Original article

A serial model of the interrelationship between perceived vulnerability to disease, fear of COVID-19, and psychological distress among teachers in South Africa

Un modèle séquentiel de l'interrelation entre la vulnérabilité perçue face à la maladie, la peur de la COVID-19 et la détresse psychologique chez les enseignants en Afrique du Sud

Anita Padmanabhanunni [a,*], Tyrone B. Pretorius [a], Nancy Stiegler [b],
Jean-Pierre Bouchard [b,c,d]

[a] *Department of Psychology, University of the Western Cape, Robert-Sobukwe road, Bellville, 7535 Cape-Town, South Africa*
[b] *Department of Statistics and Population Studies, University of the Western Cape, Robert-Sobukwe road, Bellville, 7535 Cape-Town, South Africa*
[c] *Institut psycho-judiciaire et de psychopathologie (IPJP), Institute of Forensic Psychology and Psychopathology, centre hospitalier de Cadillac, 89, rue Cazeaux Cazalet, 33410 Cadillac, France*
[d] *Unité pour malades difficiles (UMD), pôle de psychiatrie médico-légale (PPML), centre hospitalier de Cadillac, 10, avenue Joseph-Caussil, 33410 Cadillac, France*

A B S T R A C T

The current study examined the serial relationship between perceived vulnerability to disease, fear of COVID-19, anxiety, and psychological distress among school teachers. Participants were South African school teachers ($n = 355$) who completed the Perceived Vulnerability to Disease Questionnaire, Fear of COVID-19 Scale, trait scale of the State-Trait Anxiety Inventory, Beck Hopelessness Scale, and the Centre for Epidemiological Depression Scale. A path analysis confirmed that teachers who appraised themselves as more susceptible to disease, experienced heightened levels of fear of COVID-19, which led to heightened levels of anxiety, depression, and hopelessness. Specifically, germ aversion and perceived infectability were separately associated with heightened fear of COVID-19, which in turn was associated with heightened anxiety. This serial relationship was associated with heightened levels of hopelessness and depression. The current study extends research on the impact of the COVID-19 pandemic among a distinct subgroup of the population.

© 2021 The Authors. Published by Elsevier Masson SAS. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

R É S U M É

La présente étude examine la relation entre la vulnérabilité perçue face à la maladie, la peur de la COVID-19, l'anxiété et la détresse psychologique chez les enseignants. Les participants étaient des enseignants d'école, en Afrique du Sud ($n = 355$). Ces enseignants ont rempli un questionnaire sur la vulnérabilité perçue face à la maladie, l'échelle de la peur de la COVID-19, l'échelle des traits du « *State-Trait Anxiety Inventory* », l'échelle de désespoir de Beck et l'échelle du « *Center for Epidemiological Depression* ». La pandémie de la COVID-19 a eu un impact sur les établissements d'enseignement dans le monde et a conduit de nombreux pays à fermer des écoles pour réduire la transmission du virus. La fermeture des écoles a précipité une transition imprévue et sans précédent de l'enseignement traditionnel en classe à l'enseignement à distance d'urgence et a changé le travail des enseignants à bien des égards. Les enseignants ont dû apprendre rapidement à utiliser les outils numériques, adapter le contenu académique à un format de diffusion en ligne et aider les élèves et les parents à négocier la transition vers

* Auteur correspondant. University of the Western Cape, Private Bag X17, Bellville, 7535 Cape-Town, South Africa.
E-mail address: apadmana@uwc.ac.za (A. Padmanabhanunni).

l'apprentissage à distance. Dans le même temps, les enseignants devaient également gérer l'impact de la pandémie sur leur propre vie, notamment en fournissant un enseignement à domicile à leurs propres enfants et en s'occupant des membres vulnérables du ménage. Ces multiples facteurs de stress ont été associés à des niveaux accrus de détresse psychologique, y compris la dépression et l'anxiété, chez les enseignants. L'analyse du parcours, basée sur ces différentes échelles, a confirmé que les enseignants qui se considéraient comme plus sensibles à la maladie éprouvaient des niveaux accrus de peur de la COVID-19, ce qui entraînait des niveaux accrus d'anxiété, de dépression et de désespoir. Plus précisément, l'aversion aux microbes et aux virus et la propension perçue à être infecté étaient séparément associées à une peur accrue de la COVID-19, qui, à son tour, était associée à une anxiété accrue. Cette relation séquentielle est, en outre, associée à des niveaux accrus de désespoir et de dépression. La présente étude étend les recherches sur l'impact de la pandémie de la COVID-19 sur un sous-groupe distinct de la population.

