# Peer

## Experience of COVID-19 disease and fear of the SARS-CoV-2 virus among Polish students

#### Elżbieta Turska<sup>1,\*</sup>, Natalia Stępień-Lampa<sup>2,\*,†</sup> and Paweł Grzywna<sup>2</sup>

<sup>1</sup> Institute of Psychology, University of Silesia, Katowice, Silesian Voivodeship, Poland

<sup>2</sup> Institute of Political Science, University of Silesia, Katowice, Silesian Voivodeship, Poland

<sup>t</sup> These authors contributed equally to this work.

<sup>†</sup> Deceased.

#### ABSTRACT

**Background**. The SARS-CoV-2 virus pandemic has significantly affected individuals and entire societies. It has caused a number of adverse consequences for public health. It has contributed to lower average life expectancy and significantly reduced the sense of health security. It has affected not only physical but also mental health. COVID-19 infections have become so common in many countries, including Poland, that almost every member of society has either experienced it themselves or has a family member or friend who have been affected by the disease. The investigations undertaken in the article concern the fear of COVID-19 infection among Polish university students, determined by the experience of the disease –whether direct or among loved ones.

**Methods**. An online survey was conducted with 851 students. It took place between 1 and 15 March 2021, a year after detection of the first case of infection with the virus in Poland. The aim of the study was to find out about the relationship between the experience of COVID-19 disease (whether direct or among people close to the respondent) and fear of this disease among university students in Poland. The analysis used intergroup comparison tests (Mann–Whitney *U* Test and *t*-test).

**Results**. The results indicate that the level of fear of COVID-19 among Polish university students was low (M = 1.98; SD = .49), with women (M = 2.04; SD = .75) presenting statistically higher (t (620.46) = 3.05; p = .002) fear than men (M = 1.87; SD = .74). The situation of the respondent having had a close person fall ill with COVID-19 or die as a result of coronavirus infection was found to be significant for the level of experienced fear of COVID-19 in the studied group (t (469.46) = -2.98; p = .003).

**Conclusions**. The significantly higher level of fear in the group of young people who knew someone close with severe (fatal) COVID-19 disease indicates that psychological support may be more significant for such people than for individuals who have not experienced such a situation. A similar conclusion can be formulated taking into account the gender criterion, as the results make it possible to predict that women expect more support in a pandemic situation.

#### Subjects Mental Health, COVID-19

Keywords Polish students, COVID-19 pandemic, Fear of COVID-19, Experience of COVID-19 disease

Submitted 4 May 2022 Accepted 17 October 2022 Published 13 December 2022

Corresponding authors Elżbieta Turska, elzbieta.turska@us.edu.pl Paweł Grzywna, pawel.grzywna@us.edu.pl

Academic editor Jayakumar Saikarthik

Additional Information and Declarations can be found on page 11

DOI 10.7717/peerj.14356

Copyright 2022 Turska et al.

Distributed under Creative Commons CC-BY 4.0

OPEN ACCESS

#### INTRODUCTION

The COVID-19 pandemic forced people around the world to face previously unknown challenges. COVID-19 is an infectious disease caused by the SARS-CoV-2 coronavirus. One of the characteristic features of any infectious disease is fear. It is significantly linked to the manner of perceiving difficult situations, to the undertaking of certain behaviors, and to adaptation processes. Fear is a natural reaction of the body indicating potential danger, and mobilizing the individual to take actions to cope (*Lazarus, 1986; Borecka-Biernat, 2017*).

Studies related to COVID-19 have confirmed increased levels of fear around the world (*Knipe et al., 2020*). The most common causes of fear which are emphasized include fear of accidental contact with an infected person, fear of being infected or of infecting one's nearest and dearest, and the fear of isolation from other people (*Lin, 2020*). Fear of the infectious disease is mainly associated with the rapidity of the spread of the virus, the high risk of infection, and the substantial mortality rate (*Pappas et al., 2009*).

It has been proven that during a pandemic, a certain level of fear has a significant positive effect on protective behaviors, is an important predictor of observance of social distancing and hand hygiene rules, and plays an important role in adherence to measures protecting against infection (*Pakpour & Griffiths, 2020; Harper et al., 2021*). However, increased fear can lead to panic and misinterpretation of insignificant complaints as symptoms of the disease (*Asmundson & Taylor, 2020*), it becomes one of the major factors increasing the level of stress, and exacerbating existing mental health problems (*Colizzi et al., 2020*).

Researchers have pointed out that the level of fear experienced depends on many factors, including, among others, the individual's own resources (*Eysenck, MacLeod & Mathews, 1987*), the social support network (*Cohen & McKay, 1984*), as well as gender and age. Numerous studies show that, in general, women are more fearful and develop anxiety disorders more often than men (*Cameron & Hill, 1989; Brody, Lovas & Hay, 1995; Gallacher & Klieger, 1995; Kelly et al., 2008; McLean & Anderson, 2009; Hallers-Haalboom et al., 2020*). Higher levels of fear in women concern both open and hidden fear, although it is worth noting that gender differences in implicit measures were found to be approximately half the size of those in explicit measures (*Egloff & Schmukle, 2004*).

The COVID-19 pandemic also proved to be a greater trauma and cause of stress for women than for men, even though men appeared to be a group more vulnerable to adverse health consequences associated with the coronavirus (*Fitzpatrick, Harris & Drawve, 2020*; *Giordani et al., 2020*; *Tzur Bitan et al., 2020*; *Islam et al., 2020*; *Bonnici, Clark & Azzopardi, 2020*; *Niño et al., 2021*; *Alsyouf et al., 2021*; *Sari et al., 2021*; *Sánchez-Teruel et al., 2022*; *Broche-Pérez et al., 2022*). Other researchers also pointed out that fear of COVID-19 significantly reduced women's mental health during the pandemic (*Guadagni, Umilta' & Iaria, 2020*; *Ahmed et al., 2020*; *Salehi et al., 2020*; *Casagrande et al., 2020*; *García-Fernández et al., 2021*; *Siddique, Ahmed & Hossain, 2021*; *Khattak et al., 2021*).

