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RESEARCH ARTICLE

Fear of Returning to Face-to-Face Classes in Times of COVID-19: a Cross-Country Comparison

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Abstract

This study aimed to investigate the fear of COVID-19 among university students from various countries in the context of face-to-face classes. This is a cross-sectional study, with a sample of 1,205 university students from several European (Portugal, France and England) and Latin American (Brazil and Paraguay) countries. An online survey was carried out including sociodemographic questions about COVID-19, type of university, face-to-face classes and the Fear of COVID-19 Scale for Face-to-Face Learning (FCV-19S-FL). Descriptive statistics, independent t-tests, ANOVA and multiple linear regression were used for data analysis. The results obtained identified a set of fear predictor variables (*total*, *emotional* and *cognitive*), with emphasis on females, first- and second-year students, attendance of courses not related to Health Sciences, preference for a distance learning model, comorbidities among family members or friends, and no previous COVID-19 infection. The comparative study between countries showed that university students in Brazil showed higher levels of all types of fear, statistically significant when compared to the other countries studied, with the exception of England. The results obtained show the impacts and management of the pandemic at the resumption of face-to-face classes after a period of exclusively distance learning, identifying university students at greater risk of mental health.

Keywords: fear, COVID-19, face-to-face learning, university students, FCV-19S-FL, cross-country study

Introduction

The COVID-19 pandemic started in March 2020 (World Health Organization Europe, n.d.). The rapid spread of SARS-COV-2 across the world, the high lethality rate and the lack of effective treatment have led governments to take a set of measures to mitigate the transmission of the disease (Batra et al., 2022). As the pandemic varied in intensity, these measures included lockdowns in extreme situations, social distancing measures, and the use of face masks and disinfectants. After two years, mass immunization has offered a promising exit strategy for the pandemic and provided a semblance of pre-COVID normality. However, the rise of the XBB.1.5 Omicron subvariant (World Health Organization, 2023) and the subsequent increasing number of new cases in several countries have posed a threat to the pandemic control that was believed to be achieved, causing disruptions to economies, labor markets, and education, among others. Education has been one of the most affected sectors during the pandemic. In the first wave, 87% of students were affected by school closures worldwide (United Nations Educational, Scientific and

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Cultural Organization, 2020). Beyond doubt, one of the most significant disruptions for young people has been the sudden move to remote instruction (Waters & Johnstone, 2022), namely the abrupt shift to distance instruction with online learning platforms only, suspension of all face-to-face classes - including labs and internships - in an attempt to ensure continuity of education during the pandemic (Green, 2022).

On the one hand, these measures have prioritized the health and safety of students; on the other hand, they have posed several challenges, which have been broadly discussed in the literature. Given these exceptional circumstances, "emergency remote instruction" (Hodges et al., 2020) required the use of digital tools, resources and equipment, which many times were not available, became scarce due to high demand (Kennedy, 2020), and/or were shared among family members, eventually affecting access to online classes. The challenge to coordinate academic activities with family responsibilities, dealing with homework overload (Berezhna & Prokopenko, 2020), and internet connectivity and load shedding have become major obstacles in online teaching (Makhoba & Reddy, 2022). Poor technical and digital skills (students and professors), a lack of engagement in online activities, and communication problems due to connection loss and noise interference (e.g., background noise) (Molea & Năstasă, 2020) have also been barriers to distance learning. As pointed out by Makhoba and Reddy (2022, p. 20193), "E-learning does not provide students with the same opportunities for explanation and clarification as face-to-face interactions"; it hampers communication and prevents access to usual non-verbal language in face-to-face teaching.

The closure of universities has triggered not only an abrupt disruption of the learning process but also of peer relationships (Schwartz et al., 2021), close friendships and romantic interactions (López-Castro et al., 2021). According to Hellemans et al., (2020), social isolation and disconnection from the university campus have accounted for a significant loss of social support for many university students, considering the importance of social relationships for their well-being. The practice of social distancing as a major mitigation measure has brought about considerable changes in behavioral patterns (Galea et al., 2020), which stand against a fundamental human need to create bonds and build interpersonal relationships mostly among young adults and "emerging adults" (Arnett, 2000).

Sussman and Arnett (2014) refer to emerging adulthood as the developmental period between adolescence and young adulthood, i.e., from 18 to 25 of age. In this period, change and exploration are common, and it is characterized as an "age of possibilities, a period in which many different potential futures remain possible and personal freedom and exploration are higher for most people than at any other time" (Arnett, 2000, p.479). However, increasing autonomy from parents (e.g., leaving the parental home to pursue higher education) and the significant changes in expected social roles during this period of life (Auerbach et al., 2019) were equally challenging during the pandemic. The closure of campuses and remote learning has prompted a considerable number of students to return home and interrupt their internships (Brooks et al., 2020), bringing uncertainties regarding their professional future. The sudden, abrupt lockdown, the fear of being infected by the virus, the uncertainty about the end of the pandemic, the return to school (Sunde, 2021) and the emergency remote instruction (Hodges et al., 2020) have increased the anxiety associated with normative academic activities (Green, 2022), impacting students´ physical and mental health.