1. Introduction

The COVID-19 pandemic impacted educational institutions globally and led to many countries instituting school closures to reduce transmission of the virus [38]. The closure of schools precipitated an unplanned and unprecedented transition from traditional classroom teaching to emergency remote teaching and changed the work of teachers in many ways. Teachers had to rapidly learn to use digital tools, adapt academic content to an online delivery format, and support students and parents in negotiating the transition to remote learning [17]. At the same time, teachers were also having to manage the impact of the pandemic on their own lives, including providing home schooling for their own children and caring for vulnerable family members [19]. These multiple stressors have been associated with heightened levels of psychological distress, including depression and anxiety, among teachers [35]. Numerous psychological and behavioural adaptive or pathological manifestations linked to the fear of Covid-19 have also been observed in the general population, including among health care workers and caregivers in France [3,4,9], Spain [2,6] and South Africa [37].

Most studies of the impact of COVID-19 on schoolteachers have been conducted in developed contexts, and comparatively fewer studies have emerged from low-to-middle-income countries [16]. In developing countries, access to technological resources is not uniform, and it has been argued that emergency remote teaching has further widened existing socioeconomic disparities [32].

The current study was conducted in South Africa, where school closures were implemented in March 2020 to curb the spread of COVID-19 [33]. Most schools in the country were not equipped for the transition to emergency remote teaching [11]. The few schools able to supplement state funding through private fees transitioned to online learning environments and continued to cover the curriculum during one of the strictest lockdowns globally [8]. For most South African school children, lack of access to digital technology, data, internet connectivity, and spaces conducive to learning was a salient barrier to education [11]. In essence, the pandemic exacerbated existing socioeconomic disparities [36] in access to education, which prompted the South African government to reopen schools. In August 2020, a phased reopening of schools was implemented, which featured a rotational teaching system in which specific groups of learners attended school on alternate weeks [33]. Conventional schooling resumed in February 2021 during the third wave of the pandemic. Approximately 2283 teachers had died as a result of contracting the virus during the first and second waves of the pandemic [30]. Media reports at the time of reopening suggested that teachers were experiencing heightened levels of fear and anxiety [20]. These fears were likely related to concerns about teacher safety – including access to personal protective equipment, sanitisation of classrooms, access to running water, and social distancing – in the context of overcrowded classrooms [8].

The current study investigated the interrelationship between perceived vulnerability to disease, fear of COVID-19, and psychological distress among a sample of South African school teachers. It is proposed that individuals who perceive themselves to be at risk of contracting disease would experience heightened levels of fear of COVID-19, which in turn would lead to heightened anxiety and higher levels of psychological distress. The following hypotheses are postulated:

- germ aversion, as a component of perceived vulnerability to disease, will be associated with heightened fear of COVID-19, which in turn will be associated with heightened anxiety.
- perceived infectability, as a component of perceived vulnerability to disease, will be associated with heightened fear of COVID-19, which in turn will be associated with heightened anxiety.
- germ aversion will be associated with heightened fear of COVID-19, which in turn will be associated with heightened anxiety. The previous serial relationship would result in heightened depression.
- perceived infectability will be associated with heightened fear of COVID-19, which in turn will be associated with heightened anxiety. The previous serial relationship would result in heightened depression.
- germ aversion will be associated with heightened fear of COVID-19, which in turn will be associated with heightened anxiety. The previous serial relationship would result in heightened hopelessness.
- perceived infectability will be associated with heightened fear of COVID-19, which in turn will be associated with heightened anxiety. The previous serial relationship would result in heightened hopelessness.

2. Method

2.1. Participants

The study used a cross-sectional survey design. A convenience sample of schoolteachers (*n* = 355) from across South Africa participated in the study. Table 1 contains a description of the sample.

The mean age of the sample was 41.89 years (±12.42) and the mean number of years as a teacher was 15.7 (±11.75). Most of the

Table 1
Description of sample.

Variable	Categories	n	%
Gender	Male	83	23.1
	Female	272	76.6
	Non-binary	1	0.3
Province	Eastern Cape	12	3.4
	Western Cape	292	82.3
	Gauteng	31	8.7
	KwaZulu Natal	10	2.8
	Mpumalanga	2	0.6
	North West	3	0.8
	Limpopo	2	0.6
	Free State	3	0.8
Area of residence	Rural	136	38.3
	Urban	219	61.7
Grade teaching	Pre-primary	14	3.9
	Primary	217	61.1
	Secondary	122	34.4
	Learning support	2	0.6
Age		Mean = 41.89	SD = 12.42
Years teaching		Mean = 15.7	SD = 11.75

participants were women (76.6%), resided in the Western Cape Province (82.3%), and taught at the primary school level (61.1%). Additionally, 92.1% of participants reported knowing people who had been infected with COVID-19, and 63.9% had lost a family member to COVID-19.

