

3.1. Chi-Square Analysis of the Relationship Between Demographic Variables and Vaccination Idea

Pearson chi-square analysis was conducted to examine the relationship between demographic variables and vaccination attitude, which we determined as the dependent variable. First, the hypothesis test is established, the established hypothesis is shown.

Table 7. Age-Vaccination Thought Observed and Expected Value

		Vaccination Thought							
Age		**I don't think**		**I am intensive**		**I think**		**Total**	**Sig.**
		N	**Post-Hoc**	**N**	**Post-Hoc**	**N**	**Post-Hoc**		
18-40 Age	Count	42	42a	41	41a	32	32 a	115	
40 + Age	Count	15	15b	38	38 a	79	79 b	132	
Total		57		79		111		247	0.000

The age independent variable is evaluated in terms of vaccination attitude. To prevent 20% of the data being under five, the age variable considered in five groups (18-28, 29-39, 40-50, 50-

60, 60+) is combined into two groups. Likewise, the idea of vaccination stated in the 5-point Likert scale is combined into three evaluations. As can be seen in Table 7, it is seen that the participants in the 18-40 age group mostly answered "I do not think", and the participants over the age of 40 answered "I think" more.

Looking at the Pearson chi-square result, it is seen that the p value is less than 0.05. Therefore, H_0 is rejected. It is commented that there is a statistically significant relationship between age and the idea of being vaccinated.

A comparison of the columns is made. In Table 7, it is seen that there is a significant difference between the columns expressed with different letters. It is seen that there is a difference between the ages of 18-40 and over 40 in terms of thinking about vaccination, and there is no difference between the two age groups in terms of indecision towards vaccination.

Table 8. Expected and Observed Values of the Vaccination Thought by Gender

		Vaccine Thought				
Gender		**I don't think**	**I am indecisive**	**I think**	**Total**	**Sig**
Female	Count	34	41	58	133	0.583
Male	Count	23	38	54	115	
Total		57	79	112	248	

Considering the idea of getting vaccinated according to the gender independent variable, it is seen that female participants responded with "I think" more, and male participants responded more "I think".

Table 9. Expected and Observed Values of Vaccination Thought According to Education

		Vaccination Thought				
Education		**I don't think**	**I am indecisive**	**I think**	**Total**	**Sig.**
Primary/ Secondary School	Count	14	22	42	78	0.151
High School	Count	12	18	30	60	
University	Count	31	39	40	110	
Total		57	79	112	248	

When the idea of vaccination is evaluated according to the education independent variable, to prevent 20% of the expected value falling below 5 in four groups (primary school, secondary school, high school, university (associate degree, undergraduate), graduate (master, doctorate) The graduate group was merged with the university. As can be seen from the table, primary-secondary school graduates responded more "I think." Participants who were high school graduates and university graduates responded more like "I think".

Considering the result of the Pearson chi-square analysis, it can be said that there is no significant relationship between the educational status variable and the idea of being vaccinated because the p value is above 0.05 and the H_0 a hypothesis is accepted.

Table 10. Pearson's Chi-Square Analysis Result of the Vaccination Thought According to Marital Status

		Vaccination Thought				
Marital Status		**I don't think**	**I am indecisive**	**I think**	**Total**	**Sig.**
Married	Count	23	37	84	144	0.000
Single	Count	34	42	28	104	
Total		57	79	112	248	

When the marital status independent variable and the idea of being vaccinated are evaluated together, it is seen that married participants responded more like "I think" and single participants responded more "I think".

Pearson's chi-square analysis result is examined. It can be said that the p value is less than 0.05, that is, the H_0 the hypothesis will be rejected, and there is a significant relationship between marital status and the idea of being vaccinated.

3.2. Examining the Relationship Between Gender and Knowledge Level with T Test

The sub-problems of the study were examined and whether the data obtained from two independent variables were meaningful with each other or not.T test was applied and the confidence interval was stated as 95%. It has been investigated whether gender is related to the level of knowledge of Covid 19. A total scoring was made in the information about the information.

Table 11. T Test Result for the Relationship Between Gender and Knowledge Level

Gender	**N**	**X**	**SS**	**Sig.**
Female	133	0.819	0.184	0.207*
Male	115	0.787	0.214	

*p<0.05

There was no significant relationship between gender and level of knowledge.