The level of fear of COVID-19 infection also varies across age groups. It seems to be relatively lower in young people compared to older people (*Długosz, 2020; Saravanan et al., 2020; CBOS, 2021*). However, even though younger people are at a lower risk of both severe COVID-19 and complications of the disease (*Colizzi et al., 2020*), they also

experience a number of negative consequences of the pandemic. Young people suffer mainly due to social distancing and self-isolation caused by lockdowns. The limitations concerning physical, social, and economic activity are among the main causes of anxiety and depression experienced particularly by health professionals, by older people, but also by younger people, including students (*Zhang et al., 2020; Sahu, 2020; Cao et al., 2020; Odriozola-González et al., 2020; Ballester et al., 2020; Roy & Covelli, 2020; Bolatov et al., 2020*).

The results of studies conducted on groups of students have shown that during the pandemic they have been experiencing increased levels of stress, anxiety and fear for their own health and that of their loved ones, problems focusing, sleep disturbances, increased concerns about academic performance, and severe consequences of reduced social interactions (*Son et al., 2020; Wang et al., 2020; Köktürk Dalcalı, Durgun & Taş, 2021*). The pandemic has also had a negative impact on their mental health (*Chirikov et al., 2020; Morales-Rodríguez, 2021; Marques et al., 2021*). Experiencing symptoms of depression, anxiety, and stress has affected students' life satisfaction, psychological well-being, and adaptive coping (*Lopes & Nihei, 2021*). A significant difference was also found concerning fear related to COVID-19 depending on the students' gender, with women reporting higher levels of fear on average compared to men (*Rodríguez-Hidalgo et al., 2020; Zolotov et al., 2022*).

Researchers have pointed out that the likelihood of anxiety and depression symptoms is significantly higher if the individual knows someone who has suffered (or is suffering from) COVID-19 (*Ma et al., 2020; Cao et al., 2020; Mertens et al., 2020; Son et al., 2020; Wang et al., 2020; Elsharkawy & Abdelaziz, 2021; Bourion-Bédès et al., 2021; Vigo et al., 2021; Green et al., 2021*).

During the COVID-19 pandemic, fear and anxiety, associated with the threats resulting from the epidemic situation, was defined by *Ahorsu et al. (2020)* as fear of COVID-19. This construct was used in the present study, expecting that one's own experience of contracting COVID-19, the experience of a loved one contracting the disease, and the latter's severity, would significantly differentiate the level of experienced fear of COVID-19.

On this basis, we formulated the following hypotheses: Hypothesis 1: Women declared a higher level of fear of COVID-19 than men. Hypothesis 2: Individuals who have had COVID-19 will present higher levels of fear of the coronavirus compared to ones who have not had it. Hypothesis 3: Individuals knowing a close person who fell ill with COVID-19 will present higher levels of fear of the coronavirus compared to ones not knowing anyone close who fell ill with COVID-19. Hypothesis 4: Individuals knowing a close person who became severely ill with or died of COVID-19 will present higher levels of fear of the coronavirus compared to ones knowing someone close who was asymptomatic/lightly ill with COVID-19.

Our additional aim was to find out the specificity of fear of COVID-19 (its level and structure) in a group of young people, students of Polish universities.

#### **MATERIALS & METHODS**

#### **Participants**

Written approval was obtained from the Research Ethics Committee of the University of Silesia to conduct the study (number of the approval: KEUS.95/02.2021). The research was conducted between 1 and 15 March 2021. It was performed by Biostat, a professional data collection and online survey company. Participation in the study was voluntary. All participants gave informed written consent to participate. They were apprised of the possibility of withdrawing from the study without giving any reason. Participants were also informed that their responses would be used only for research purposes and that researchers would not receive any personal information about study participants. A total of 851 respondents took part in the survey, including 552 women and 299 men. University students from all over Poland were included in the study. The mean age was M = 21.36 (for women: M = 21.41, for men: M = 21.26). Only a slight majority of the respondents: 51.4% (N = 437) were only students at the time of the survey, while the remaining 48.6% (N = 414) were studying and working.

#### Measures

The tool used included the Fear of COVID-19 scale (*Ahorsu et al., 2020*), personal data (*e.g.*, age: between 19 and 24, gender: woman, man), and additional questions formulated to verify the research hypotheses:

Have you had COVID-19? (yes, no).

If yes, what is/was the disease like? (asymptomatic, light, severe, very severe).

Has any of your relatives or friends been ill with COVID-19? (yes, no).

If yes, what is/was the disease like? (asymptomatic, light, severe, very severe, fatal).

The Fear of COVID-19 scale (FCV-19S) is a unidimensional scale measuring the level of fear of COVID-19. It consists of seven items rated on a five-point scale from 1 ("strongly disagree") to 5 ("strongly agree"). The total score is calculated by adding up all the items. Higher scores indicate higher levels of fear of COVID-19. The studies used the Polish adaptation of the scale by *Pilch, Kurasz & Turska-Kawa (2021)*. The authors have permission to use this instrument from the copyright holders. In addition, the toolkit included questions aimed at identifying the experience of the illness by the respondents and their loved ones. The research also concerned the severity of the disease among the individuals (asymptomatic/light or severe/fatal).

The IBM SPSS software (version 26) was used to compute statistical analyses.

#### RESULTS

In the beginning, descriptive statistics for the FCV-19S scale (mean, standard deviation) were checked, as well as the reliability coefficients given in Table 1.