2.2. Instruments

Participants completed a demographic survey, as well as the following questionnaires: the Perceived Vulnerability to Disease Questionnaire (PVD-Q:[12]), the Fear of COVID-19 Scale (FCV-19S: [1]), the trait scale of the State-Trait Anxiety Inventory (STAI-T: [34]), the Beck Hopelessness Scale (BHS:[7]) and the Centre for Epidemiological Depression Scale (CES-D: [27]).

The PVD-Q consists of 15 items scored on a 7-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7). The scale contains two distinct subscales, germ aversion (GA) and perceived infectability (PI). Germ aversion refers to discomfort in situations that have a high potential for disease transmission, whereas perceived infectability refers to one's perception of vulnerability to infection. Example items include: "*I do not like to write with a pencil someone else has obviously chewed on*" (GA) and "*I am more likely than the people around me to catch an infectious disease*" (PI). [12] reported satisfactory reliability coefficients for the two subscales (PI: α = .87; GA: α = 74). However, some studies have failed to replicate this reliability with regard to germ aversion (e.g., [10]: α = .59), and others have reported satisfactory coefficients of internal consistency [e.g., [40]: α = .71 and .77].

The FCV-19S consists of 7items scored on a 5-point Likert scale that ranges from 1 (*strongly disagree*) to 5 (*strongly agree*). It assesses emotional fear reactions toward the COVID-19 pandemic. An example item is: "*It makes me uncomfortable to think about Coronavirus-19*". [1] reported a satisfactory alpha coefficient of .82 for the FCV-19S. Other studies have similarly reported alpha coefficients greater than .80 (e.g., [29]). In South Africa, [25] used classical test theory and Mokken and Rasch analysis to confirm the reliability, validity, and unidimensionality of the scale.

The STAI-T is a 20-item scale that assesses trait anxiety and is scored on a 4-point scale that ranges from 1 (*almost never*) to 4 (*almost always*). Example items of the STAI-T include: "*I am inclined to take things hard*" and "*I am a steady person*". In general, researchers have reported satisfactory reliabilities for the STAI-T in excess of .80 (e.g., [15,39]). [26] reported a Cronbach's alpha of .90 for this scale in a sample of South African university students.

The BHS is a 20-item measure of hopelessness scored on a true-false rating scale. Example items of the BHS include: "*I might as well give up because there is nothing I can do about making things better for myself*" and "*I can't imagine what my life would be like in ten years*". [7] reported a Cronbach's alpha of .93, and more recent studies have reported similarly favourable estimates of internal consistency (e.g., [5,18]). [24] reported an alpha coefficient of .86 in a South African study.

The CES-D consists of 20 items that measure depression and is scored on a 4-point Likert scale that ranges from 0 (*rarely or none of the time*) to 4 (*most or all the time*). Example items of the CES-D include: "*I thought my life had been a failure*" and "*I felt that everything I did was an effort*" [27] reported highly satisfactory estimates of internal consistency (.85–.90). Similar satisfactory reliabilities have been reported in more recent studies [22,31]. [24] used the CES-D scale in South Africa and reported highly satisfactory estimates of reliability (α and ω > .90).

2.3. Procedure

An electronic survey consisting of the measuring instruments was developed using Google Forms and distributed to schoolteachers via social media platforms. Some teacher groups requested the electronic link to be sent to them via email. The University's school liaison officer circulated the link to additional school contacts.

2.4. Ethics

The Humanities and Social Sciences Ethics Committee of the University of the Western Cape granted ethical approval for the study to be conducted (ethics reference number: HS21/3/8). The survey was anonymous, and participants gave informed consent before they were allowed to proceed to the survey.

2.5. Data Analysis

IBM SPSS Statistics for Windows (version 26; IBM Corp., Armonk, NY, USA) was used to obtain descriptive statistics, reliabilities (alpha and omega), and the intercorrelations between variables. The serial model of perceived vulnerability to disease, fear of COVID-19, anxiety, and indices of psychological distress was examined using IBM SPSS Amos (version 26; IBM Corp.). Amos provides bootstrapped confidence intervals (95%) for all direct and indirect effects. If the confidence interval does not contain zero, the effect is said to be significant.