3.3. Examination of the Relationship Between Chronic Disease and Thinking of Being a Covid Vaccine Using T Test

It has been investigated whether those with chronic diseases are related to the desire to get the Covid 19 vaccine.

Table 12. The T-Test Result of the Relationship Between Chronic Disease and Thinking About Covid Vaccine

Chronic Disease	**N**	**X**	**SS**	**P value**
Yes there is	147	3.490	1.631	0.578*
No not	101	3.376	1.541	

*p<0.05

People with chronic diseases are more likely to be vaccinated than those who do not. However, there is no significant relationship between considering vaccination and chronic illness. People with chronic illnesses are expected to have a much higher request for vaccination than those who do not it may be thought to do.

3.4. The Relationship Between Fear Level and Attitude Score Against Vaccine

While the H_0 hypothesis argues that there is no difference between the fear level and the idea of being vaccinated, the H_1 hypothesis shows that there is a difference between them.

It is seen that there is a significant difference between the fear level of individuals and their attitude towards vaccination. To determine the direction of the difference, Turkey Test was conducted and it was observed that all groups differed significantly over each other. The vast majority of participants are extremely afraid of Covid 19.

Table 13. Result of the Relationship Between Fear Level and Attitude Score Against Vaccine

	Fear-Level	**N**	**X**	**SS**	**F**	**P Value**	**Significant Difference**
Attitude Score	I have no fear	32	2.819	0.884	25.799	0.0006	I have no fear-Moderate-I am extremely afraid
	Moderately scared	62	3.411	0.607			
	I'm too afraid	154	3.764	0.693			

3.5. The Relationship Between Vaccine Domestic Status and WHO Support and Attitude Score Against Vaccine

There is a significant relationship between the vaccine being indigenous and being supported by WHO and the attitude towards the vaccine.

Table 14. Result of the Relationship Between Local Vaccine and WHO Support and Attitude Score Against Vaccine

	Local Vaccine-WHO Support	**N**	**X**	**SS**	**F**	**P Value**	**Significant Difference**
Attitude Score	I strongly disagree	23	3.571	1.006	3.597	0.007	Absolutely I agree- I strongly disagree
	I do not agree	35	3.109	0.904			
	I am indecisive	86	3.635	0.623			
	I agree	51	3.641	0.566			
	Absolutely I agree	53	3.627	0.857			

$P<0.05$

In determining the direction of the difference, Turkey Test was used and 0.531 negative significance was found between Absolutely agree or not.

3.6. Information and Comments on the Relationship Between Attitude towards Vaccine and Level of Knowledge

Table 15. The Correlation of the Relationship Between Attitude and Knowledge Level

		Attitude Score	**Total Knowledge Score**	**R**
Attitude Score	Correlation Significance	1	0.002	0.197
	N		248	
Total Knowledge Score	Correlation Significance	0.002	1	
	N	248		

The relationship between the participants' attitude scores towards the vaccine (Mean = 3.554, SD = 0.768) and the total knowledge score (Mean = 8.290, SD = 2.279) was measured by Pearson correlation. A low level, a positive significant relationship was found between these variables. (R (246) =, 197, p <0.01)

3.7. Investigation of the Effect of Using TV and Social Media to Access Information with Ordinal Logistic Regression on the Thought of Vaccination

In this analysis, the use of TV and social media, which are independent variables, is evaluated categorically. The idea of vaccination, which is the dependent variable, is expressed with a sequential increasing scale. Therefore, Ordinal Logistic Regression use was deemed appropriate. The research aims to measure the effect of people who use TV and Social Media resources to obtain information on the idea of vaccination. This measurement was based on the odds (OR) ratio. Odds, the probability of observing any event; is the ratio of the probability of not being observed [34]. SPPS does not provide Odds output for the data analyzed in version 22. For this reason, the output table is transferred to Microsoft Excel and Exp(β_k) It was calculated according to the formula. Ordered Logistics Analysis also contains some assumptions.