Reliability indices for the Fear of COVID-19 scale are satisfactory, with  $\alpha = .86$  95% CI [.84–.87],  $\omega = .86$ .

The remaining analyses were based on group comparisons. The independent *t*-test and the Mann–Whitney test were used depending on the assumptions met for individual tests. Details on these analyses are provided later on in the article.

 
 Table 1
 Descriptive statistics and reliability coefficients of the Fear of COVID-19 scale.
 Variables Reliability Mean SD Avg. α ω Avg. interitem item-rest correlation correlation Fear of COVID-19 1.98 0.49 .86 .48 .63 .86

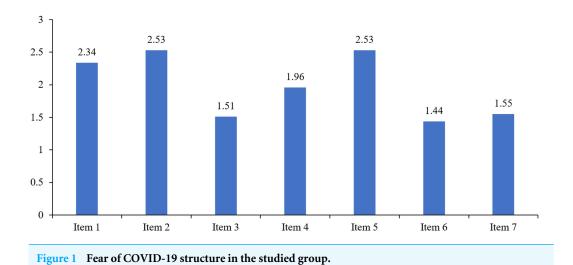
 Table 2
 Descriptive statistics for the individual items of the Fear of COVID-19 scale.

Items	Mean	SD
1	2.34	1.07
2	2.53	1.20
3	1.51	0.79
4	1.96	1.10
5	2.53	1.25
6	1.44	0.80
7	1.55	0.87

Table 2 presents descriptive statistics for the individual items of the Fear of COVID-19 scale:

- 1. I am most afraid of coronavirus-19.
- 2. It makes me uncomfortable to think about coronavirus-19.
- 3. My hands become clammy when I think about coronavirus-19.
- 4. I am afraid of losing my life because of coronavirus-19.
- 5. When watching news and stories about coronavirus-19 on social media, I become nervous or anxious.
- 6. I cannot sleep because I'm worrying about getting coronavirus-19.
- 7. My heart races or palpitates when I think about getting coronavirus-19.

Figure 1 presents the Fear of COVID-19 structure in the studied group. Table 3 and Fig. 2 present the structure of fear of COVID-19 for the individual items by gender. Hypothesis 1: First, the difference between the genders in terms of perceived fear of COVID-19 was checked. The assumption of normality was not met in either group (for women, W = .95; p < .001; for men W = .93; p < .001), therefore the bootstrap for independent samples test was used (*Field*, 2013). The analyses showed that fear of COVID-19 was significantly higher in young women (N = 552) than in young men (N = 229). The results are presented in Table 4.



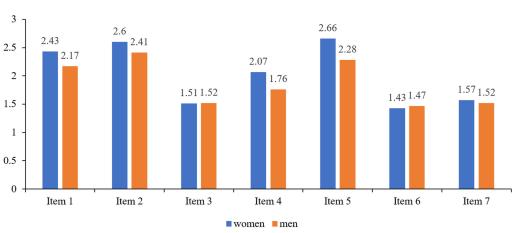


Figure 2 Fear of COVID-19 structure taking into account the gender criterion.

#### Full-size DOI: 10.7717/peerj.14356/fig-2

Full-size DOI: 10.7717/peerj.14356/fig-1

Items	Wor	nen	M	en
	Mean	SD	Mean	SD
1	2.43	1.09	2.17	1.02
2	2.60	1.19	2.41	1.19
3	1.51	0.76	1.52	0.84
4	2.07	1.15	1.76	0.98
5	2.66	1.23	2.28	1.25
6	1.43	0.78	1.47	0.83
7	1.57	0.89	1.52	0.84

### <mark>Peer</mark>J\_

Table 4       Gender differences in terms of fear of COVID-19.													
Variables	Women Men		en	t(620,46)	Þ	Cohen's d	Mean Difference	96% Confidence Interval of the Difference <sup>a</sup>					
	Mean	SD	Mean	SD					Lower	Upper			
Fear of COVID-19	2.04	0.75	1.87	0.74	3.05	.002	0.22	0.16	0.06	0.26			

Notes.

<sup>a</sup>Bootstrap results are based on 1,000 bootstrap samples.

Table 5Differences between individuals who have vs. have not been ill with COVID-19 with regard tofear of COVID-19.

Independent-samples Mann–Whitney $U$ test summary							
Total N	851						
Mann–Whitney U	30,487.50						
Standard Error	2,188.40						
Standardized Test Statistic	-1.56						
Asymptotic Sig. (2-sided test)	.12						

Fear of COVID-19 in the female group was M = 2.04, 95% CI [1.97–2.10], SD = .75, while in the male group it was M = 1.87, 95% CI [1.79–1.96], SD = .74. This difference = .16, BCa 95% CI [.06–.26] was statistically significant, t (620.46) = 3.05, p = .002.

#### Hypothesis 1 was confirmed.

**Hypothesis 2**: Individuals who have had COVID-19 will present higher levels of fear of the coronavirus compared to ones who were not infected did not fall ill with COVID-19 (Table 5).

Due to the unequal sample size in the two groups, as well as to the failure to meet the normality assumption (individuals who have been ill with COVID-19 W = .92; p < .001; individuals who have not been ill with COVID-19 W = .95; p < .001), the Mann–Whitney test was used.

The level of fear of COVID-19 in the group of individuals who have had COVID-19 (N = 89) was not significantly different from that in the group of individuals who have not had it (N = 762), U = 30487.5; z = -1.56; p = .12; r = -.05.

#### Hypothesis 2 was not confirmed.

**Hypothesis 3.** Individuals knowing someone close who fell ill with COVID-19 will present higher levels of fear of the coronavirus compared to ones who did not know anyone close to them ill with COVID-19.