3. Results

The descriptive statistics, reliabilities, and intercorrelations are presented in Table 2. Except for the germ aversion subscale, all

Table 2
Descriptive statistics, reliabilities, and intercorrelations between variables.

	1	2	3	4	5	6
1. Germ aversion	–					
2. Perceived infectability	.35**	–				
3. Fear of COVID-19	.25**	.41**	–			
4. Anxiety	.13*	.38**	.33**	–		
5. Hopelessness	.01	.25**	.25**	.62**	–	
6. Depression	.04	.28**	.33**	.74**	.61**	–
Mean	42.9	28.7	20.9	44.9	5.7	21.96
SD	8.4	8.8	7.1	10.3	4.9	12.2
Alpha	.65	.78	.91	.91	.89	.92
Omega	.66	.78	.91	.91	.89	.93

* $P < .05$.
** $P < .001$.

measuring instruments demonstrated very good reliability (α = .78–.92; ω = .78–.93). The germ aversion subscale had moderate but acceptable internal consistency (α = .65; ω = .66).

The zero-order correlations indicated that germ aversion and perceived infectability were positively related to fear of COVID-19 (germ aversion: r_{353} = .25, $P<$ .001; perceived infectability: r_{353} = .41, $P<$ .001) and anxiety (germ aversion: r_{353} = .13, P = .016; perceived infectability: r_{353} = .38, $P<$ .001). This finding indicates that heightened germ aversion and perceived infectability are associated with heightened fear of COVID-19 and anxiety. Fear of COVID-19 was positively associated with anxiety (r_{353} = .33, $P<$ .001), which indicates that heightened fear of COVID-19 is associated with heightened anxiety. Perceived infectability and fear of COVID-19 were positively related to hopelessness (perceived infectability: r_{353} = .25, $P<$ .001; fear of COVID-19: r_{353} = .25, $P<$ .001) and depression (perceived infectability: r_{353} = .28, $P<$ .001; fear of COVID-19: r_{353} = .33, $P<$ .001). This finding indicates that heightened perceived infectability and fear of COVID-19 are associated with heightened hopelessness and depression. Anxiety was positively related to hopelessness (r_{353} = .62, $P<$ .001) and depression (r_{353} = .74, $P<$ .001). Finally, hopelessness and depression were positively related to one another (r_{353} = .61, $P<$ .001). There was no significant relationship between germ aversion and depression or between germ aversion and hopelessness.

The structural equation model that was used to examine the serial model is presented in Fig. 1. In this model, germ aversion and perceived infectability are predictors, and hopelessness and depression are the outcome variables. The model postulates a serial relationship between the predictor and outcomes that sequentially includes fear of COVID-19 and anxiety.

The direct effects resulting from the structural equation model are presented in Table 3. All direct effects were significant except for perceived infectability and hopelessness (β = .036, P = 491), perceived infectability and depression (β = .079, P = 071), germ aversion and anxiety (β = −.031, P = 502), fear of COVID-19 and hopelessness (β = .067, P = 198), and fear of COVID-19 and depression (β = .038, P = 379). The zero-order correlations for these relationships were significant; however, they were not significant in the context of the serial model.

The indirect effects are reported in Table 4. The results indicate that all hypotheses were supported:

- germ aversion was positively associated with fear of COVID-19, which in turn was positively associated with anxiety (β = 027, P = 015).
- perceived infectability was positively associated with fear of COVID-19, which in turn was positively associated with anxiety (β = 079, $P<$ 001).
- germ aversion was positively associated with fear of COVID-19, which was positively associated with anxiety. In turn, this serial relationship was positively associated with depression (β = 027, P = .014).
- perceived infectability was positively associated with fear of COVID-19, which in turn was positively associated with anxiety. In turn, this serial relationship was positively associated with depression (β = 079, $P<$ .001).
- germ aversion was positively associated with fear of COVID-19, which in turn was positively associated with anxiety. In turn, this serial relationship was positively associated with hopelessness (β = 027, P = .014).
- perceived infectability was positively associated with fear of COVID-19, which in turn was positively associated with anxiety. In turn, this serial relationship was positively associated with hopelessness (β = 079, $P<$ .001).
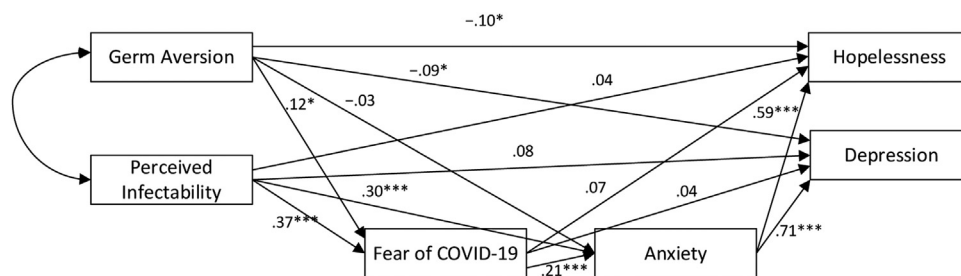

Fig. 1. Path analysis model of interrelationship between study variables. Regression weights are standardized. ***$P<$ .001, *$P<$ .05.