Moreover, the shift to online teaching has caused changes in lifestyle (e.g., use of masks, social isolation and hand disinfection (Rashid & Di Genova, 2020); poor communication between peers and teachers (Ding et al., 2023); and the worsening of learning outcomes and mental and physical health (Fornili et al., 2021), such as decreased motivation, procrastination, increased levels of depression and anxiety (AlAzzam et al., 2021; Carvacho et al., 2021; Dodd et al., 2021; Fruehwirth et al., 2021), post-traumatic stress, confusion and anger during quarantine, as well as and fear of infection (Brooks et al., 2020), which were all aggravated due to the lack of psychological support (Sunde, 2021).

Although young people are not among the high-risk groups for COVID-19, a study developed by Singh et al., (2020) identified them as being more likely to experience symptoms of anxiety and fear of familial infection. Female individuals appear in the literature as more vulnerable to the adverse effects of the pandemic (AlAzzam et al., 2021; Carvacho et al., 2021; Dodd et al., 2021; Fruehwirth et al., 2021).

Notably, students have been confronted with several threats to their mental health and well-being (Arslan, 2022; Alshehri et al., 2020; Browne et al., 2017; Yıldırım & Çelik Tanrıverdi, 2021; Zapata-Ospina et al., 2021) due to

academic and financial stress, poor self-care (Browne et al., 2017) and new challenges, especially those who changed their place of residence. According to a study carried out by the American College Health Association (2019) in May 2019, university students reported anxiety (68.9%), depression (51.6%), loneliness (69.6%), as well as feeling overwhelmed with multiple tasks (88.2%) within the last 12 months.

The pandemic has enhanced mental health risk factors (Chirico et al., 2022; Matuszewki et al., 2022) due to the remodeling of the educational experience (Ashraf et al., 2023; Browning et al., 2021; Ding et al., 2023; Francisco et al., 2021), with the closure of university campuses (Sahu, 2020), the lack of coping strategies to deal with the pandemic challenges (AlAzzam et al., 2021), and/or the use of ineffective coping strategies, such as social media among female university students and substance abuse among male students, both producing a negative effect on academic outcomes (Prowse et al., 2021). News of outbreaks at the university campuses is also a factor contributing to psychological distress (Elsharkawy & Abdelaziz, 2021), which is associated with feelings of uncertainty about the future, poor academic performance and a strong predictor of university dropout (Hellemans et al., 2020).

Returning to the university campus has proved to be equally stressful. On the one hand, it represents a return to "normality" and an opportunity for (re)socialization; on the other hand, it can create distress and anxiety due to the fear of being infected and infecting others, viewing that the fear of being infected is positively correlated to mental health symptoms (Tasso et al., 2021). Likewise, the constraints posed by non-pharmacological measures to mitigate the pandemic (e.g., student monitoring, student mass testing, isolation of symptomatic cases, contact tracing and quarantine of high-risk contacts) (Pollock et al., 2021) and changes in the capacity of classrooms and university residences (Kennedy, 2020) have triggered an increase in levels of depression and anxiety, especially among female students (Ding et al., 2023). Despite these measures, a study conducted by Ding et al., (2023) revealed that some students had concerns about the lack of risk management in large spaces, such as classrooms, and adherence to implemented policies and protocols by universities on the part of the students, especially with regard to testing. Considering that many students reside with their families, the reopening of universities represented a risk for their families and communities (Junge et al., 2022).

Also, the fear of contagion through contact may be more harmful than the spread of the virus itself (Elsharkawy & Abdelaziz, 2021). The mitigation measures, mainly social distancing, resulted in changes in behavior patterns and disruptions in daily routines (Galea et al., 2020), possibly making it more difficult to return to physical proximity, which is inevitable in face-to-face classes, especially in practical classes. On-campus hygiene measures may increase the level of vigilance, negatively affecting their mental health (Rashid & Di Genova, 2020) and eventually their academic success.

Thus, given the dearth of studies about the impacts of resuming face-to-face teaching, the main objective of the present study was to assess the fear of COVID-19 in university students during the return to face-to-face classes in the middle of a pandemic, after a long period of exclusive distance learning in several European and South American countries. As specific objectives, this study aimed to investigate the existence of differences regarding fear (*total*, *emotional* and *cognitive*) among gender; types of students (first- and second-year students vs. others; students attending Health Sciences courses vs. others), public and private universities; history of COVID-19 infection and comorbidities in family and friends; preferred learning model (distance, face-to-face or blended learning); and country of origin.

