

**TITLE PAGE: FEAR OF COVID-19 IN MADRID: WILL PATIENTS ATTEND FOR DENTAL CARE?**

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# **FEAR OF COVID-19 IN MADRID: WILL PATIENTS ATTEND FOR DENTAL CARE?**

## **ABSTRACT**

*Introduction:* The objective of this research is to describe how the vulnerability of the adult population to perceived infectability, germ aversion, and fear of COVID-19 has changed in the period since the beginning of the pandemic until the lockdown exit phase, along with its influence on dental care behaviour.

*Materials and Methods:* Some 961 participants were monitored in a study in Madrid with two time points: before lockdown (T0) and after completion of total lockdown (T1). A questionnaire included basic sociodemographic aspects, the perceived vulnerability to disease scale (PVD) this scale has the two subscales: of perceived infectability and germ aversion, and the fear of COVID-19 scale, and it also asked about their dental visiting behaviour after confinement for fear of COVID.

*Results:* The participants had higher scores for infectability and germ aversion at T1 than at T0 ( $p < .01$ ). 24.5% (235) of participants would not go to the dentist for fear of COVID-19. Those who had a high perceived infectability scale score were at least five times more likely not to visit the dentist. Those with high COVID-19 fear were at least six times more likely not to visit the dentist, those older than 60 were eight times more likely not to.

*Conclusions:* The population's high levels of vulnerability to infectability and perceived germ aversion as being perceived to be possibly associated with COVID-19 fear and the resultant avoidance behaviour to dental care will remain until an effective drug or vaccine for SARS-CoV2 is found.

## **Introduction**

The epidemic disease COVID-19, caused by SARS-CoV-2, is an international public health emergency, which has through the exacerbation of mental health problems such as

stress, anxiety, depressive symptoms, insomnia, denial, anger and fear raised a challenge to psychological resilience<sup>1</sup>. Since the World Health Organization officially declared the global pandemic, Madrid has established itself as one of the main foci of the COVID-19 in Europe. As of May 26, Madrid was the Spanish city most affected by COVID-19. It had recorded 67,871 cases of infection, 3,463 hospitalized patients and 8,977 deaths<sup>2,3</sup>

The high number of coronavirus-infected patients and suspected cases, as well as the growing number of countries affected by the outbreak, have raised concerns both nationally and globally about becoming infected. The unpredictable future of this epidemic has been exacerbated by constant media coverage and the promulgation of myths, misinformation, and the misunderstanding of health updates which may have contributed to an increase in the fear of contagion among the population<sup>4</sup>. The measures taken by the authorities in trying to contain the outbreak and limit contagion entailed unprecedented restrictions on mobility through social distancing and quarantine, which may have led to greater public anxiety and its immediate effects on mental health<sup>5,6</sup>. This may also have caused considerable psychological stress. All of the above stresses the importance of emotional balance in a period of uncertainty when fear and prolonged confinement are combined.

For those who already have some kind of pathology or psychological disorder, the situation can be harmful but it may also affect others who have previously enjoyed good mental health<sup>1</sup>.

The two main factors that can generate high levels of fear and anxiety are the virulence and lethality of COVID-19, especially for people older than 60 and for those with comorbidities<sup>7,9</sup>. Mental as well as general physical health is threatened especially in terms of emotion and cognition<sup>10</sup>. As a consequence some people may develop a set of negative psychological responses (e.g., aversion, anxiety, etc<sup>11,12</sup>); and make negative cognitive assessments<sup>13,14</sup> as a means of self-protection. Previous research has shown that negative emotions (dental fear, anxiety, neuroticism) are associated with a lower frequency of dental visits<sup>15</sup>. Dental avoidance

increases the prevalence of caries<sup>16</sup> and leads to a deterioration of the quality of life related to oral health<sup>17</sup>.

The above considerations led us to the following general objective: to analyze vulnerability to perceived infectability and germ aversion, fear of COVID-19 and to the rejection of hypothetical dental clinic attendance in Spanish adults in the period from the beginning to the end of the confinement. In accordance with the above, it is hypothesized that a positive association will be found between perceived vulnerability (an increase in perceived germ aversion or infectability) and fear of COVID-19 before and after confinement. In addition, it is expected that significant differences will be encountered as regards gender and whether or not COVID-19 was suffered, and that perceived vulnerability before confinement may predict dental avoidance.

