Benefits of a short course on mental health well-being and resilience for healthcare workers in South Africa during the COVID-19 pandemic

Maiketso MH[1], Wolvaardt JE[1]

[1]*School of Health Systems and Public Health, University of Pretoria, Pretoria, South Africa*

Corresponding author: J Wolvaardt (liz.wolvaardt@up.ac.za)

ABSTRACT

Purpose: The study explored whether an asynchronous short online course in mental health well-being and resilience for healthcare workers (HCWs) showed improved self-reported results among participants during the second wave of the COVID-19 pandemic.

Design/Methodology/Approach: A descriptive cross-sectional study evaluated the course outcomes using the 10-item Connor and Davison's Resilience Scale, the World Health Organization's WHO-five well-being index and self-developed questions. Data were collected via online questionnaires before and after course completion.

Findings: A total of 1 301 HCWs participated. The highest proportion of participants were from South Africa (93.7%) and females (78.7%). Analysed mean pre- and post-training scores showed increased scores in all five domains: knowledge, confidence in course outcomes, behaviour, resilience, and well-being. Confidence in the course outcomes was the only common significant construct for both well-being and resilience. Mindfulness activities (β = 0.12, 95%CI [0.032, 0.213], *p* = 0.008) and self-care behaviours (β = 0.14, 95%CI [0.035, 0.241], *p* = 0.009) were significant predictors of participants' well-being. Coping mechanisms for stress (β = 0.12, 95%CI [0.036, 0.21], *p* = 0.006) and connecting with a social support network (β = 0.085, 95%CI [0.0007, 0.17], *p* = 0.048) were significant predictors of participants' resilience. Those working in the private sector, those working in clinical settings and those who were female showed significant associations with well-being and resilience.

Originality/value: The research is noteworthy as literature shows that female HCWs tend to have worse mental health outcomes than males in the same field. Online learning can enable HCWs to conveniently access mental health education, accommodate their work commitments and explore topics that are potentially stigmatising.

Keywords: mental health; well-being; resilience; online; short course

Introduction

To date, there have been more than 766 million cases and over seven million deaths globally due to COVID-19 (World Health Organization, 2023) and the pandemic has created severe health, economic, political, and social stress for individuals, families, communities, and countries. The Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2022) warns that when hospitals become flooded and health systems strained, most healthcare workers (HCWs) face emotional fatigue and burnout due to extended working hours, the severity of ill patients, loss of life and attending to affected families as well as occasional shortages of Personal Protective Equipment. Healthcare workers are a crucial resource in any pandemic. South Africa (SA) is no exception as it is one of the hardest-hit countries in Africa with more than 4 million cases and over 100,000 deaths due to COVID-19 by May 2023 (World Health Organization, 2023).

Those who work in health care appear to be vulnerable to the experience and consequences of high levels of workplace stress (Santos et al., 2010). The experience of stress in these workplace settings is linked to both negative individual outcomes (e.g. depression, anxiety, burnout, compassion fatigue), patient outcomes (e.g. compromised patient care) or organizational outcomes (e.g. absenteeism, reduced productivity, early retirement and resignations) (Bride et al., 2007; Docrat *et al.*, 2019; Figley, 2002; Mealer et al., 2012; Muthuri *et al.,*2020; Tan et al., 2014).

HCWs can experience sustained psychological distress due to the care that they provide to patients who are at the highest risk of complications and/or mortality (Shanafelt, Ripp & Trocke, 2020). The consequence of long exposure to high levels of stress increases the possibility for HCWs to develop burnout. Burnout is a combination of emotional exhaustion, depersonalization and a sense of low personal accomplishment (Maslach et al., 2019). As burnout is associated with cognitive impairment, such as memory loss and difficulties in solving complex problems it is clear that effective strategies are needed to enable HCWs to manage work-related stress.

.