Method

Participants

The sample was a convenience sampling based on the researchers' background with 1,205 university students from various countries (534 from Portugal, 266 from France, 253 from Brazil, 112 from Paraguay, and 40 from England), aged between 17 and 58 years old (M = 22.67; SD = 5.98), and 843 (70.0%) of them are female (Table 1). A total of 606 (50.3%) students attended public universities; 744 (61.7%) were enrolled in Health Science courses; and 629 (52.2%) were in the first or second year of the course. A total of 879 (72.9%) of the participants had a family member or close friend infected with COVID-19; 685 (56.8%) reported that these family members and friends had comorbidities; and 150 (12.4%) lost someone to COVID-19. The majority of the participants (51.7%) mentioned a preference for a blended learning model (face-to-face and distance learning).

Measures

For the sample collection, an online questionnaire was created with Google Forms, composed of four parts: 1) Sociodemographic questions; 2) Questions about COVID-19; 3) Issues related to the type of university and face-to-face classes; and 4) the FCV-19S-FL Questionnaire.

The Fear of COVID-19 Scale for Face-to-Face Learning – FCV-19S-FL (Gonçalves et al., 2021) is a specific tool to assess the fear of COVID-19 among university students in the context of face-to-face learning. It is composed of nine items (e.g. "Returning to face-to-face classes makes me uncomfortable"), which were answered, "using a five-point Likert scale: "strongly disagree", "disagree", "neither agree nor disagree", "agree", "totally agree". The total score ranges from 0 to 45, and higher scores represent greater fear" (Gonçalves et al., 2021, p.831). The items were translated and adapted into Portuguese for Portugal and Brazil, Spanish, French, and English (Gonçalves et al., 2021). This unidimensional scale includes two factors: cognitive fear (items 1, 2, 4, 5, and 8) and emotional fear (items 3, 6, 7, and 9). The adaptation and validation were initially carried out with the Portuguese sample, showing good reliability results: total Cronbach's alpha (α) of 0.904; α= 0.878 for factor 1; and α = 0.842 for factor 2. The same can be observed in the sample in Brazil (α Total = 0.937; α Factor 1 = 0.907; α Factor 2 = 0.907), Paraguay (α Total = 0.937; α Factor 1 = 0.901; α Factor 2 = 0.917), England (α Total = 0.905; α Factor 1 = 0.851; α Factor 1= 0.858), and France (α Total = 0.866; α Factor 1 = 0.768; α Factor 2 = 0.858), which confirms the instrument is robust (Gonçalves et al., 2021).

Procedure

This is a quantitative study with a cross-sectional design and the data was collected using an online survey between 25 October 2020 and 30 November 2020. The sample was collected using the "Snowball" method, where each researcher recruited future participants via social media (WhatsApp, Messenger, Instagram) and personal contacts, inviting them to participate and sharing the content of the study with their acquaintances among university students and so on, thus providing subsequent referrals. The inclusion criteria for the study were all the students who had gone through a period of school closure and attended online classes only, and when the sample was collected, the students were receiving blended education (distance and face-to-face learning). European students (Portugal, France and England) were in the middle of the first semester (the academic year starts in September) and South American students (Brazil and Paraguay) were finishing the school year (the academic year ends in November). Participation in the study was voluntary. Participants were asked to provide informed consent prior to completing the questionnaire and could withdraw from the study by simply not submitting the questionnaire. All procedures were conducted in compliance with the ethical principles of the Declaration of Helsinki and approved by the Brazilian Ethics Committee of the Union of Faculties of the Great Lakes– Unilago/SP (N. 4,393,453).

Data analysis

The data were analyzed with the IBM® SPSS® Statistics software (Statistical Program for Social Sciences), version 27.0 for Windows. Descriptive statistics were used to estimate the frequencies, percentages mean and standard deviation of the sociodemographic characteristics of the participants. Data normality was verified with the Shapiro-Wilk test. The independent t-test was used to assess the levels of *total fear*, *emotional fear* and *cognitive fear* when comparing two different groups (e.g., gender, type of university and COVID-19 variables). Cohen's *d* was used to calculate *emotional fear* effect sizes. The following guidelines were observed: $| d | \leq 0.20$ interpreted as a small *emotional fear* effect size, $| d | = 0.50$ as a moderate *emotional fear* effect size, and $| d | \geq 0.80$ as a large *emotional fear* effect size (Cohen, 1988). We used an ANOVA test to compare the mean levels of *total fear*, *emotional fear* and *cognitive fear* between the various countries, as well as fear levels according to the *emotional fear* erred type of learning (face-to-face, blended or distance learning), followed by Tukey's post hoc test. To assess the factors associated with *total fear*, *emotional fear* and *cognitive fear*, multivariate linear regression models were performed (Method Enter), including the following independent variables: gender, being a first- or second-year student, attending Health Science courses, attending a public or private university, preference for face-to-face learning, preference for blended learning, preference for distance learning, having had a family member or friend infected with COVID-19 and family members or friends with comorbidities. Variables that showed significant levels greater

than 0.05 were not considered in the final model. For all analyses, the level of statistical significance was set at $p < .05$.

Results

FCV-19S-FL levels according to the total sample characteristics

Independent t-tests were performed (Table 2) to verify the existence of significant differences in the levels of *total fear*, *emotional f*ear and *cognitive fear* according to the characteristics of the total sample.