## **Materials and Methods**

### *Design type*

A repeated measures design was used with two time points: before lockdown (T0) and after completion of total lockdown (T1). A self-complete questionnaire was administered to a convenience sample of adults aged 18 years and over, residing in a district of Madrid (XXX), which is a representative area of the community of Madrid in terms of socioeconomic level. At T0, 1,008 participants were surveyed on the streets from March 1 to March 8, 2020. At that time, the state of alarm in Spain and the confinement had not yet been declared.

The criteria for inclusion were to be  $\geq 18$  years old and understand Spanish well. Three of the researchers each day organized themselves into a district sampling, balancing the sample in terms of gender and age. The questionnaire was collected through a self-administered electronic format. In addition, a member of the research team was present in case they had any questions. The nature of the study was explained to them, and they were asked to give informed consent in which, apart from giving consent to

participate in the study, they agreed to be followed up later (T1) selecting the method (Whatsapp or e-mail). Our study was approved by the Rey Juan Carlos University Ethics and Research Committee (Registration number: 0103202006520)

At T0, the survey consisted of structured questions organized in the two section of: (1) demographic data: age, gender and level of education (uneducated, primary, secondary, higher education); and (2) Perceived vulnerability to disease. The questionnaire is attached in the online Appendix.

At T1, Spain had completed total lockdown (4-11 May 2020), and then dental clinics were allowed to reopen. All T0 participants were contacted to participate in T1. There was a 4.6% sample loss due to non-response at T1. Accordingly, the final sample comprised of 961 participants. An online electronic questionnaire was constructed and implemented using Google forms and included an attached consent form. The link to the questionnaire was sent by email or WhatsApp. Upon receiving and clicking on the link, participants were automatically directed to the study information and the consent FORM. After filling in data about the acceptance of the survey and inserting a participant code, they answered the questions that appeared sequentially. Only those who had access to the internet were allowed to participate in the study.

In this phase, the survey consisted of: (1) Scale of perceived vulnerability to disease (which had already been collected at T0); (2) Scale of fear of COVID-19 (published during the confinement, so it was not possible to apply it in T0); (3) Structured questions about avoidance behaviour towards the dental clinic; (4) They were also asked if they had been ill with COVID-19 (confirmation by positive PCR). The questionnaire is attached in the online Appendix.

### *Instruments*

Perceived vulnerability to disease was assessed through the perceived vulnerability to disease (PVD) scale<sup>18</sup>, validated for Spanish use by Magallares, Fuster-Ruiz de Apodaca,

and Morales<sup>19</sup>. The PVD scale contains 15 items using a Likert scale response format from 1 (totally disagree) to 7 (completely agree). This scale has the two subscales: of perceived infectability (7 items) and germ aversion (8 items). An example of an item in the “Perceived infectability” subscale is “I am more likely to catch an infectious disease than people in my environment”. An example of an item in the “Germ aversion” subscale is, “I prefer to wash my hands right after shaking someone’s hand”. Scores were calculated by adding and averaging the 7 items of the "Perceived Infectability" subscale and the 8 items of the "Germ Aversion" subscale. With a score range of 1 to 7, higher scores on the “Perceived Infectability” subscale reflect people's greater perceived susceptibility to infectious diseases. With a score range of 1 to 7, higher scores on the “Germ aversion” subscale reflect greater discomfort of individuals in situations that denote a higher probability of pathogen transmission.

The fear of COVID-19 scale (FCV-19S) was used, this had been recently developed and validated by Ahorsu et al<sup>20</sup>. This questionnaire was translated to Spanish using a forward and backward translation procedure. This scale contains a 7-items scale, participants rated their agreement with the statements using a five-point Likert scale, using the responses 1 (strongly disagree) to 5 (strongly agree) with scores in the range of 7 to 35. For instance, “It makes me uncomfortable to think about coronavirus-19”. The higher the score, the greater was the patient’s fear of COVID-19. The internal consistency of the FCV-19S in the present study was very good ( $\alpha = 0.91$ ).