Possible strategies range from addressing existing distress, such as psychosocial support, to preventative strategies that could promote the mental health well-being and resilience of HCWs.

Well-being (specifically psychological well-being) is described as living a good life and reaching one's potential (Keyes et al., 2002). Hannah et al. (2020) describe seven key dimensions of psychological well-being from a literature review and relate them to work functioning and performance: 1) *Purpose in life:* employees who do work that is meaningful and serves a greater purpose are likely to be intrinsically motivated; 2) *Positive relations with others:* employees who are able to accept and respect others as well as support one another have their need for belonging met and are more motivated to perform; 3) *Self-acceptance:* employees who have self-worth and self-respect are able to have positive interpersonal relationships in the workplace; 4) *Autonomy:* employees who are self-directed are successful at work because they use their agency in the workplace; 5) *Environmental mastery:* employees who are flexible and able to solve problems believe that they are capable of positively affecting their environment to achieve goals; 6) *Personal growth:* employees who continually develop and learn are linked to positive performance in the workplace; and finally 7) *Stress tolerance/resilience:* employees who are able to overcome stress and routine adversity are able to operate more effectively in challenging workplace settings.

It is this ability to tolerate workplace stress or resilience that was of interest in this study. Resilience can be defined as "*the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioural flexibility and adjustment to external and internal demands*" (American Psychological Association, 2023). The International Collaboration of Workforce Resilience proposes a theoretical model (ICWR-1) for individual workforce resilience (Rees *et al.*, 2015).

The ICWR-1 model assumes that employees will be exposed to either acute or chronic workplace stress. The model proposes four components. The first is *neuroticism* which exerts both an influence on psychological well-being and is also related to negative outcomes such as burnout. Neuroticism is described as the tendency to "experience enduring negative emotional states such as anxiety, guilt, anger and

depression more frequently, intensely, and readily, and for a more enduring period of time" (Rees et al., 2015). The second is *mindfulness* as those who have poorer psychological awareness (not able to be mindful) will be less likely to be able to distance themselves from the situation or be able to reflect. The third component is *self-efficacy* or the belief in their ability to affect change. The key reason for this inclusion is it impacts on the way a person will attempt to manage a stressor and is linked to the next component; *coping*. Those with low self-efficacy will be more likely to engage in passive coping such as avoidance and substance use, while those with high self-efficacy are more likely to look for social support, problem-solve or engage in cognitive reappraisal. The outcome of the model is a *psychological adjustment* and represents the main outcomes: stress, depression, anxiety, burnout, and compassion fatigue.

The "reservoir" conceptual model of well-being by Dunn, Iglewicz and Moutier (2008) is a useful metaphor to understand the relationship between mental health well-being and resilience (Figure 1). In this model, positive inputs such as intellectual stimulation replenish the reservoir while negative inputs such as internal conflict drain the reservoir. Two possible types of outcomes are possible depending on the internal structure of the reservoir. The internal structure of the reservoir is the personal traits, temperament, and coping style which influence the outcome. Positive outcomes are enhanced mental health such as resilience, while negative outputs are phenomena such as burnout and cynicism.
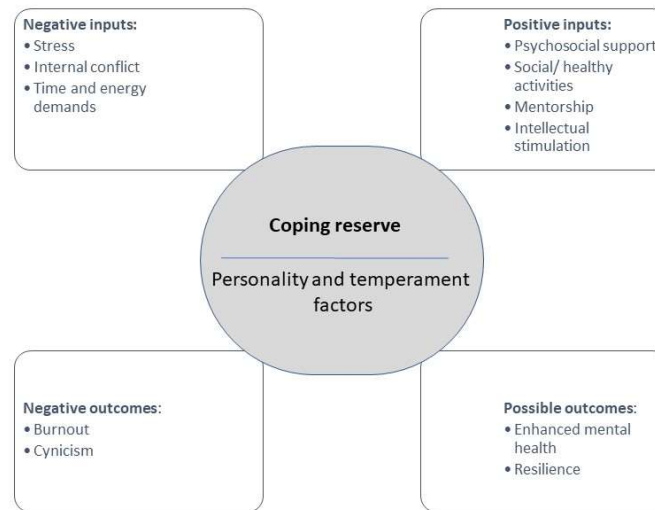
Figure 1: Diagrammatic representation of the "reservoir" conceptual model of well-being by Dunn, Iglewicz and Moutier (2008). Figure by authors.