Initially, the assumption of normality was checked, which was not met for either group (individuals who know someone close who fell ill N = 538; W = .94; p < .001; individuals who do not know someone close who fell ill N = 313; W = .94; p < .001). Therefore, the bootstrap for independent samples test was used. The results are presented in Table 6.

The level of fear of COVID-19 in the group of individuals who knew someone close to them had had COVID-19 was M = 2.01, 95% CI [1.94, 2.07], SD = .75, while in the group

Variables		person VID-19	-		t(647.308)	Þ	Cohen's d	Mean Difference	interv	onfidence al of the renceª
	Mean	SD	Mean	SD					Lower	Upper
Fear of COVID-19	2.01	0.75	1.94	0.76	1.33	.19	0.09	0.07	-0.04	0.16

Table 6 Differences between individuals knowing someone close who has been ill with COVID-19 with regard to fear of COVID-19.

Notes.

<sup>a</sup>Bootstrap results are based on 1,000 bootstrap samples.

 Table 7
 Differences between individuals who knew a close person with asymptomatic/light or severe/fatal course of the disease in terms of fear of COVID-19.

Variables	Asymptomatic/Light		Severe/Fatal		t(469.46)	р	Cohen's d	Mean Difference	interv	onfidence al of the rence <sup>a</sup>
	Mean	SD	Mean	SD					Lower	Upper
Fear of COVID-19	1.92	0.72	2.12	0.77	-2.98	.003	-0.26	-0.20	-0.33	-0.08

Notes.

<sup>a</sup>Bootstrap results are based on 1,000 bootstrap samples.

of those who did not know anyone close who had been ill, level of fear was M = 1.94, 95% CI [1.85–2.02], SD = .76. This difference = .07, BCa 95% CI [-.04–16] was statistically insignificant, t (647.308) = 1.33, p = .19.

#### Hypothesis 3 was not confirmed.

**Hypothesis 4**: Individuals knowing a close person who became severely ill with or died of COVID-19 will present higher levels of fear of the coronavirus compared to ones knowing someone close who was asymptomatic/lightly ill with COVID-19.

In the last analysis, two groups were distinguished based on the severity of the disease in the respondents' environment. The first group included respondents who knew a close person with an asymptomatic or light course of the disease, N = 311, and the second group included those who knew a close person with a severe or fatal course N = 227. In both groups the assumption of normal distribution was not met (asymptomatic/light group W = .93; p < .001; severe/fatal group W = .96; p < .001). Therefore, as in the previous analyses, it was decided to use the bootstrap for the independent samples test. Table 7 presents the differences between individuals who knew a close person with asymptomatic/light or severe/fatal course of the disease in terms of fear of COVID-19.

Fear of COVID-19 in the group of people who knew someone close to them with an asymptomatic/light course of the disease (N = 331) was M = 1.92, 95% CI [1.84–2.00], SD = .72, while in the group of respondents who knew someone close to them with a severe/fatal course (N = 227), it was M = 2.12, 95% CI [2.02–2.22], SD = .77. This difference, = .20, BCa 95% CI [.33–.08] was statistically significant, t (469.46) = -2.98, p = .003.

Hypothesis 4 was confirmed.

#### DISCUSSION

Knowledge about the determinants, specificities and consequences of fear of COVID-19 is extremely important and valuable. It makes it possible to develop and implement specific actions and programs, including in the field of public health, to mitigate the psychosocial and health-related effects of the pandemic. The core element of the study presented in this article was to determine the associations between one's direct experience of falling ill with the disease or knowing a close person who was ill, and fear of COVID-19.

The present study partly confirmed the results of other studies, according to which fear would occur much more often among those who knew someone who had suffered or who was suffering from COVID-19. However, in the case of Polish students, higher levels of fear were found only among those who knew someone with a severe/fatal course of the disease. The mere fact that someone in the students' closest circle had been ill with the coronavirus did not mean that they had higher levels of fear of COVID-19 compared to those who did not know anyone who had suffered from the disease. This may indicate a certain lack of fear related to the potential possibility of infection and severe COVID-19. In relation to Poland, this may have been one of the effects of the narrative pursued especially in the early phases of the pandemic, according to which young and healthy people did not constitute risk groups for severe or fatal disease. This may also have been influenced by the fact that asymptomatic or oligosymptomatic COVID-19 was actually much more frequent there than in the older group. According to the results of the present study, individuals who had had the disease did not generally present a higher fear of coronavirus than ones who had not had COVID-19, which may be linked precisely to the light course of the disease.

The study further showed that the level of fear declared by students in Poland (mean age for women M = 21.41, for men M = 21.26) was low (*Pilch, Kurasz & Turska-Kawa*, 2021) with higher levels of fear linked to the mental, cognitive domain (thinking about the coronavirus, experiencing general anxiety caused by the coronavirus, including fear of loss of life, watching news about the coronavirus) rather than to the somatic domain (palms sweating, sleep problems, heart racing). This is consistent with findings from other studies, indicating that young people have lower fear of COVID-19 compared to people in older age groups (*Długosz, 2020; Saravanan et al., 2020; CBOS, 2021*). At the same time, however, as proven by the review and meta-analysis of the studies on fear of COVID-19 among college students conducted in 11 countries, the level of that fear which they reported was moderate. Thus, Polish students differed in terms of presented fear of COVID-19 from their younger counterparts (*Wang et al., 2022*).

It was also found on the basis of the results that the level of fear of COVID-19 was significantly higher in female students than in male students. A fear structure analysis taking into account the gender criterion leads to the conclusion that in women, the level of fear of COVID-19 manifested in the mental domain is higher than in men, while in the somatic domain, gender does not differentiate the level of experienced anxiety.