Among the structured questions about avoiding the dental clinic were: “Are you afraid to visit the dentist for fear of COVID-19?” The response format was dichotomous (Yes/no). “Are you going to the dentist?” The response format was dichotomous (Yes/no).

Those who answered that they would go were asked what their reasons were for continuing to go to the dentist (“because I don’t want to change my habits”, “because I

have a treatment course open”, and other reasons) and were asked whether they would start aesthetic, orthodontics, or implantology treatment (dichotomous question yes/no).

Those who answered that they would not go were asked why (e.g., fear of COVID, economic problems, or other reasons) and how long they would maintain this decision (e.g., until the disease is eradicated, until I am vaccinated, until an effective medication against COVID-19 appears, or when my economy or others recover).

They were also asked independently whether they would go to the dentist in the next year for a gum problem, for a suspected cavity, or for a lost or broken filling or tooth. A five-point Likert scale was used, from 1 (“I sure would”) to 5 (“I sure wouldn’t”).

### *Statistical analysis*

Statistical analysis used SPSS version 24 (SPSS Inc., Chicago, IL, USA). Data analysis included descriptive statistics and the Kolmogorov–Smirnov test to evaluate the assumption of normality, which was confirmed. Paired T-tests examined differences in T0–T1 for continuous variables in the sample and by gender. Pearson's correlation coefficient was used to analyse the association between continuous variables. A logistic regression analysis was carried out, using attendance to a dental clinic as a dependent, with responses (yes = 0, no = 1) as independent dichotomized variables in the first step: aversion to germs in T1, perceived infectability in T1, fear of COVID in T1, being older than 60 years, and gender. The cut-off points used for the dichotomization of these variables were high aversion to germs ( $\geq 5$ ), high aversion to infectability ( $\geq 5$ ), and high fear of COVID-19 ( $\geq 30$ ). The probability ratio, with a 95% confidence interval, was calculated using logistic regression analysis to evaluate dental clinic avoidance and the degree of association between avoidance and independent variables. Statistical significance was established at  $p < 0.05$ .

### **Results**

As can be seen in Table 1, the sample (N=961) is composed of 402 men and 559 women, with an average age of 38.4 ( $\pm 16.1$ ) years. In terms of educational levels for the total

sample, 8.7% completed primary school, 28.3% completed secondary school, and 59.6% obtained a university degree. 58 participants had suffered from COVID-19, with confirmed positivity by a PCR test in T1.

Descriptive statistics are reported in Table 2. Participants experienced significantly higher scores on T1 than T0, both in infectability ( $p < 0.01$ ) and in aversion to germs ( $p < 0.01$ ).

As shown in Table 3, there is a significant positive correlation between the COVID-19 fear scale and the subscales of infectability and germ aversion in T0 and in T1 ( $p < 0.01$ ). Furthermore, a strong positive association was found between fear of COVID-19 in T1 and aversion to germs in T0 ( $p < 0.01$ ).

As shown in Table 4, significant gender differences were found in the subscale of infectability (♀;  $M = 4.2$ ,  $sd = 1.1$ ) (♂;  $M = 3.9$ ,  $sd = 1.1$ ) ( $p < 0.01$ ) and germ aversion in T1 (♀;  $M = 4.6$ ,  $sd = 1.1$ ) (♂;  $M = 4.4$ ,  $sd = 1.1$ ), with higher scores for women. Significant differences were also found for the fear of COVID-19 scale (♀;  $M = 21.5$ ,  $sd = 6.6$ ) (♂;  $M = 19.6$ ,  $sd = 6.6$ ;  $p < 0.01$ ) in T1, with higher scores for women. No gender differences were found in T0–T1.

#### *Differences between participants who have been infected with COVID-19*

Participants who had overcome the disease ( $N = 58$ ) presented a higher COVID fear score ( $M = 23.06$ ,  $sd = 6.57$ ) than the rest ( $M = 20.62$ ,  $sd = 6.67$ ) ( $p < 0.01$ ) and greater change in germ aversion in T0–T1 ( $M = -0.73$ ,  $sd = 0.86$ ) than the rest ( $M = -0.44$ ,  $sd = 0.68$ ) ( $p < 0.05$ ).