Heath et al. (2020) summarised the resilience strategies used during the COVID-19, SARS and Ebola pandemics into individual and organizational strategies. The strategies that require organizational infrastructure or organizational support e.g. small group discussions and effective leadership far outweigh (n=17) the individual strategies (n=5). Even within the five individual strategies listed, there was only one (exercise) that did not need organizational infrastructure or organizational support, unlike sleep hygiene, social support, reflective counselling and mindfulness practice.

One example of a strategy that required organizational support during the COVID pandemic was coaching leadership (Kumar & Jin, 2022), but this type of strategy requires leadership to be present, willing and able to act. In health systems where this is less certain interventions that are not dependent on others are preferable. One such possible intervention is education and an asynchronous online short course in particular. The benefit of the use of an asynchronous online course is that the HCW can complete the course in their own time and need not be released from work, which is a key consideration during a pandemic. The Foundation for Professional Development (FPD), is a private higher education institution that provides both formal

qualifications and short professional development courses and developed an asynchronous online course on mental health resilience for HCWs (Foundation for Professional Development, 2021). The purpose of the short course is to improve the mental health well-being and resilience of frontline HCWs. There are six modules and students must complete one module before moving to the next. The objectives of the course are to improve students' knowledge of stress in the workplace, mental health resilience and well-being principles and practices; and the ability to manage stress, trauma, and distress (i.e. resilience) related to COVID-19 by the implementation of practical solutions to stressful working conditions.

The aim of the study was to analyse the outcomes of a short-course on mental health well-being and resilience for HCWs workers in South Africa during the second wave of the COVID-19 pandemic.

Methods

Study design, setting, and sample

This was a descriptive cross-sectional study. Data collected by the Foundation of Professional Development during the period related to the second COVID-19 wave in South Africa (January to March 2021) was analysed.

Total population sampling was done and all the HCWs (n=3 639) who started the short course were invited to participate (the invitation and link were embedded in the course). Total population sampling is a type of non-probability sampling (Sharma, 2017). All those who consented to take part in the study and completed the short course were included.

Data collection

Data were collected via online questionnaires at two different points in time (before and after the course). The pre-and post-questionnaires were built into FPD's online learning platform and participants were asked to complete the pre-course questionnaire before the first module (after providing informed consent) and the post-course questionnaire directly after completing the last module.

The online pre-course and post-course questionnaire had five sections and was available in English (Table 1). The questionnaire included the 10-item Connor-Davidson Resilience Scale (Connor & Davidson, 2003) which was developed to measure mental health resilience in men and women and the World Health Organization's 5 well-being index (World Health Organization, 2021). The Connor-Davidson Resilience Scale (CD- RISC©) was chosen as it scored the most highly among 15 self-report measures in terms of psychometric qualities such as internal consistency and construct validity and has been validated in different countries, including South Africa (Rees *et al*., 2015). Permission to use this scale was granted to the Foundation for Professional Development. Similarly, the World Health Organization's 5 well-being index (WHO-5) was chosen as it has adequate validity in screening for depression. Item response theory analyses in studies indicate that the index has good construct validity as a unidimensional scale to measure well-being (Topp *et al*., 2015). The questions in the remaining sections were developed by a subject matter expert who developed the course material. The questionnaire had been piloted before an earlier study that examined the same construct during the first wave of the pandemic (Kelly *et al*., 2021).