Table 3
Direct effects of perceived vulnerability to disease, fear of covid-19, and anxiety.

Effect	Beta	SE	β	95% CI	P
Germ Aversion → Hopelessness	−.060	.026	−.102	[−.176,−.028]	.023
Perceived Infectability → Hopelessness	−.020	.027	.036	[−.047, .113]	.491
Germ Aversion → Depression	−.129	.062	−.089	[−.158, −.014]	.043
Perceived Infectability → Depression	.111	.060	.079	[.005,.147]	.071
Germ Aversion → Anxiety	−.038	.059	−.031	[−.110, .047]	.502
Perceived Infectability → Anxiety	−.352	.067	.299	[.207, .385]	.001
Germ Aversion → Fear of COVID-19	.105	.047	.124	[.036, .220]	.023
Perceived Infectability → Fear of COVID-19	.302	.041	.370	[.287, .451]	.001
Fear of COVID-19 → Anxiety	.308	.072	.213	[.134, .291]	.001
Fear of COVID-19 → Hopelessness	.046	.035	.067	[−.016, .147]	.198
Fear of COVID-19 → Depression	.065	.076	.038	[−.035, .111]	.379
Anxiety → Hopelessness	.285	.025	.594	[.526, .662]	.001
Anxiety → Depression	.842	.045	.710	[.657, .759]	.001

Table 4
Indirect effects of perceived vulnerability to disease and fear of COVID-19.

Effect	Beta	SE	β	95% CI	P
Germ Aversion → Fear of COVID-19 → Anxiety[1]	.032	.016	.027	[.011,.065]	.015
Perceived Infectability → Fear of COVID-19 → Anxiety[2]	.093	.027	.079	[.055, .143]	.001
Germ Aversion → Fear of COVID-19 → Anxiety → Depression[3]	.028	.014	.027	[.010, .057]	.014
Perceived Infectability → Fear of COVID-19 → Anxiety → Depression[4]	.081	.023	.079	[.048, .123]	.001
Germ Aversion → Fear of COVID-19 → Anxiety → Hopelessness[5]	.009	.005	.027	[.003, .019]	.014
Perceived Infectability → Fear of COVID-19 → Anxiety → Hopelessness[6]	.027	.008	.079	[.015, .043]	.001
Germ Aversion → Fear of COVID-19 → Depression	.011	.009	.007	[.000, .035]	.089
Perceived Infectability → Fear of COVID-19 → Depression	.031	.023	.022	[−.003, .070]	.138
Germ Aversion → Fear of COVID-19 → Hopelessness	.004	.004	.007	[−.001, .013]	.182
Perceived Infectability → Fear of COVID-19 → Hopelessness	.011	.011	.020	[−.005, .031]	.263
Germ Aversion → Anxiety → Depression	−.033	.050	−.023	[−.119, .049]	.491
Perceived Infectability → Anxiety → Depression	.305	.059	.219	[.203, .408]	.001
Germ Aversion → Anxiety → Hopelessness	−.011	.017	−.019	[−.039, .016]	.500
Perceived Infectability → Anxiety → Hopelessness	.101	.021	.178	[.067, .138]	.001
Fear of COVID-19 → Anxiety → Depression	.267	.061	.156	[.166, .368]	.001
Fear of COVID-19 → Anxiety → Hopelessness	.088	.023	.127	[.053, .128]	.001

[1,2,3,4,5,6] corresponds to numbering of hypotheses.

Other significant indirect effects were:

- perceived infectability was positively associated with anxiety, which in turn was associated with depression (β = 219, $P < .001$).
- perceived infectability was positively associated with anxiety, which in turn was associated with hopelessness (β = 178, $P < .001$).
- fear of COVID-19 was positively associated with anxiety, which in turn was associated with depression (β = 156, $P < .001$).
- fear of COVID-19 was positively associated with anxiety, which in turn was associated with hopelessness (β = 127, $P < .001$).