#### *Avoidance of dental visit*

As shown in Table 5, within the sample, 30.9% admitted to being afraid of going to the dentist because of the possibility of contagion by COVID-19 ( $N = 297$ ), although more than half would continue to go to the dentist ( $N = 541$ , 56.3%). 25.3% of the respondents would go to the dentist because they had not finished their treatments ( $N = 243$ ), but 42.5% would not start aesthetic, orthodontic, or implant treatments ( $N = 408$ ).



Of the total sample, 43.7% would not go to the dentist (N=420), 24.5 % for fear of COVID-19 (N=235), 16% because of financial problems (N=154), and 3.2 % for others reasons (N=31). More than half of the respondents would maintain this decision until the disease is eradicated or an effective treatment is found. In addition, 20.7% (N=199) would not go to the dentist even if they had gum problems; 20.2% would not go even if they suspected that they might have cavities (N=194); and, lastly, 16.3% would not go even if fillings or teeth were fractured (N=157).

A logistic regression analysis was carried out, with the Hosmer–Lemeshow test, the logistic model is considered adequate (.732) and explains 35.2% of the variability from Nagelkerke’s R-square value.

Based on multivariate analysis, the three variables that showed a significant relationship with  $p = 0.001$  were perceived infectability, fear of COVID-19, and being older than 60 years. The respondents who had a high score on the scale of perceived infectability were at least five times more likely not to visit the dentist (OR = 4.21,  $\beta = 1.43$ ). Those with a COVID-19 fear score above 30 were at least six timesore likely not to visit the dentist (OR = 5.18,  $\beta = 1.64$ ). Finally, participants older than 60 were eight times more likely not to go to the dental clinic (OR = 7.63,  $\beta = 2.03$ ).

## **Discussion**

The results obtained in this research can contribute to the clarification of increased levels of vulnerability to infectability and germ aversion in the Spanish population promulgated by the fear of COVID-19 during a two-month pandemic period (March and April 2020). Research on other infectious disease outbreaks suggests that individual difference variables, such as perceived vulnerability to disease, may play a role in coronavirus phobia and the development of xenophobia or social discrimination related to the said virus<sup>21</sup>.

Furthermore, a large percentage of citizens say they would not go to dental surgery, other than for an emergency, until effective treatment for COVID-19 or a vaccine is found.

Such avoidance behaviour is typified by Hayes et al. and promoted by fear of contracting the virus<sup>22</sup>. In previous studies, the prevalence of fear of COVID-19 has not been specified as other emotional states predictive of fear, such as anxiety have. Specifically, the prevalence of anxiety after confinement varies from 27.2% to 38.7% in different studies<sup>23,24</sup>.

The results of our study also reveal a significant difference in terms of fear of infection; this fear being greater in women than in men. This difference may be due to women knowing how to recognize and express their feelings, and uncertainty better than men<sup>25</sup>. Recent COVID-19 studies have also endorsed the fact that gender is a consistent predictor of negative affective states such as anxiety, stress or depression<sup>26</sup> as well as showing that women are more careful in implementing hygiene measures than men are in general. Therefore, in a pandemic situation, they are more aware of the risk of COVID-19 disease from failure to comply with hygiene measures<sup>27,28</sup>.

The data show that 43.7% of those surveyed would not go to dental services, and of that percentage 33.8% would not go for fear of contagion from COVID-19 and 44.3% because of economic problems arising from the pandemic. Previous studies support the serious impact on economic life caused by the pandemic<sup>29,30</sup>. The World Trade Organization (WTO) and the Organization for Economic Cooperation and Development (OECD) identified the COVID-19 pandemic as the greatest threat to the economy since the financial emergency of 2008–2009. Some experts have even said that the world is facing its greatest emergency since World War II. It is estimated that there will be an approximate monthly loss of 2% in annual GDP growth<sup>29</sup>. Other authors report that rampant unemployment best describes this crisis, with consequences for the psychological, economic, and social well-being of individuals<sup>30</sup>.