When the analysis is done in SPSS package program, the results are as follows:

Table 16. Frequencies of Data

		N	Cumulative percent (%)
Are you considering getting the Covid 19 vaccine?	" NO"	57	23.0
	"i am indecisive"	79	31.9
	" YES"	112	45.2
TV	0	72	29.0
	1.0	176	71.0
Social Media	0	67	27.0
	1.0	181	73.0
Valid		248	100.0
Missing		0	
Total		248	

Table 17.Significance and Chi-Square Value of the Model

Model	-2 Log Likelihood	Chi Square Value	Df	Sig.
Intercept Only	49.746			
Final	32.504	17.241	2	0.000

For this analysis, it can be said that there is a significant difference between the variables in which the H_0 a hypothesis is rejected since the p value is lower than 0.05 in the general result.

Table 18. The goodness of Fit Assumption for the Model

	Chi Square Value	Df	Sig.
Pearson	0.471	4	0.976
Deviance	0.476	4	0.976

When the Pearson p value for the goodness of fit test was examined, it was seen that it was considerably higher than 0.05. So the H_0 the hypothesis is accepted. The data are suitable for the model.

Table 19. Parallelism Test for the Model

Model	-2 Log Likelihood	Chi Square Value	Df	Sig
Null Hypothesis	32.504			
General	32.062	0.442	2	0.802

A parallel test is examined. It is concluded that the p value is greater than 0.05, that is, the assumption that the H_0 a hypothesis is accepted.

Table 20. The Result of Ordinal Logistic Regression Analysis

		Estimate	Std. Error	Wald	Df	Sig	OR
Threshold	[I do not think to be vaccinated= 1.0]	-1.397	0.187	55.68	1	0.000	0.25
	[I am indecisive= 3.0]	0.088	0.161	0.298	1	0.085	1.1
Location	[TV=,0]	-1.025	0.270	14.445	1	0.000	0.36
	[TV=1.0]	0[a]	.	.	0	.	
	[Social Media=,0]	0.625	0.281	4.936	1	0.026	1.87
	[Social Media=1.0]	0[a]	.	.	0	.	

Considering the test result, the state of thinking about getting vaccinated is the dependent variable selected as a reference, while the reference in the independent variables is the state of thinking about television as a means of obtaining information and the state of thinking about social media as an information tool. If the result is to be interpreted, the idea of being in contact with those who do not think of TV as a means of obtaining information is 0.36 times higher than those who think. ($p<0.05$,%95 CI, 0.21-0.60) Those who do not think of social media as a means of obtaining information have 1.87, or approximately two times higher, than those who think about getting vaccinated ($p<0.05$, %95 CI, 1.07-3.24).

4. CONCLUSIONS

An online questionnaire was applied to 248 participants in Kocaeli province. The relationships between the participants' attitudes towards the Covid 19 Vaccine, their thoughts on getting vaccinated and their knowledge level about Covid 19 were investigated.

43.3% of the respondents are university graduates, with 53.6% female, 46.4% male, 35.9% undergraduate and 8.5% graduate.

Skewness and kurtosis values between -1.5 and +1.5 indicate normal distribution to determine whether the data set conforms to the normal distribution. Cronbach's alpha value was found to be 0.830.

T test was used for the effect of chronic discomfort on vaccination idea and there was no significant difference. The reason for this may be that those with chronic discomfort of Covid 19 fear the side effects of the vaccine. has been seen.

Pearson's chi-square analysis was conducted to examine the relationship between demographic variables and the idea of vaccination, which we determined as the dependent variable. It was concluded that the relationship between age and marital status was statistically significant. No relationship was found between education and gender and the idea of being vaccinated.

ANOVA was made for the relationship between the vaccine being indigenous and supported by WHO and the attitude and it was seen that there was a significant difference.

The difference was determined by the Turkey Test and there is a negative significance between strongly disagree and agree.

The fact that the vaccine is local is cultivated positively.

The effect of using TV and social media on the idea of vaccination was investigated to reach information with ordinal logistic regression.

Considering the test result, the state of thinking about getting vaccinated is the dependent variable selected as a reference, while the reference in the independent variables is the state of thinking about television as a means of obtaining information and the state of thinking of social media as an information tool. As a result, it has been observed that there is a significant difference between those who think of TV as a means of obtaining information and those who do not. Likewise, it was found that there is a significant difference between those who think of social media as a means of obtaining information and those who do not.

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