It is particularly important to note, in line with the findings of the studies analyzed here, that during the COVID-19 pandemic women have been much more afraid of falling ill, and the pandemic itself causes more trauma and stress for them than for men.

Studying the determinants of fear of COVID-19 is important for instance for disease prevention, as fear influences the extent to which people maintain social distancing, adhere to hand washing guidelines, and get vaccinated to protect themselves against COVID-19 infection. Furthermore, due to the novel nature of COVID-19 and the psychological stress associated with it, assessing fear of COVID-19 and studying its predictors makes it possible to develop appropriate prevention and support programs and to address them to specific groups of people (*Pakpour & Griffiths, 2020*).

On the one hand, fear of COVID-19 can have a paralyzing effect and thus foster the development of mental illness, significantly reducing perceived quality of life. This concerns situations when its level is high. On the other hand, however, it can mobilize one to adhere to recommendations such as social distancing, wearing protective masks, or disinfecting hands and touch surfaces. Last but not least, fear of COVID-19 may also contribute to the decision to get vaccinated against the disease.

In Poland, the public attitude towards adherence to COVID-19 recommendations changed each month as the pandemic continued. In spring 2020, the vast majority of the Polish population reduced social contacts, kept their distance, wore protective masks and disinfected their hands and touch surfaces. As time passed, these behaviors became less and less frequent. One of the reasons for this might have been the fact that people were becoming accustomed to living in the era of the COVID-19 pandemic, and consequently had a low level of fear of the disease, presented in particular by young people.

The scale of non-compliance with the legal provisions on the part of the general public is the result of historical circumstances on the one hand, and of the institutional environment on the other hand. Despite the changes it has undergone in the recent decades, the Polish society still differs from the open society of the Western type. In the Polish case, one can speak of a shortage of cultural resources, an essential category of which is social trust, including trust in authority. Society in Poland is characterized by a culture of distrust found at all levels of social life (*Sztompka, 1996*). The origins of this syndrome should be sought not only in the legacy of real socialism, but also in the experiences of the transformation period and in the related crises. The high degree of vaccine skepticism and one of the highest mortality rates in Europe represent a visible result reflecting not the decades of living under communism, but the decades of social consequences of its collapse. Low trust in the political elite translates, therefore, into selective compliance with the government's recommendations. These trends were additionally reinforced by the increasing information chaos and restrictions introduced without justification (*e.g.*, the ban on entry to forests).

The Polish society, as a result of diverse historical experiences, differs significantly from the societies of Western European or North American countries, but also from Asian ones. Citizens in Western Europe, North America, as well as in highly developed Asian countries generally comply with the regulations and recommendations of the authorities, including pandemic recommendations. This happens even in a place such as China, with the pandemic restrictions more stringent than in Poland. The Polish distrust of authority may have contributed not only to non-compliance with pandemic restrictions, but also to the low level of fear which we diagnosed among university students in Poland.

#### Limitations

The present study has several limitations. Firstly, an online survey addressed to random respondents being university students weakens the generalizability of its results. The data was collected from the respondents on a voluntary basis on the basis of an online application, which advises caution when making certain generalizations. Another limitation is the fact that although the study was conducted on a relatively large sample, it used a cross-sectional method of data collection. More reliable results could be obtained using a longitudinal study design. Further research is most definitely needed to identify further significant factors influencing student behavior during the pandemic.

#### **CONCLUSIONS**

The present study focused on whether the experience of COVID-19 disease (whether direct or among loved ones) was linked to fear among university students in Poland. According to the results, students generally presented a relatively low level of fear. Having suffered from the disease and knowing someone who had had light or asymptomatic COVID was not associated with higher levels of fear. This was only implied when the respondent knew someone who had been severely ill with or died of COVID-19. The level of fear was differentiated by gender (it was higher in the female group).

The study discussed here fits within the line of research on fear during the COVID-19 pandemic. One of the determinants of this fear, namely the experience of COVID-19 disease, is discussed here. Low fear has been found among students in the study. It thus provides data important for both theory and practice.

#### ACKNOWLEDGEMENTS

The authors wish to thank the students for their participation in the study.

#### **ADDITIONAL INFORMATION AND DECLARATIONS**

#### Funding

This work was supported by the Research Excellence Initiative of the University of Silesia in Katowice. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

#### **Grant Disclosures**

The following grant information was disclosed by the authors: Research Excellence Initiative of the University of Silesia in Katowice.

#### **Competing Interests**

The authors declare there are no competing interests.

#### **Author Contributions**

• Elżbieta Turska conceived and designed the experiments, performed the experiments, analyzed the data, prepared figures and/or tables, and approved the final draft.

- Natalia Stępień-Lampa conceived and designed the experiments, performed the experiments, authored or reviewed drafts of the article, and approved the final draft.
- Paweł Grzywna conceived and designed the experiments, performed the experiments, authored or reviewed drafts of the article, and approved the final draft.

#### **Human Ethics**

The following information was supplied relating to ethical approvals (i.e., approving body and any reference numbers):

The Research Ethics Committee of the University of Silesia in Katowice granted Ethical approval to carry out the study within its facilities (KEUS.95/02.2021).

#### **Data Availability**

The following information was supplied regarding data availability:

The data is available at OSF: Stępień-Lampa, N., Turska, E., & Grzywna, P. Ł. (2022, April 26). Fear of COVID-19. Retrieved from osf.io/s47hx.

Grzywna Paweł, & Turska Elżbieta. (2022). Experience of COVID-19 disease and fear of the SARS-CoV-2 virus among Polish students (Version 1) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.7295270.

#### **Supplemental Information**

Supplemental information for this article can be found online at http://dx.doi.org/10.7717/ peerj.14356#supplemental-information.