The limitations of this study are linked to the sample used, which has an associated bias in that it is not random, which may have biased our results and limited the generalization of the findings to a broader population. Although the gender of the participants was chosen in an equitable manner, so that, prior to the pandemic, the

prevalence of vulnerability to infection and rejection of the germs observed in our sample remained within the limits recorded in previous works among the adult population<sup>18</sup>. A possible second limitation comes from the use of self-reporting measures, which may be affected by responses based more on social desirability than reality. Finally, the COVID-19 fear discussion would have methodological limitations because the COVID-19 measurement instrument was validated and published after the commencement of our study<sup>31</sup>.

This research has some implications that may be of some relevance to dental practice. It is quite possible that the presence of COVID-19 among the public has led to a certain degree of rejection of dental services. Psychological support will be needed to assist patients in the face of emotional disturbances, some of which may be linked to the pandemic and to help them overcome levels of fear and anxiety<sup>32</sup>. Exposure therapy may be an effective resource in improving certain avoidance behaviour<sup>33</sup>. In addition, since chronic stress is an important modulator of immunity, it may be linked to and thus directly influence the likelihood of infection.

Probably after this pandemic, due to the increased fear of COVID-19, not only will avoidance behaviour develop in dental practices but also in other medical specialities. It would be important to identify the people at risk of developing negative emotions and avoidance tendencies in order to try to reduce the impact on the population's overall health.

Furthermore, the prevention-based approach to dentistry may be negatively influenced by this new era of COVID-19 fear, which may bring the patient to the dental clinic only for urgent or curative treatments and discard the preventive support so important for oral health. Specialists recommend that patients be examined every six months or at least once a year.

Early intervention can help to avoid invasive treatments such as tooth extraction. Regular consultation will spare patients from exposure to pain and oral pathologies, as well

as from the side effects associated with the spread of infections<sup>34-38</sup>. In summary, we believe that promotion, prevention, and education at the individual and general population level should focus on psychosocial support for the management of the effects derived from the fear of the virus, as well as on emphasizing messaging focusing on the importance of periodic consultations for the maintenance of oral and general health<sup>35,36,39-41,44-46</sup>.

Future lines of research will be necessary to assess to what extent the fear of COVID-19, the perception of vulnerability, and the population's aversion to germs could be associated with difficulties related to causing problems in oral, systemic and mental health, or if the passage of time will allow people to become familiar with the presence of the virus, mitigating current rejection behaviours.

In conclusion, our study shows the population's high levels of vulnerability to infectability and perceived germ aversion as being perceived to be possibly associated with COVID-19 fear and the resultant avoidance behaviour to dental care will remain until an effective drug or vaccine for SARS-CoV2 is found.

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### **Conflicts of interest**

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

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## TABLES

**Table 1. Sociodemographic characteristics in T1 by gender (N = 961)**

	Male N=402	Female N=559	Total 1008 (100%)
<b>Age</b> M (SD)	40 (17)	37.2 (15.3)	38.4 (16.1)
18- 60 years old N (%)	336 (35%)	501 (52.1%)	837 (87.1%)
≥60 years old N (%)	66 (6.9%)	58 (6%)	124 (12.9%)
<b>Education level</b> N (%)			
No studies	15 (1.6 %)	17 (1.8%)	32 (3.3%)
Primary	49 (5.1%)	35 (3.6%)	84 (8.7%)
Secondary	113 (11.8%)	159 (16.5%)	272 (28.3 %)
Higher education	225 (23.4%)	348 (36.2%)	573 (59.6%)

**Table 2. Mean, standard deviation, N (%) in T0/T1 and significance in T0-T1 for the variables of perceived vulnerability to infection (Infectability subscale and Germ-Aversion Subscale) and fear of COVID-19.**