4. Discussion

This study investigated the interrelationship between perceived vulnerability to disease, fear of COVID-19, and psychological distress among a sample of South African school teachers. There were several important findings. First, germ aversion was associated with heightened fear of COVID-19, which in turn was associated with heightened anxiety, depression, and hopelessness. Germ aversion entails discomfort and fear of situations in which disease transmission is likely [12]. It is plausible that South African teachers' germ aversion and related fear of COVID-19 and heightened anxiety may be due to their work conditions. The average teacher-student ratio in the country is one teacher to every 33 students; this ratio, combined with poor school infrastructure, results in heavily overcrowded classrooms [28]. Further, inadequate government provision of personal protective equipment, poor sanitation, lack of access to running water, and difficulties disinfecting classrooms can aggravate teachers' fear of COVID-19 and associated anxiety about contracting the virus [14].

Anxiety is an adaptive response to threat that can prompt adaptive threat-mitigating cognitive appraisals and behaviours aimed at protecting the individual from harm [13]. When risk of contact with a pathogen is high, cognitive appraisals of threat typically prompt avoidant coping strategies (e.g., physical distancing and social isolation). However, the government mandate to resume conventional teaching has rendered the avoidance of threat impossible, which may contribute to heightened anxiety, despondency, and hopelessness among teachers about their inability to protect themselves.

Second, the study found that perceived infectability was associated with heightened fear of COVID-19, which in turn was associated with heightened anxiety, depression, and hopelessness. Perceived infectability was also associated with anxiety, which in turn was associated with hopelessness and depression. Perceived infectability refers to appraisals of one's own susceptibility to infectious diseases [12]. Approximately 46% of South African teachers have reported having multiple comorbid conditions, such as diabetes, hypertension, and asthma [21]. For teachers, returning to school environments poses a real threat to their physical safety, and awareness of the severe complications associated with comorbidity may enhance their sense of susceptibility. Profound appraisals of threat have been found to result in excessive fear and have been associated with psychological distress, particularly anxiety and depression [23]. Teachers' difficulties in implementing protective measures and awareness of increased mortality due to comorbidities could lead to a sense of hopelessness about their situation.

5. Limitations

The study has certain limitations. First, the use of a cross-sectional survey design limits the extent to which causal relationships can be conclusively identified. Future research studies could recruit larger and more diverse samples of teachers, which would be beneficial in confirming the findings of the present study. Second, the internal consistency of the germ aversion subscale was moderate, which could potentially distort the observed correlations between measures of psychological constructs. However, the findings of the study are supported by existing research [16,35].

6. Conclusion

The current COVID-19 pandemic is distinctive due to the high transmissibility and infectibility of the virus, as well as severe complications among those with comorbidities. Considering the potentially protracted nature of the pandemic, it is important to examine the psychological responses of specific subgroups of the population that have been differentially impacted by the pandemic. Doing so will allow for a more comprehensive understanding of the pandemic's impact and facilitate targeted psychosocial interventions. The current study extends existing research by highlighting the association of perceived vulnerability to disease to fear of COVID-19 and psychological distress among teachers.

Disclosure of interest

The authors declare that they have no competing interest.

References

[1] Ahorsu DK, Lin CY, Imani V, Saffari M, Griffiths MD, Pakpour AH. The fear of COVID-19 scale: development and initial validation. Int J Ment Health 2020; 1–9. http://dx.doi.org/10.1007/s11469-020-00270-8.

[2] Al Joboory S, Álvarez Fernando V, Remingol L, Brulin-Solignac D, Bouchard JP. Covid-19, les effets psychopathologiques de la pandémie. Soins Psychiatr 2020;41:12–5. http://dx.doi.org/10.1016/S0241-6972(20)30119-5.

[3] Al Joboory S, Monello F, Soulan X, Alvarez Fernândez V, Bouchard JP. Covid-19 : les dispositifs de soutien psychologique. Rev Infirm 2020;69:37–9. http://dx.doi.org/10.1016/s1293-8505(20)30240-2.

[4] Al Joboory S, Monello F, Bouchard JP. PSYCOVID-19, dispositif de soutien psychologique dans les champs de la santé mentale, du somatique et du médico-social. Ann Med Psychol 2020;178:747–53. http://dx.doi.org/10.1016/j.amp.2020.06.008.

[5] Aloba O, Olabisi O, Ajao O, Aloba T. The Beck Hopelessness Scale: factor structure, validity, and reliability in a non-clinical sample of student nurses in South-western Nigeria. J Behav Health 2017;6:58–65. http://dx.doi.org/10.5455/jbh.20161022032400.