#### REFERENCES

- Ahmed O, Ahmed MZ, Alim SMdAHM, Khan MDAU, Jobe MC. 2020. COVID-19 outbreak in Bangladesh and associated psychological problems: an online survey. *Death Studies* 0:1–10 DOI 10.1080/07481187.2020.1818884.
- Ahorsu DK, Lin C-Y, Imani V, Saffari M, Griffiths MD, Pakpour AH. 2020. The fear of COVID-19 scale: development and initial validation. *International Journal of Mental Health and Addiction* 20:1537–1545 DOI 10.1007/s11469-020-00270-8.
- Alsyouf A, Masa'deh R, Albugami M, Al-Bsheish M, Lutfi A, Alsubahi N. 2021. Risk of fear and anxiety in utilising health app surveillance due to COVID-19: gender differences analysis. *Risks* 9:179 DOI 10.3390/risks9100179.
- Asmundson GJG, Taylor S. 2020. Coronaphobia: fear and the 2019-nCoV outbreak. *Journal of Anxiety Disorders* 70:102196 DOI 10.1016/j.janxdis.2020.102196.
- Ballester L, Alayo I, Vilagut G, Almenara J, Cebrià AI, Echeburúa E, Gabilondo A, Gili M, Lagares C, Piqueras JA, Roca M, Soto-Sanz V, Blasco MJ, Castellví P, Mortier P, Bruffaerts R, Auerbach RP, Nock MK, Kessler RC, Jordi A, UNIVERSAL study Group. 2020. Mental disorders in Spanish university students: prevalence, age-of-onset, severe role impairment and mental health treatment. *Journal of Affective Disorders* 273:604–613 DOI 10.1016/j.jad.2020.04.050.
- Bolatov AK, Seisembekov TZ, AZh Askarova, Baikanova RK, Smailova DS, Fabbro E. 2020. Online-learning due to COVID-19 improved mental health among medical students. *Medical Science Educator* 31:183–192 DOI 10.1007/s40670-020-01165-y.

- **Bonnici J, Clark M, Azzopardi A. 2020.** Fear of COVID-19 and its impact on Maltese university students' wellbeing and substance use. *Malta Journal of Health Sciences* 7:6–15 DOI 10.14614/FEARCOVID19/7/20.
- **Borecka-Biernat D. 2017.** Psychospołeczne korelaty agresywnej strategii radzenia sobie dorastających w sytuacji konfliktu społecznego. *Polskie Forum Psychologiczne* **XXII**:600–622 DOI 10.14656/PFP20170405.
- Bourion-Bédès S, Tarquinio C, Batt M, Tarquinio P, Lebreuilly R, Sorsana C, Legrand K, Rousseau H, Baumann C. 2021. Psychological impact of the COVID-19 outbreak on students in a French region severely affected by the disease: results of the PIMS-CoV 19 study. *Psychiatry Research* 295:113559 DOI 10.1016/j.psychres.2020.113559.
- Broche-Pérez Y, Fernández-Fleites Z, Jiménez-Puig E, Fernández-Castillo E, Rodríguez-Martin BC. 2022. Gender and fear of COVID-19 in a Cuban population sample. *International Journal of Mental Health and Addiction* 20:83–91 DOI 10.1007/s11469-020-00343-8.
- Brody LR, Lovas GS, Hay DH. 1995. Gender differences in anger and fear as a function of situational context. *Sex Roles* 32:47–78 DOI 10.1007/BF01544757.
- Cameron OG, Hill EM. 1989. Women and anxiety. *The Psychiatric Clinics of North America* 12:175–186 DOI 10.1016/S0193-953X(18)30459-3.
- Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, Zheng J. 2020. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research* 287:112934 DOI 10.1016/j.psychres.2020.112934.
- **Casagrande M, Favieri F, Tambelli R, Forte G. 2020.** The enemy who sealed the world: effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. *Sleep Medicine* **75**:12–20 DOI 10.1016/j.sleep.2020.05.011.
- CBOS. 2021. Komunikat z badań. Warszawa: Obawy Polaków w czasach pandemii.
- **Chirikov I, Soria KM, Horgos B, Jones-White D. 2020.** Undergraduate and graduate students' mental health during the COVID-19 pandemic. SERU Consortium. University of California Berkeley and University of Minnesota. *Available at https://cshe.berkeley.edu/seru-covid-survey-reports.*
- **Cohen S, McKay G. 1984.** Social support, stress and the buffering hypothesis: a theoretical analysis. In: *Handbook of Psychology and Health*. Volume IV. London: Routledge.
- Colizzi M, Bortoletto R, Silvestri M, Mondini F, Puttini E, Cainelli C, Gaudino R, Ruggeri M, Zoccante L. 2020. Medically unexplained symptoms in the times of COVID-19 pandemic: a case-report. *Brain, Behavior, & Immunity - Health* 5:100073 DOI 10.1016/j.bbih.2020.100073.
- **Długosz P. 2020.** Raport z badań. Krakowscy studenci w sytuacji zagrożenia pandemią koronawirusa.
- **Egloff B, Schmukle SC. 2004.** Gender differences in implicit and explicit anxiety measures. *Personality and Individual Differences* **36**:1807–1815 DOI 10.1016/j.paid.2003.07.002.