Table 1. Sociodemographic characteristics of the participant

		Portugal		France		Brazil		Paraguay		England		Total	
Characteristics	Level	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Gender													
	Male	130	24.3	88	33.1	102	40.3	35	31.3	7	17.5	843	70.0
	Female	404	75.7	178	66.9	151	59.7	77	68.6	33	82.5	362	30.0
University													
	Public	409	76.6	51	19.2	106	41.9	2	1.8	38	95.0	606	50.3
	Private	125	23.4	215	80.8	147	58.1	110	98.2	2	5.0	599	49.7
Academic Year													
	First and Second Year	323	60.5	128	48.1	151	59.7	15	13.4	12	30.0	629	52.2
	Others	211	39.5	138	51.9	102	40.3	97	86.6	28	70.0	576	47.8
Type of course													
	Health Sciences	283	53.0	206	77.4	141	55.7	112	100	2	5.0	744	61.7
	Others	251	47.0	60	22.6	106	41.9	0	0.0	38	95.0	461	38.3
Preferred Type of Learning													
	Blended (Face-to-face and distance learning)	299	56.0	167	62.8	86	34.0	45	40.2	26	65.0	623	51.7
	Distance Learning	111	20.8	48	18.0	120	47.4	23	20.5	9	22.5	311	25.8
	Face-to-face Learning	124	23.2	51	19.2	47	18.6	44	39.3	5	12.5	271	22.5
Comorbidities (family and friends)[a]		298	55.8	96	36.1	187	73.9	83	74.1	21	52.5	685	56.8
COVID-19 infection (family and friends)[a]		82	15.4	94	35.3	99	39.1	46	41.1	5	12.5	326	27.1

[a] Number and percentage of participants answering "yes" to this question

Genders

The analysis of the total sample showed significant differences between genders in relation to the level of *total fear* [$t(1203) = 4.80$; $p < .001$; $d = 0.302$], *emotional fear* [$t(1203) = 5.62$; $p < .001$; $d = 0.353$], and *cognitive fear* [$t(1203) = 2.92$; $p = .004$; $d = 0.184$]. Females showed significantly higher values than their male counterparts in relation to *total fear*, *emotional fear* and *cognitive fear*. The country analysis showed significant statistical differences among Portuguese students for *total fear* [$t(532) = 4.81$; $p < .001$; $d = 0.485$], *emotional fear* [$t(532) = 5.64$; $p < .001$; $d = 0.569$], and *cognitive fear* [$t(532) = 2.76$; $p = .006$; $d = 0.279$]. The same was observed among Brazilian students for *total fear* [$t(251) = 2.99$; $p = .023$; $d = 0.293$], and *emotional fear* [$t(251) = 2.56$; $p = .011$; $d = 0.327$]. Among French and Paraguayan students, there were no statistically significant differences in gender and levels of fear, but females showed higher values. This analysis could not be carried out in England given the disparity of the groups.

Table 2. Means, standard deviations and independent t-test between FCV-19S-FL levels according to the characteristics of the sample

Characteristics of the Sample	Total Fear					Emotional Fear					Cognitive Fear				
	M	*SD*	*t(1203)*	*p*	Cohen's *d*	*M*	*SD*	*t(1203)*	*p*	Cohen's *d*	*M*	*SD*	*t(1203)*	*p*	Cohen's *d*
Female (n=843)	23.00	8.79	4.80	< .001	0.302	15.07	5.39	5.62	< .001	0.353	7.94	4.06	2.92	.004	0.184
Male (n=362)	20.36	8.70				13.15	5.53				7.21	3.75			
Public Universities (n=606)	22.78	8.52	-1.30	.023	-0.244	14.92	5.29	-2.27	.007	-0.269	7.87	3.94	-2.71	.193	-0.075
Private Universities (n=599)	21.63	9.12				14.06	5.67				7.57	4.01			
First-and Second-Year Students (n=629)	22.49	8.95	1.17	.242	0.067	14.65	5.50	1.07	.285	0.062	7.84	4.06	1.12	.262	0.065
Students attending other academic years (n=576)	21.90	8.73				14.31	5.49				7.58	3.89			
Students attending Health Sciences Courses (n=744)	21.62	8.97	-2.94	.003	-0.174	14.10	5.61	-3.12	.002	-0.301	7.52	3.94	-2.21	.027	-0.247
Students attending other courses (n=461)	23.16	8.56				15.12	5.26				8.04	4.03			
Previous COVID-19 Infection (n=326)	21.73	9.08	1.15	.249	0.075	13.96	5.50	2.03	.043	0.131	7.76	4.20	-0.23	.814	-0.015
No previous COVID-19 infection (n=879)	22.38	8.75				14.68	5.48				7.70	3.90			
Comorbidities(n=685)	23.89	8.87	-7.70	< .001	-0.448	15.63	3.45	-8.45	< .001	-0.493	8.25	4.16	-5.4	< .001	-0.314
No comorbidities (n=520)	20.00	8.32				13.00	5.34				7.02	3.62			