Variables	T0 N= 1008	T1 N= 961	T0-T1 p value
<b>Vulnerability to infection</b>			
Infectability subscale M(SD)	3.3 (1.1)	4.1 (1.1)	<0.001**
<i>Score 1-3 N (%)</i>	446 (46.4%)	190 (19.8%)	
<i>Score 3-5 N (%)</i>	429 (44.6%)	516 (53.7%)	
<i>Score 5-7 N (%)</i>	86 (8.9%)	255 (26.5%)	
Germ-Aversion Subscale M(SD)	3.5 (1.1)	4.5 (1.1)	<0.001**
<i>Score 1-3 N (%)</i>	332 (34.5%)	82 (8.5%)	
<i>Score 3-5 N (%)</i>	530 (55.2%)	548 (57 %)	
<i>Score 5-7 N (%)</i>	99 (10.3%)	331 (34.4%)	
<b>Fear of COVID-19 M(SD)</b>		20.7 (6.6)	
<i>Score 1-12 N (%)</i>		81 (8.4%)	
<i>Score 12-30 N (%)</i>		672 (69.9%)	
<i>Score 30-35 N (%)</i>		208 (21.6%)	

\*\* . Significance at the 0.01 level

**Table 3. Cronbach's Alpha and intercorrelations between subscale of infectability and germ aversion (at T0 and T1) and fear of COVID-19 (T1).**

Theoretical range	Range	$\alpha$	1	2	3	4	5
1. Infectability subscale T0 (1-7)	1-7	0.783		0.279**	0.587**	0.231**	0.250**
2. Infectability subscale T1 (1-7)	1-7	0.859			0.188**	0.822**	0.313**
3. Germ aversion subscale T0 (1-7)	1-7	0.729				0.204**	0.324**
4. Germ aversion subscale T1 (1-7)	1-6.7	0.771					0.179**
5. Fear of COVID-19 T1 (7-35)	7-35	0.913					

\*\* . Correlation is significant at the 0.01 level

**Table 4. Mean, standard deviation and significance according to gender for the variables of Vulnerability to infection and Fear of Covid-19.**

Variables	Man	Woman	Man	Woman	Man	Woman	Man/Woman
	M (SD)	M (SD)	M (SD)	M (SD)	<i>p</i>	<i>p</i>	<i>p</i>
	T0	T0	T1	T1	T0-T1	T0-T1	T0-T1
<b>Vulnerability to infection</b>							
Infectability subscale	3.2(1.1)	3.3(1.1)	3.9(1.1)	4.2(1.1)	<0.001**	<0.001**	0.891
Germ-Aversion Subscale	3.5(1.1)	3.6(1.1)	4.4(1.1)	4.6(1.1)	<0.001**	<0.001**	0.296
<b>Fear of Covid 19</b>			19.6(6.6)	21.5(6.6)			<0.001**

\*\* . Significance at the 0.01 level

**Table 5. Dentist avoidance in T1 (N, %).**

Are you afraid to visit the dentist for fear of COVID-19?	Yes	297 (30.9%)	No	664 (69.1%)
Are you going to the dentist in the next year?	Yes	541 (56.3%)	No	420 (43.7%)
	What are your reasons to keep going to the dentist?		Why don't you go to the dentist?	
	Treatment in progress	243 (25.3 %)	Fear of Covid	235 (24.5%)
	I will not change my habits	250 (26 %)	Economic problems	154 (16%)
	Other reasons	48 (5 %)	Other reasons	31 (3.2%)
	Would you start an aesthetic treatment, orthodontic or implant treatment?		How long would you keep this decision?	
Yes	133 (13.8%)	Until the disease is eradicated	110 (11.4%)	
No	408 (42.5%)	Until I am vaccinated	70 (7.3%)	
		Until an effective medication against COVID-19 appears	115 (12%)	
			125 (13%)	

			When my economy or others recover	
Would you go to the dentist in the next year for a gum problem?	Yes	762 (79.3%)	No	199 (20.7%)
Would you go to the dentist in the next year for a suspected cavity?	Yes	767 (79.8 %)	No	194 (20.2 %)
Would you go to the dentist in the next year for a lost or broken filling or tooth?	Yes	804 (83.7 %)	No	157 (16.3%)

**Table 6. Results of the logistic regression model for Dentist avoidance.**

Variables	OR	IC (95%)	p
High Perceived Infectability	4.21	2.87-5.64	<0.001**
High Fear of Covid-19	5.18	2.96-9.4	<0.001**
Older than 60 years old	7.63	3.56-15.35	<0.001**

\*\* . Significance at the 0.01 level