Table 1. Online pre-course and post-course questionnaire according to specified sections

Section	Variable	Description
Section 1	Knowledge	Multiple choice questions that assessed participants' knowledge about the content of the course
Section 2	Confidence in course outcomes	The participants were asked to rate their confidence on a scale from 1 to 3
Section 3	Behaviour	Description of how often participants engage in behaviours which are related to the practical solutions and coping mechanisms taught during the course
Section 4	Resilience	The 10-item Connor-Davidson Resilience Scale (CD-RISC©) for mental health resilience
Section 5	Well-being	The WHO-5 Well-Being Index for a measure of mental well-being

Table by authors.

To ensure data quality FPD used the student management system, data profiling, quality automation and alerts of incoming data to check and manage the data.

Ethical consideration

The study was approved by the Foundation for Professional Development Research Ethics Committee (FPDREC) and the Faculty of Health Sciences Research Ethics Committee, University of Pretoria (552/2021).

Data analysis

Descriptive and multivariable analyses of the data were done with the use of STATA13.1 software and the assistance of a statistician. The analyses calculated and statistically compared the mean of pre- and one-month post-training scores. Crude linear regressions were applied to estimate associations between the change (from pre-to post-training) in well-being and resilience and the change in knowledge, confidence, and resilience-building behaviours. Data were synthesized, and descriptive analysis was performed. Multivariate analyses focused on understanding the relationship between different variables and how relevant they are to the problem being studied. In the well-being model, a simple linear regression was used to predict participants' well-being from knowledge, confidence, behaviour, and resilience. Multivariate regression was used to predict the participants' well-being from knowledge, confidence, behaviour, and resilience. The same concept was applied in the resilience model with simple linear regression used to predict participants' resilience from knowledge, confidence, behaviour, and well-being, Multivariate regression was used to predict the participants' resilience from knowledge, confidence, behaviour, and well-being.

Finally, well-being and resilience models were combined and compared with socio-demographic variables to create Well-being model 1*2** and Resilience model 1* 2**.

Results

The study analysed the results of 1 301 HCWs who participated in the study out of the possible 3 639 (Response rate = 36%).

The socio-demographic analysis (Table 2) shows that the highest proportion of participants were from SA (93.7%), were female (78.7%) and worked in a clinical setting (77.3%). Participants were predominantly from urban settings (67.2%) with a similar proportion of peri-urban (16.4%) and rural (16.5%) settings. There were more participants from the publicly-funded sector (53.9%) and the lowest representation was among the Asian and Coloured groups.

Table 2. Sociodemographic characteristics of participants (n=1 301)

Sociodemographic		Total (N)	Percentage (%)
Gender	Male	227	21.29%
	Female	1,024	78.71%
Area of work	Urban	874	67.18%
	Peri-Urban	213	16.37%
	Rural	214	16.45%
Work Function	Clinical	1,005	77.25%
	Non-Clinical	296	22.75%
Sector of Work	Public Sector	702	53.96%
	Private Sector	599	46.04%
Ethnicity	Asian	140	10.76%
	Black	445	34.20%
	Coloured	142	10.91%
	White	574	44.12%
Country	South Africa	1,219	93.70%
	Outside of South Africa	82	6.30%

Table by authors.

Table 3 summarises the pre-and post-test scores regarding participants' self-reported knowledge, confidence in the course outcomes, behaviour, resilience, and well-being. The mean and standard deviation of the post-test results are higher than the pre-test results across all five domains mentioned. The confidence in the course outcomes shows a significant difference of 5.15 points from the pre- to post-test ($p < 0.001$) in all content areas. The knowledge score of the participants increased by 1.52 when compared to the pre-test knowledge score.

Table 3. Mean pre-and post-test results of participants' self-reported knowledge, confidence in course outcomes, behaviour, resilience, and well-being.