Universities

Statistically significant differences were also found between students from public and private universities at the *total fear* [$t(1203) = -1.30$; $p = .023$; $d = -0.244$] and *emotional fear* [$t(1203) = -2.27$; $p = .007$; $d = -0.269$], with students from public universities showing significantly higher values. No statistically significant differences in *total fear*, *emotional fear* and *cognitive fear* levels were found between first- and second-year students compared to students of other years. Accordingly, Pearson's correlation coefficient indicated a very weak negative relationship between the year of the course and *total fear*, *emotional fear* and *cognitive fear*, but with no statistical significance. Students from Health Sciences courses showed significantly lower values compared to students from other courses for *total fear* [$t(1203) = -2.94$; $p = .003$; $d = -0.174$], *emotional fear* [$t(1203) = -3.12$; $p = .002$; $d = -0.301$], and *cognitive fear* [$t(1203) = -2.21$; $p = .027$; $d = -0.247$].

COVID-19: infection and comorbidities

Students who had a family member or friend infected with COVID-19 showed statistical differences with students who did not have a family member or friend infected with COVID-19, only for *emotional fear* level [$t(1203) = 2.03$; $p = .043$; $d = 0.131$]. Those who had a family member or friend infected with COVID-19 had significantly lower *emotional fear* levels ($M = 13.96$; $SD = 5.50$ versus $M = 14.68$; $SD = 5.48$). Statistically significant differences were also found between students with family members or friends with comorbidities, compared to students with family members or friends without comorbidities for *total fear*, *emotional fear* and *cognitive fear* with students with family members or friends with comorbidities having significantly higher levels of all dimensions.

Table 3. Means, standard deviations and one-way analysis of variance in FCV-19S-FL levels between countries

Measure	Country	M	SD	F(4, 1200)	η^2
Total fear	Brazil	25.51	9.79	32.75***	.098
	England	24.88	7.94		
	Portugal	23.02	8.11		
	France	17.58	7.10		
	Paraguay	20.94	9.43		
Emotional fear	Brazil	16.23	5.63	34.11***	.102
	England	15.78	4.80		
	Portugal	15.35	5.11		
	France	11.65	4.90		
	Paraguay	12.75	5.64		
Cognitive fear	Brazil	9.29	4.70	26.91***	.082
	England	9.10	3.72		
	Portugal	7.66	3.72		
	France	5.94	2.73		
	Paraguay	8.19	4.32		

***$p < .001$

FCV-19S-FL levels among students from different countries

Table 3 lists the statistically significant differences in levels of *total fear* [($F(4, 1200) = 32.75$; $p < .001$; $\eta^2 = .098$], *emotional fear* [($F(4, 1200) = 34.11$; $p < .001$; $\eta^2 = .102$] and *cognitive fear* [($F(4, 1200) = 26.91$; $p < .001$; $\eta^2 = .082$] among different countries. Brazilian students showed significantly higher values of *total fear*, followed by England, Portugal, Paraguay and France. With regard to *emotional fear* and *cognitive fear*, Brazil is also the country with significantly higher mean levels, followed by England, Paraguay, Portugal and France. With regard to *total fear*, Tukey's post hoc test yielded statistically significant differences between Brazil and Portugal, Brazil and France, Brazil and Paraguay, Portugal and France, England and France, and Paraguay and France. As for *emotional fear*, statistically, significant differences were found between Brazil and France, Brazil and Paraguay, Portugal and

France, Portugal and Paraguay, England and Paraguay, and England and France. For *cognitive fear* levels, there were statistically significant differences between Brazil and Portugal, Brazil and France, Portugal and France, Paraguay and France, and England and France.

FCV-19S-FL levels according to the preferred learning model

Table 4 describes the statistically significant differences in levels of *total fear* [$F(2, 1202) = 141.07$; $p < .001$ $\eta^2 = .190$], *emotional fear* [($F(2, 1202) = 130.90$; $p < .001$ $\eta^2 = .179$], and *cognitive fear* [$F(2, 1202) = 109.56$; $p < .001$ $\eta^2 = .154$] between the different models. The students who prefer a distance learning model show significantly higher mean levels of fear (*total*, *emotional* and *cognitive*), followed by students who prefer a blended model. Students who prefer a face-to-face learning model show lower mean levels of fear in all domains.