[6] Álvarez Fernandez V, Bouchard JP. Covid-19 en Espagne : l'impact psychologique de la pandémie sur les infirmiers. Rev Infirm 2020;69:33–5. http://dx.doi.org/10.1016/j.revinf.2020.08.007.

[7] Beck AT, Weissman A, Lester D, Trexler L. The measurement of pessimism: the hopelessness scale. J Consul Clin Psychol 1974;42:861–5 [Online. Available: https://psycnet.apa.org/doi/10.1037/h0037562].

[8] Black S, Spreen C, Vally S. Education, Covid-19 and care: social inequality and social relations of value in South Africa and the United States. SARE 2020;26:40–61 [Online. Available: https://hdl.handle.net/10520/ejc-sare-v26-n1-a4].

[9] Bouchard JP. Covid-19 : les soignants entre héroïsation et ostracisation. Rev Infirm 2020;69:31–2 [Online. Available: MEDLINE | ID: mdl-32600593].

[10] Díaz A, Beleña Á, Zueco J. The role of age and gender in perceived vulnerability to infectious diseases. Int J Environ Res Public Health 2020;17:485. http://dx.doi.org/10.3390/ijerph17020485.

[11] Dube B. Rural online learning in the context of COVID 19 in South Africa: evoking an inclusive education approach. Multidiscip J Educ Res 2020;10:135–15710.

[12] Duncan LA, Schaller M, Park JH. Perceived vulnerability to disease: development and validation of a 15-item self-report instrument. Pers Individ Differ 2009;47:541–6. http://dx.doi.org/10.1016/j.paid.2009.05.001.

[13] Fay AJ, Ainsworth SE, Maner JK. State anxiety and pathogen cues jointly promote social cognitive responses to pathogen threats. Soc Cogn 2020;38:21–39. http://dx.doi.org/10.1521/soco.2020.38.1.21.

[14] Groenewald C, Ntini T, Maluleka M. Anxiety about schools reopening: enhancing the voice of teachers, parents and learners through photovoice. HSRC Review 2020;18:13–4 [Online. Available: http://www.hsrc.ac.za/en/review/hsrc-review-july-2020/anxiety-about-schools-reopening.].

[15] Guil R, Gómez-Molinero R, Merchan-Clavellino A, Gil-Olarte P, Zayas A. Facinganxiety, growing up. Trait emotional intelligence as a mediator of the relationship between self-esteem and university anxiety. Front Psychol 2019;10:567. http://dx.doi.org/10.3389/fpsyg.2019.00567.

[16] Khlaif ZN, Salha S, Affouneh S, Rashed H, ElKimishy LA. The Covid-19 epidemic: teachers' responses to school closure in developing countries. Technol Pedagogy Educ 2020;30:95–109. http://dx.doi.org/10.1080/1475939X. 2020.1851752.

[17] Klapproth F, Federkeil L, Heinschke F, Jungmann T. Teachers' experiences of stress and their coping strategies during COVID-19 induced distance teaching. J Pedagog Res 2020;4:444–542. http://dx.doi.org/10.33902/JPR. 2020062805.

[18] Kliem S, Lohmann A, Mößle T, Brähler E. Psychometric properties and measurement invariance of the Beck hopelessness scale (BHS): results from a German representative population sample. BMC Psychiatry 2018;18:1–11. http://dx.doi.org/10.1186/s12888-018-1646-6.

[19] Marshall DT, Shannon DM, Love SM. How teachers experienced the COVID-19 transition to remote instruction. Phi Delta Kappan 2020;102:46–50. http://dx.doi.org/10.1177/0031721720970702.

[20] Mlamla S. Schools return to full-time teaching but the worries about Covid-19 remain. IOL Online. https://www.iol.co.za/capeargus/news/schools-return-to-full-time-teaching-but-the-worries-about-covid-19-remain-c5e480f6-4ed1-48a4-8ed8-f3472b505c03.

[21] Mthethwa A. Living in fear: the plight of educators with comorbidities. Daily Maverick; 2020 [https://www.dailymaverick.co.za/article/2020-07-07-living-in-fear-the-plight-of-educators-with-comorbidities/].

[22] Niu L, He J, Cheng C, Yi J, Wang X, Yao S. Factor structure and measurement invariance of the Chinese version of the Center for Epidemiological Studies Depression (CES-D) scale among undergraduates and clinical patients. BMC Psychiatry 2021;21:1–9. http://dx.doi.org/10.1186/s12888-021-03474-x.