Content Area	Pre-Test	Post-Test	Difference	P-value
Knowledge (mean ± SD) *Range: 0-12*	6.99 ± 1.75	8.51 ± 1.39	1.52	**0.00**
Confidence in Course Outcomes (mean ± SD) *Range: 0-18*	11.83 ± 2.96	16.98 ± 1.84	5.15	**0.00**
Behaviour (mean ± SD) *Range: 0-25*	21.15 ± 4.19	24.30 ± 3.20	3.15	**0.00**
Resilience (mean ± SD) *Range: 0-40*	27.54 ± 6.21	30.82 ± 5.67	3.28	**0.00**
Well-being (mean ± SD) *Range: 0-25*	14.60 ± 4.73	17.14 ± 4.16	2.54	**0.00**

Table by authors.

Table 4 shows the difference in the mean scores over time for the four domains of interest (participants' self-reported confidence in course outcomes, behaviour, resilience, and well-being). The short course on mental health resilience for healthcare workers resulted in an improvement of all the items under the different constructs used to measure mental health resilience.

Table 4. Pre- and post-test results (mean scores) of participants' self-reported confidence in course outcomes, behaviour, resilience, and well-being.

Questionnaires	Total		
Confidence *(Item Range: 0-3)*	*Pre-test*	*Post-test*	*Difference*
1. I can describe the stress-related physical manifestations that can occur in the body and discuss the coping mechanisms to deal with them	2.071	2.825	0.754

	Pre-test	Post-test	Difference
2. I can describe the existing stressors that Frontline Workers have to deal with and discuss additional stressors linked specifically to COVID-19	2.151	2.887	0.736
3. I know how to develop a self-care plan for frontline workers	1.716	2.783	1.065
4. I can discuss the psycho-social effects of COVID-19 on patients and healthcare workers	2.019	2.851	0.832
5. I can discuss the clinical features of anxiety, panic attacks and depression linked to COVID-19 and ways to cope with them	2.011	2.825	0.814
6. I can discuss the clinical features of PTSD linked to providing health care during the COVID-19 pandemic and ways to cope	1.864	2.812	0.949

Behaviour (Item Range: 0-5)	Pre-test	Post-test	Difference
1. Use coping mechanisms to deal with stress and anxiety	4.264	4.810	0.547
2. Engage in mindfulness and relaxation activities	4.045	4.645	0.601
3. Engage in self-care behaviours	4.471	5.027	0.556
4. Connect with your social support network	4.323	4.987	0.663
5. Discuss the impact of COVID-19 on mental health with co-workers	4.046	4.829	0.782

Resilience (Item Range: 0-4)			
1. I can adapt when changes occur	2.923	3.211	0.284
2. I can deal with whatever comes my way	2.722	3.094	0.372
3. I try to see the humorous side of things when I am faced with problems	2.450	2.856	0.406
4. Having to cope with stress can make me stronger	2.712	3.075	0.362
5. I tend to bounce back after illness, injury, or other hardships	2.945	3.173	0.224
6. I believe I can achieve my goals, even if there are obstacles	3.074	3.300	0.227
7. Under pressure, I stay focused and think clearly	2.669	2.957	0.287
8. I am not easily discouraged by failure	2.479	2.870	0.390
9. I think of myself as a strong person when dealing with life's challenges and difficulties	2.919	3.248	0.328

10. I can handle unpleasant or painful feelings like sadness, fear, and anger	2.641	3.038	0.397
Well-being *(Item Range: 0-5)*	**Pre-test**	**Post-test**	**Difference**
1. I have felt cheerful and in good spirits	3.209	3.632	0.423
2. I have felt calm and relaxed	3.018	3.472	0.454
3. I have felt active and vigorous	2.803	3.302	0.499
4. I woke up feeling fresh and rested	2.625	3.193	0.568
5. My daily life has been filled with things that interest me	2.945	3.543	0.598

Table by authors.