Table 4. One-way analysis of variance in FCV-19S-FL levels according to the preferred learning model

Measure	Preferred Learning Model	M	SD	F(2, 1202)	η^2
Total fear	Distance learning (n=311)	28.00	9.29	141.07***	.190
	Face-to-face learning (n=623)	21.56	7.74		
	Blended learning (distance and face-to-face classes) (n=271)	17.06	6.74		
Emotional fear	Distance learning (n=311)	17.77	5.36	130.90***	.179
	Face-to-face learning (n=623)	14.33	4.96		
	Blended learning (distance and face-to-face classes) (n=271)	11.08	4.57		
Cognitive fear	Distance learning (n=311)	10.23	4.58	109.56***	.154
	Face-to-face learning (n=623)	7.23	3.46		
	Blended learning (distance and face-to-face classes) (n=271)	5.97	2.85		

***$p < .001$.

Predictors of FCV-19S-FL levels

The multivariate regression analyses are summarized in table 5. In the model referring to *total fear*, it is observed that being female ($\beta = .14$; $p < .001$), being a student of Health Science courses ($\beta = -.06$; $p = .035$), attending the first or second year of university ($\beta = .07$; $p = .012$), having a preference for a distance learning model ($\beta = .29$; $p < .001$), or face-to-face learning ($\beta = -.21$; $p < .001$), and the existence of comorbidities among family members or friends ($\beta = .18$; $p < .001$) are significant predictors of *total fear*, accounting for 24% of the variance [R^2adjusted = .24; $F(6,1198) = 50.97$; $p < .001$]. In the model referring to *emotional fear*, it is also verified that being female ($\beta = .16$; $p < .001$), being a student of Health Science courses ($\beta = -.06$; $p = .016$), attending the first or second year of university ($\beta = .07$; $p = .012$), having a preference for a distance learning model ($\beta = .24$; $p < .001$), or face-to-face learning ($\beta = -.25$; $p < .001$), the existence of comorbidities in family members or friends ($\beta = .21$; $p < .001$), are significant predictors of *emotional fear*, which is associated with having had a relative or friend infected with COVID-19 ($\beta = -.06$; $p = .017$), accounting for 25% of the variance [R^2adjusted = .25; $F(7, 1197) = 57.86$; $p < .001$]. Likewise, in the model referring to *cognitive fear*, being female ($\beta = .08$; $p = .002$), attending the first or second year of university ($\beta = .06$; $p = .027$), having a preference for a distance learning model ($\beta = .32$; $p < .001$), or face-to-face learning ($\beta = -.13$; $p < .001$) and the existence of comorbidities among family member or friends ($\beta = .11$; $p < .001$) are significant predictors of *cognitive fear*, representing 18% of the variance [R^2adjusted = .17; $F(5, 1199) = 50.97$; $p < .001$].

Discussion

In the present study, we have explored the fear of COVID-19 of university students from various countries in the context of face-to-face learning after a period of exclusively distance learning, its relationship with several variables, as well as the protective and risk factors that may be linked to fear in general and, more specifically, to emotional

and cognitive fear. The lack of certainty about COVID-19 and its future implications have been associated with feelings of the unpredictability of events and fear − with fear being one of the most studied emotional reactions during the pandemic. This emotion is defined as an unpleasant state due to threat perception (Schimmenti et al., 2020), acting as an intervening variable between a set of stimuli and behavioral responses (Adolphs, 2013). The fear of contracting an infectious disease, such as COVID-19, plays an important role in the experience of psychological distress (Labrague & Los Santos, 2021), which is why returning to in-person classes after a long period of remote learning may have a negative impact on mental health and academic performance in university students.

With regards to fear, our results indicate the presence of this emotion in the context of face-to-face classes, being associated with a set of variables. In our sample, being female has proved to be a risk factor, as women showed significantly higher mean levels of *total fear*, *emotional fear* and *cognitive fear* compared to their male counterparts; it also represents a predictor variable, accounting for 13.8% of the *total fear* variance; 15.8% for *emotional fear*, and 8.2% for *cognitive fear*.

Table 5. Multiple regression analyses of predictions FCV-19S-FL levels among university students during face-to-face classes

	B	95% CI for *B*		*SE*	β	R^2	Δ R^2
Variable		*LL*	*UL*				
Total Fear						.24	.24
Constant	18.06***	16.77	19.35	0.66			
Female (Yes=1)[a]	2.66***	1.69	3.62	0.49	.14***		
Type of course (Health Sciences=1)[a]	-1.06*	-1.94	-0.73	0.48	-.06*		
Academic year (1st/2nd = 1)[a]	1.16*	0.255	2.06	0.46	.07*		
Preference for distance learning (Yes=1)[a]	5.86***	4.79	6.93	0.55	.29***		
Preference for face-to-face learning (Yes=1)[a]	-4,51***	-5.62	-3.40	0.57	-,21***		
Comorbidities in the family (Yes=1)[a]	3.19***	2.29	4.08	0.46	.18***		
Emotional Fear						.25	.25
Constant	12.09***	11.28	12.89	0.41			
Female (Yes=1)[a]	1.89***	1.29	2.48	0.30	.16***		
Type of course (Health Sciences=1)[a]	-0.72*	-1.30	0.14	0.30	-.06*		
Academic year (1st/2nd = 1)[a]	0.71*	0.16	1.27	0.28	.07*		
Preference for distance learning (Yes=1)[a]	3.05***	2.38	3.71	0.34	.24***		
Preference for face-to-face learning (Yes=1)[a]	-3.2***	-3.94	-2.56	0.35	-.25***		
Comorbidities in the family (Yes=1)[a]	2.28***	1.73	2.84	0.21	.21***		
COVID-19 infection (Yes=1)[a]	-0.75*	-1.36	-0.13	0.31	-.06***		
Cognitive Fear						.18	.17
Constant	6.00***	5.47	6.54				
Female (Yes=1)[a]	0.72**	0.27	1.16	0.23	.08**		
Academic year (1st/2nd = 1)[a]	0.46*	0.05	0.88	0.21	.06*		
Preference for distance learning (Yes=1)[a]	2.88***	2.38	3.38	0.25	.32***		
Preference for face-to-face learning (Yes=1)[a]	-1.23***	-1.79	-0.75	0.27	-.13***		
Comorbidities in the family (Yes=1)[a]	0.94***	0.48	1.33	0.21	.11***		