- **Elsharkawy NB, Abdelaziz EM. 2021.** Levels of fear and uncertainty regarding the spread of coronavirus disease (COVID-19) among university students. *Perspectives in Psychiatric Care* **57**:1356–1364 DOI 10.1111/ppc.12698.
- **Eysenck MW, MacLeod C, Mathews A. 1987.** Cognitive functioning and anxiety. *Psychological Research* **49**:189–195 DOI 10.1007/BF00308686.
- Field A. 2013. *Discovering statistics using IBM SPSS statistics*. Los Angeles, London, New Delhi, Singapore, Washington, D.C.: Sage.
- **Fitzpatrick KM, Harris C, Drawve G. 2020.** Fear of COVID-19 and the mental health consequences in America. *Psychological Trauma: Theory, Research, Practice, and Policy* **12**:17–21 DOI 10.1037/tra0000924.
- Gallacher F, Klieger DM. 1995. Sex role orientation and fear. *The Journal of Psychology* 129:41–49 DOI 10.1080/00223980.1995.9914946.
- García-Fernández L, Romero-Ferreiro V, Padilla S, López-Roldán PDavid, Monzó-García M, Rodriguez-Jimenez R. 2021. Gender differences in emotional response to the COVID-19 outbreak in Spain. *Brain and Behavior* 11:e01934 DOI 10.1002/brb3.1934.
- Giordani RCF, da Silva MZ, Muhl C, Giolo SR. 2020. Fear of COVID-19 scale: assessing fear of the coronavirus pandemic in Brazil. *Journal of Health Psychology* 27:901–912 DOI 10.1177/1359105320982035.
- Green ZA, Noor U, Ahmed F, Himayat L. 2021. Validation of the fear of COVID-19 Scale in a sample of Pakistan's University students and future directions. *Psychological Reports* 125:00332941211016754 DOI 10.1177/00332941211016754.
- **Guadagni V, Umilta' A, Iaria G. 2020.** Sleep Quality, empathy, and mood during the isolation period of the COVID-19 pandemic in the Canadian Population: females and women suffered the most. *Frontiers in Global Women's Health* **1** DOI 10.3389/fgwh.2020.585938.
- Hallers-Haalboom ET, Maas J, Kunst LE, Bekker MHJ. 2020. Chapter 22 the role of sex and gender in anxiety disorders: Being scared like a girl? In: Lanzenberger R, Kranz GS, Savic I, eds. *Handbook of clinical neurology. Sex differences in neurology and psychiatry*. Elsevier, 359–368 DOI 10.1016/B978-0-444-64123-6.00024-2.
- Harper CA, Satchell LP, Fido D, Latzman RD. 2021. Functional Fear Predicts Public Health Compliance in the COVID-19 Pandemic. *International Journal of Mental Health and Addiction* 19:1875–1888 DOI 10.1007/s11469-020-00281-5.
- Islam SMD-U, Bodrud-Doza Md, Khan RM, Haque MdA, Mamun MA. 2020. Exploring COVID-19 stress and its factors in Bangladesh: a perception-based study. *Heliyon* 6:e04399 DOI 10.1016/j.heliyon.2020.e04399.
- Kelly MM, Tyrka AR, Anderson GM, Price LH, Carpenter LL. 2008. Sex differences in emotional and physiological responses to the trier social stress test. *Journal of Behavior Therapy and Experimental Psychiatry* **39**:87–98 DOI 10.1016/j.jbtep.2007.02.003.
- Khattak SR, Saeed I, Rehman SU, Fayaz M. 2021. Impact of fear of COVID-19 pandemic on the mental health of nurses in Pakistan. *Journal of Loss and Trauma* 26:421–435 DOI 10.1080/15325024.2020.1814580.

- Knipe D, Evans H, Marchant A, Gunnell D, John A. 2020. Mapping population mental health concerns related to COVID-19 and the consequences of physical distancing: a Google trends analysis. DOI 10.12688/wellcomeopenres.15870.1.
- Köktürk Dalcalı B, Durgun H, Taş AS. 2021. Anxiety levels and sleep quality in nursing students during the COVID-19 pandemic. *Perspectives in Psychiatric Care* 57:1999–2005 DOI 10.1111/ppc.12839.
- Lazarus R. 1986. Paradygmat stresu i radzenia sobie. Nowiny Psychologiczne 3-4:2-40.
- Lin C-Y. 2020. Social reaction toward the 2019 novel coronavirus (COVID-19). *Social Health and Behavior* 3:1 DOI 10.4103/SHB.SHB\_11\_20.
- Lopes AR, Nihei OK. 2021. Depression, anxiety and stress symptoms in Brazilian university students during the COVID-19 pandemic: predictors and association with life satisfaction, psychological well-being and coping strategies. *PLOS ONE* 16:e0258493 DOI 10.1371/journal.pone.0258493.
- Ma Z, Zhao J, Li Y, Chen D, Wang T, Zhang Z, Chen Z, Yu Q, Jiang J, Fan F, Liu X. 2020. Mental health problems and correlates among 746,217 college students during the coronavirus disease 2019 outbreak in China. *Epidemiology and Psychiatric Sciences* 29 DOI 10.1017/S2045796020000931.
- Marques G, Drissi N, Díez I de la T, de Abajo BS, Ouhbi S. 2021. Impact of COVID-19 on the psychological health of university students in Spain and their attitudes toward mobile mental health solutions. *International Journal of Medical Informatics* 147:104369 DOI 10.1016/j.ijmedinf.2020.104369.
- McLean CP, Anderson ER. 2009. Brave men and timid women? A review of the gender differences in fear and anxiety. *Clinical Psychology Review* 29:496–505 DOI 10.1016/j.cpr.2009.05.003.
- Mertens G, Gerritsen L, Duijndam S, Salemink E, Engelhard IM. 2020. Fear of the coronavirus (COVID-19): predictors in an online study conducted in 2020. *Journal of Anxiety Disorders* 74:102258 DOI 10.1016/j.janxdis.2020.102258.
- Morales-Rodríguez FM. 2021. Fear, stress, resilience and coping strategies during COVID-19 in Spanish University students. *Sustainability* 13:5824 DOI 10.3390/su13115824.
- Niño M, Harris C, Drawve G, Fitzpatrick KM. 2021. Race and ethnicity, gender, and age on perceived threats and fear of COVID-19: evidence from two national data sources. *SSM Population Health* 13:100717 DOI 10.1016/j.ssmph.2020.100717.
- Odriozola-González P, Á Planchuelo-Gómez, Irurtia MJ, de Luis-García R. 2020. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research* 290:113108 DOI 10.1016/j.psychres.2020.113108.
- Pakpour AH, Griffiths MD. 2020. The fear of COVID-19 and its role in preventive behaviors. *Journal of Concurrent Disorders* 2:58–63 *Available at https://irep.ntu.ac.uk/id/eprint/39561*.
- Pappas G, Kiriaze IJ, Giannakis P, Falagas ME. 2009. Psychosocial consequences of infectious diseases. *Clinical Microbiology and Infection* 15:743–747 DOI 10.1111/j.1469-0691.2009.02947.x.