[23] Padmanabhanunni A, Pretorius TB. The loneliness-life satisfaction relationship: the parallel and serial mediating role of hopelessness, depression and ego-resilience among young adults in south africa during covid-19. Int J Environ Res Public Health 2021;18:3613. http://dx.doi.org/10.3390/ijerph18073613.

[24] Padmanabhanunni A, Pretorius TB. When coping resources fail: the health-sustaining and moderating role of fortitude in the relationship between COVID-19-related worries and psychological distress. Soc Health Sci 2020;18:28–47 [Online. Available: https://hdl.handle.net/10520/ejc-safety1-v18-n2-a3].

[25] Pretorius TB, Padmanabhanunni A, Stiegler N, Bouchard JP. Validation de l'Échelle de la Peur de la COVID-19 en Afrique du Sud : trois analyses complémentaires. Ann Med Psychol 2021. http://dx.doi.org/10.1016/j.amp.2021.10.010.

[26] Pretorius T, Padmanabhanunni A. A looming mental health pandemic in the time of COVID-19? Role of fortitude in the interrelationship between loneliness, anxiety, and life satisfaction among young adults. S Afr J Psychol 2021;51:256–68.

[27] Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas 1977;1:385–401.

[28] Reddy V, Soudien C, Winnaar L. Disrupted learning during COVID-19: the impact of school closures on education outcomes in South Africa. HSRC Review 2020;18:11–2 [Online. Available: http://www.hsrc.ac.za/en/review/hsrc-review-july-2020/disrupted-learning-during-covid19].

[29] Satici B, Gocet-Tekin E, Deniz ME, Satici SA. Adaptation of the Fear of COVID-19 Scale: its association with psychological distress and life satisfaction in Turkey. Int J Ment Health 2020;1–9. http://dx.doi.org/10.1007/s11469-020-00294-0.

[30] Shoba S. Lessons from lockdown: South Africa's education system is just another Covid-19 statistic. The Daily Maverick; 2021 [https://www.dailymaverick.co.za/article/2021-07-18-lessons-from-lockdown-south-africas-education-system-is-just-another-covid-19-statistic/].

[31] Singh S, Zaki RA, Farid NDN, Kaur K. Reliability Analysis of the Malay version of the Center for Epidemiologic Studies-Depression Scale (CESD) among adolescents in Malaysia. Prev Med Rep 2021;24:101585.

[32] Soudien C, Reddy V, Harvey J. The Impact of COVID-19 on a Fragile Education During Covid-19: Disruptions to Educational Opportunity Education System: The Case of South Africa.," in Primary and Secondary During a Pandemic, F.M. Reimers Ed. Cambridge, MA: Springer; 2020. p. 303–25.

[33] South African Department of Basic Education. Basic Education Gazette for reopening of schools. Government Gazette, 659, May 29, No. 43372 [Online] Available:43372gen302.pdf - South African Government.

[34] Spielberger CD, Gorsuch RL, Lushene RE. Manual for the state-trait anxiety inventory. Palo Alto, CA: Consulting Psychologists Press; 1970.

[35] Stachteas P, Stachteas C. The psychological impact of the COVID-19 pandemic on secondary school teachers. Psychiatriki 2020;1:293–301. http://dx.doi.org/10.22365/jpsych.2020.314.293.

[36] Stiegler N, Bouchard JP. South Africa: challenges and successes of the COVID-19 lockdown. Ann Med Psychol 2020;178:695–8.

[37] Stiegler N, Bouchard JP. Covid-19 en Afrique du Sud : les soignants impliqués. Rev Infirm 2021;0(268):32–4. http://dx.doi.org/10.1016/j.revinf.2020.12.013.

[38] Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. Lancet Child Adolesc Health 2020;4:397–404. http://dx.doi.org/10.1016/S2352-4642(20)30095-X.

[39] Vujović M, Sovilj M, Jeličić L, Stokić M, Plećaš D, Plešinac S, et al. Correlation between maternal anxiety, reactivity of fetal cerebral circulation to auditory stimulation, and birth outcome in normotensive and gestational hypertensive women. Dev Psychobiol 2018;60:15–29. http://dx.doi.org/10.1002/dev.21589.

[40] Winter T, Riordan BC, Pakpour AH, Griffiths MD, Mason A, Poulgrain JW, et al. Evaluation of the English version of the Fear of COVID-19 Scale and its relationship with behavior change and political beliefs. Int J Ment Health 2020. http://dx.doi.org/10.1007/s11469-020-00342-9.