Note: CI = confidence interval; LL = lower limit; UL = upper limit; [a]All dichotomous variables were coded 0 or 1
* $p < .05$ ** $p < .01$ *** $p < .001$

These results are in agreement with the literature, which clearly shows higher levels of fear of COVID-19 among females (Broche-Pérez et al., 2021; Catania et al., 2020; Sürme et al., 2021). A study carried out by Salman et al., (2022) with 374 university students identified that fear of COVID-19 is higher in females than in males, and may lead to changes in cognitive, affective, and behavioral responses. These results may be explained by the existence

of personal characteristics commonly observed in female students compared to males (e.g., greater emotional expression, lower tolerance for uncertainty and less effective coping strategies) (Sundarasen et al., 2020), increasing their emotional vulnerability in response to the pandemic.

Students in the first and second year of university have higher levels of *total fear*, *emotional fear* and *cognitive fear*, which also represents a predictor variable for all types of fear studied. These results are in line with previous studies (Beisland et al., 2021; Fruehwirth et al., 2021). Similarly, Elsharkawy and Abdelaziz (2021) report being a senior student is a protective factor against fear. Rashid and Di Genova (2020) conducted a survey in May-June 2020 and identified a set of common concerns among university students, including the difficulty in making friends in the first academic year. New friendships among first-year university students are an important element in the psychosocial adjustment of students to the university, which may have been clearly hampered by social isolation due to the campus closure and by the maintenance of pandemic mitigation measures, with emphasis on distancing social, closure of leisure places (e.g., bars) and limited social activities inside and outside the university campus. Especially in Portugal, the cancellation of welcoming festivities for first-year students and other academic events since March 2020 has had an impact on the adaptation of freshmen to university, considering its integrative and facilitating role in the construction of new social support networks.

With regards to the area of education, contrary to the results obtained by other studies (Ruud et al., 2020; Yang et al., 2021), attending a Health Sciences course has proved to be a protective factor against fear in our study, showing lower levels of *emotional fear* and *cognitive fear*. In these students, health and scientific literacy seem to promote a greater understanding of the pandemic, and contagion as risk factors and preventive measures, which resulted in reduced fear of face-to-face classes. As for the type of learning and its relationship with fear, it was found that students who preferred face-to-face learning had lower levels of fear, representing a protective variable for *total fear*, *emotional fear* and *cognitive fear*. Similarly, the preference for distance learning represents a predictor variable for higher levels of *Total fear*, *emotional fear* and *cognitive fear*, reflecting the fear of contagion and the preference for restricted environments, more easily controllable. The fear of contagion, and in particular of being infected, is positively correlated with mental health symptoms (Tasso et al., 2021).

The negative impacts of quarantine on the mental health of university students, broadly discussed in the literature (Brooks et al., 2020; Kassir et al., 2021; Rashid & Di Genova, 2020), may be associated with some students´ difficulties in dealing with levels of stress and anxiety, leading to the creation of campus counselling service and mental health support (Agência Lusa, 2021), given the increasing demand for psychological support in universities since the beginning of the pandemic (Gonçalves, 2022). The results of our study showed that students with family members or friends with comorbidities have higher levels of *total fear*, *emotional fear* and *cognitive fear*, representing a risk factor for the various types of fear studied. These results are supported by Satici et al., (2021), who emphasizes that the fear of the unknown associated with pandemics has been connected with the uncertainty about the transmission of the virus and the susceptibility to infection and disease of each population. However, during epidemics, individuals may experience maladaptive psychological consequences just by being close to those they consider to be a potential risk group in terms of a virus outbreak.

Regarding the comparative analysis of the various countries of our sample, we noted that Brazilian students had the highest levels of *total fear*, *emotional fear* and *cognitive fear*, in contrast to their French counterparts, who showed the lowest level in all types of fear. Nevertheless, the results obtained in Brazil differ significantly from those observed in Portugal, France and Paraguay. This exacerbation of fear among Brazilian university students compared with other countries studied may be related to the Brazilian federal government's response to control the pandemic, namely the absence of nationwide guidelines to enforce the use of masks and impose lockdowns (Alegretti, 2021), despite the considerable worsening of the pandemic, the dramatic increase in death toll (Galhardo, 2020), and the challenges faced by the National Healthcare System (Vermelho, 2021). This could be related to a greater perception of risk and therefore significantly higher levels of fear in the context of face-to-face classes. On the other hand, Portugal, France and England were at the beginning of the second wave, when containment measures were being intensified, such as the mandatory use of masks in classrooms, cleaning and disinfecting of public and common spaces, and the reduction of the number of students on university campuses through blended education.