Well-being Model 1

A simple linear regression was used to predict participants' well-being from knowledge, confidence, behaviour, and resilience (Table 5). All the individual constructs included in the model were significant predictors and positively associated with participants' well-being ($p < 0.001$). The greatest effect was observed for confidence as an increase in one point of confidence score from the pre-test to the post-test, on average, an increase the well-being score of 0.94 points (95%CI [0.90, 0.98], $p < 0.001$). Conversely, the weakest effect was observed for knowledge as an increase in knowledge by one point from the pre-test to the post-test corresponded, on average, increase the well-being score of 0.18 points (95%CI [0.14, 0.22], $p < 0.001$).

Multivariate regression was used to predict the participants' well-being from knowledge, confidence, behaviour, and resilience (Table 5). The results show that knowledge, confidence, behaviour, and resilience explained significant variation in well-being and all remained positively associated with well-being in the multivariate model. The results show that approximately 41% of the variation in participants' well-being is explained by the combined effects of the predictors ($F_{4,1892} = 323.7$, $p < 0.0001$, $R^2 = 0.41$, $R^2_{adjusted} = 0.41$). well-being After adjusting for other variables in the multivariable analysis, the positive association between resilience and well-being remains highly significant, indicating that a one-point increase in resilience score from pre-test to post-test was associated with a 0.44 point increase in well-being (95%CI [0.40, 0.48], $p < 0.001$). Similarly, the association between knowledge and well-being

remained statistically significant, but the magnitude of the effect decreased. The coefficient reduces to 0.03 (95%CI [0.00, 0.06], p = 0.043), suggesting that a one-point increase in knowledge score from pre-test to post-test was associated with a smaller increase in well-being (approximately 0.03 points).

Table 5. Crude and multivariate analysis to predict participants' well-being and resilience

Variable	Crude Analysis		Multivariable Analysis	
	β (95% CI)	*P-value*	*β (95% CI)*	*P-value*
Well-being Model 1				
Knowledge	0.179 (0.14; 0.22)	**0.000**	**0.03 (0.00; 0.06)**	**0.043**
Confidence	0.940 (0.90; 0.98)	**0.000**	0.36 (0.31; 0.42)	0.000
Behaviour	0.479 (0.46; 0.50)	**0.000**	0.08 (0.04; 0.12)	**0.000**
Resilience	0.806 (0.77; 0.84)	**0.000**	0.44 (0.40; 0.48)	**0.000**
Resilience Model 1				
Knowledge	0.135 (0.098, 0.172)	0.000	-0.005 (-0.037 0.027)	0.749
Confidence	0.783 (0.747, 0.819)	**0.000**	**0.332 (0.28, 0.39)**	**0.000**
Behaviour	0.367 (0.346, 0.389)	**0.000**	0.038 (-0.0027 0.078)	0.067
Well-being	0.621 (0.5968, 0.6445)	**0.000**	**0.405 (0.365, 0.444)**	**0.000**

Table by authors.

Resilience Model 1

A simple linear regression was used to predict participant's resilience from knowledge, confidence, behaviour, and well-being (Table 5). All the individual constructs included in the model were significant predictors and positively associated with participants' resilience ($p < 0.001$). The greatest effect was observed for confidence as an increase in one point in confidence score from the pre-test to the post-test corresponded, on average, to an increase in the resilience score of 0.78-points (95%CI [0.747, 0.819], *p*

< 0.001). Conversely, the weakest effect was observed for knowledge as an increase in knowledge by one point from pre-test to post-test, on average, to an increase in the resilience score of 0.135 points (95%CI [0.098, 0.172], $p < 0.001$).