- Pilch I, Kurasz Z, Turska-Kawa A. 2021. Experiencing fear during the pandemic: validation of the fear of COVID-19 scale in Polish. *PeerJ* 9:e11263 DOI 10.7717/peerj.11263.
- Rodríguez-Hidalgo AJ, Pantaleon Y, Dios I, Falla D. 2020. Fear of COVID-19, stress, and anxiety in university undergraduate students: a predictive model for depression. *Frontiers in Psychology* 11:591797 DOI 10.3389/fpsyg.2020.591797.
- **Roy S, Covelli B. 2020.** COVID-19 induced transition from classroom to online mid semester: case study on faculty and students' preferences and opinions. *Higher Learning Research Communications* **11**:10–32 DOI 10.18870/hlrc.v11i0.1197.
- Sahu P. 2020. Closure of Universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus* 12:e7541 DOI 10.7759/cureus.7541.
- Salehi L, Rahimzadeh M, Molaei E, Zaheri H, Esmaelzadeh-Saeieh S. 2020. The relationship among fear and anxiety of COVID-19, pregnancy experience, and mental health disorder in pregnant women: a structural equation model. *Brain and Behavior* **10**:e01835 DOI 10.1002/brb3.1835.
- Sánchez-Teruel D, Robles-Bello MA, Lara-Cabrera M, Valencia-Naranjo N. 2022. Gender implications of the Fear of COVID-19 Scale in the Spanish population: a validation study. *Psychological Trauma: Theory, Research, Practice, and Policy* 14:258–265 DOI 10.1037/tra0001062.
- Saravanan C, Mahmoud I, Elshami W, Taha MH. 2020. Knowledge, anxiety, fear, and psychological distress about COVID-19 among University students in the United Arab Emirates. *Frontiers in Psychiatry* 11:582189 DOI 10.3389/fpsyt.2020.582189.
- Sari TA, Aryiza Y, Pierewan AC, Wibowo YS. 2021. Fear of coronavirus: gender differences occur in Indonesia. *Konselor* 10:57–64.
- Siddique RF, Ahmed O, Hossain KN. 2021. Relationship between the fear of COVID-19 disease and sleep quality: the mediating role of stress. *Heliyon* 7:e07033 DOI 10.1016/j.heliyon.2021.e07033.
- Son C, Hegde S, Smith A, Wang X, Sasangohar F. 2020. Effects of COVID-19 on college students' mental health in the United States: interview survey study. *Journal of Medical Internet Research* 22:e21279 DOI 10.2196/21279.
- Sztompka P. 1996. Trust and emerging democracy: lessons from Poland. *International Sociology* 11:37–62 DOI 10.1177/026858096011001004.
- Tzur Bitan D, Grossman-Giron A, Bloch Y, Mayer Y, Shiffman N, Mendlovic S. 2020. Fear of COVID-19 scale: psychometric characteristics, reliability and validity in the Israeli population. *Psychiatry Research* 289:113100 DOI 10.1016/j.psychres.2020.113100.
- Vigo D, Jones L, Munthali R, Pei J, Westenberg J, Munro L, Judkowicz C, Wang AY, VandenAdel B, Dulai J, Krausz M, Auerbach RP, Bruffaerts R, Yatham L, Gadermann A, Rush B, Xie H, Pendakur K, Richardson C. 2021. Investigating the effect of COVID-19 dissemination on symptoms of anxiety and depression among university students. *BJPsych Open* 7:e69 DOI 10.1192/bjo.2021.24.

- Wang F, Zhang L, Ding L, Wang L, Deng Y. 2022. Fear of COVID-19 among college students: a systematic review and meta-analysis. *Frontiers in Public Health* 10:846894 DOI 10.3389/fpubh.2022.846894.
- Wang Z-H, Yang H-L, Yang Y-Q, Liu D, Li Z-H, Zhang X-R, Zhang Y-J, Shen D, Chen P-L, Song W-Q, Wang X-M, Wu X-B, Yang X-F, Mao C. 2020. Prevalence of anxiety and depression symptom, and the demands for psychological knowledge and interventions in college students during COVID-19 epidemic: a large cross-sectional study. *Journal of Affective Disorders* 275:188–193 DOI 10.1016/j.jad.2020.06.034.
- Zhang W-R, Wang K, Yin L, Zhao W-F, Xue Q, Peng M, Min B-Q, Tian Q, Leng H-X, Du J-L, Chang H, Yang Y, Li W, Shangguan F-F, Yan T-Y, Dong H-Q, Han Y, Wang Y-P, Cosci F, Wang H-X. 2020. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychotherapy and Psychosomatics* 89:242–250 DOI 10.1159/000507639.
- **Zolotov Y, Reznik A, Bender S, Isralowitz R. 2022.** COVID-19 fear, mental health, and substance use among Israeli University students. *International Journal of Mental Health and Addiction* **20**:230–236 DOI 10.1007/s11469-020-00351-8.