The absence of statistically significant differences between Brazil and England may be explained by the fact that England is one of the European countries with the highest cases in the different waves, with various pandemic mitigation strategies, including hardening and softening of confinement measures and eventual lifting of imposed restrictions. This changeable strategy may have contributed to a greater feeling of insecurity in a period when England faced a surge in the number of infections (September and October), contributing to an increase in anxiety levels and a decrease in life satisfaction in this period (Office for National Statistic, 2020). In the United Kingdom, the lack of a uniform set of guidelines to reopen universities and teaching methodology (Nurunnabi & Almusharraf, 2020), the reopening of campuses in a period of great transmission of the virus, and a significantly increased number of new cases among university students, despite the mitigation measures adopted by universities (Blakey et al., 2022), may justify the levels of fear identified. In Brazil, the "denial stance" of the Federal Government and the precariousness of sanitary conditions (Francisco et al., 2021) has led to a dramatic increase in the rate of infections and deaths, negatively influencing the entire community, including university students.

Study limitations

Some limitations need to be acknowledged. First, there is a lack of assessment of the mental state of university students. Approaching the correlation found in the literature among fear, anxiety and depression, including the instruments that measure these dimensions, would have enabled a detailed correlational study among these three variables. Second, the method used (online survey and snowball) did not allow for the homogenization of the sample into groups (e.g., gender, type of university) in different countries. Notably, the sample included most respondents from Health Sciences Courses, which can be explained by the fact that the researchers worked in the Health area, and therefore had easier access to the Health Sciences students. Last, including other countries of Europe and the Americas, would have undoubtedly been an asset, allowing a greater understanding of the fear of Covid-19 as university students returned to face-to-face classes. However, despite our efforts, this was not possible due to the multiple and fast-changing stages of the pandemic worldwide, and consequently, the measures to mitigate the spread of the virus. During data collection, we were confronted with the abrupt closure of universities in countries where the collection had just started, e.g., in Italy, leading to the exclusion of these subjects for not meeting the inclusion criteria (face-to-face classes).

Contribution and implication of findings

The major contribution of our study is the identification of predictor variables of fear of COVID-19 in face-to-face classroom contexts, identifying female students attending the first or second year of university, enrolled in courses not related to the Health Sciences area, and who prefer an exclusive distance learning model. In view of these results and the association between fear of COVID-19 and depressive and anxious symptoms in students (Sultana et al., 2021), it is strongly advised to develop intervention strategies aimed at these students, in order to promote mental and physical health and/or identify and intervene in maladaptive situations, which may negatively influence their academic outcomes. The reinforcement of psychological support in higher education and the intensification of its demand by university students confirm the such impact. Health Sciences students receive a solid grounding in emergency preparedness and health protection, which highlights the importance of health literacy for improving adaptation to the pandemic. In addition, it seems important to us that an in-depth investigation should evaluate and monitor university students´ mental health in the post-pandemic period (i.e., back to "normality") to verify if mental health values, such as depression and anxiety, returned to pre-pandemic baseline levels. Finally, this cross-country study highlights the influence of government policies in the management of the pandemic and risk management, visible in the variation in the levels of fear among university students from the various countries studied, with emphasis on Brazilian students, who undoubtedly have higher levels of fear in all domains. According to how public governance is exercised, these policies may engender a sense of security and insecurity and affect the population's mental health in a positive or negative manner; therefore, communication lies at the heart of a successful strategy.

Conclusion

The negative impacts of the pandemic and mitigation measures on students' mental health have been reported by numerous studies. Fear, an unpleasant emotion due to the perception of threat (Schimmenti et al., 2020), influences individuals´ behavioral responses. Despite its adaptive nature, fear may negatively affect the adaptation of individuals to the context of action and, it is in this context that our study plays a key role in analyzing the fear of

COVID-19 in the return to face-to-face classes. The results demonstrate the existence of moderate overall levels of fear − as expected − considering the persistence and unpredictability of the pandemic. However, given the scarcity of studies of this nature, our study provides essential elements for the understanding of fear, identifying a set of fear predictor variables, and allowing prompt identification and monitoring of university students at greater risk of mental health. Ultimately, health literacy and effective management of the pandemic by governmental authorities clearly provide protective elements and psychological empowerment for individuals to cope with atypical and threatening situations, such as the COVID-19 pandemic.

Compliance with Ethical Standards

Acknowledgements

Not applicable.

Ethics

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Ethics Committee of the Union of Faculties of the Great Lakes– Unilago/SP (N. 4,393,453). Informed consent was obtained from all participants.

Competing interests

The authors declare no conflict of interest.

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