Multivariate regression was used to predict the participants' resilience from knowledge, confidence, behaviour, and well-being (Table 5). The fitted model explained a statistically significant amount of variation in the resilience of the participants. The results show that approximately 38% of the variation in participants' resilience was accounted for by the combined effects of knowledge, confidence, behaviour, and well-being ($F_{4,1892}$ = 297.3, $p < 0.0001$, R^2 = 0.38, $R^2_{adjusted}$ = 0.38). After accounting for other variables in the multivariable analysis, the positive association between well-being and resilience remained strong, with a 0.405 score (95%CI [0.365, 0.444, $p < 0.001$) increase in resilience for each one-point increase in well-being between pre-test to post-test assessment. Additionally, the association between confidence and resilience remained significant, with a 0.332 (95%CI [0.28, 0.39], $p < 0.001$) score increase in resilience for each one-point increase in confidence between pre-test to post-test assessment. However, knowledge and behaviour were not significant predictors of participants' resilience.

Well-being Model 2
A simple linear regression was used to predict participants' well-being from five specific behaviours (Table 6). Each individual construct included in the model explained a significant amount of the variance ($p < 0.001$) in participants' well-being ($p < 0.001$). The greatest effect was observed for self-care behaviours as a one-point increase in self-care behaviours, on average, increased well-being score by 0.35 points (95%CI [0.28, 0.42], $p < 0.001$). Conversely, the lowest effect was observed for discussing the impact of COVID-19 on mental health, a one-point increase from pre-test to post-test for discussing the impact of COVID-19 on mental health, on average, increased the well-being score by approximately 0.23 points (95%CI [0.17, 0.30], $p < 0.001$).

Multivariate regression was used to predict the participants' well-being from the five specific behaviours. The fitted model did not explain much of the participants' well-

being ($F_{4,1745}$ = 25.8, $p < 0.0001$, R^2 = 0.07, $R^2_{adjusted}$ = 0.07), as only 7% variation in well-being was accounted for by factors included in the model. After adjusting for other variables in the multivariable analysis, the association between coping mechanisms for stress, (β = 0.076, 95%CI [-0.012; 0.16], p= 0.091), connecting with social support network (β = 0.085, 95%CI [-0.0019, 0.17], p = 0.055), and discussing the impact of COVID-19 on mental health (β = 0.059, 95%CI [-0.014, 0.134], p = 0.114) were not significant predictors of participants' well-being. However, mindfulness activities and self-care behaviours were significant predictors of participants' well-being. A one-point increase from the pre-test to post-test in mindfulness activities corresponded, on average increased the well-being score by 0.12 points (95%CI [0.032, 0.213], p = 0.008). Similarly, a one-point increase from pre-test to post-test self-care behaviours corresponded, on average increased the well-being score by 0.14-points (95%CI [0.035, 0.241], p = 0.009).

Table 6. Changes in *specific* behaviours predicting well-being or resilience (crude and multivariable analysis)

Variable	Crude Analysis		Multivariable Analysis	
	β (95% CI)	*P-value*	*β (95% CI)*	*P-value*
Well-being Model 2				
Coping mechanisms for stress	0.29 (0.22; 0.36)	**0.000**	0.076 (-0.012; 0.16)	0.091
Mindfulness activities	0.31 (0.25; 0.37)	**0.000**	0.12 (0.032; 0.213)	**0.008**
Self-care behaviours	0.35 (0.28; 0.42)	**0.000**	0.14 (0.035; 0.241)	**0.009**
Connecting with a social support network	0.28 (0.22; 0.35)	**0.000**	0.085 (-0.0019; 0.17)	0.055
Discussing impact of COVID-19 on mental health	0.23 (0.17; 0.30)	**0.000**	0.059 (-0.014; 0.134)	0.114
Resilience Model 2				
Coping mechanisms for stress	0.20 (0.13; 0.27)	**0.000**	**0.12 (0.036; 0.21)**	**0.006**
Mindfulness activities	0.15 (0.09; 0.22)	**0.000**	0.02 (-0.07; 0.11)	0.621

Self-care behaviours	0.18 (0.12; 0.25)	**0.000**	0.05 (-0.05; 0.15)	0.328
Connecting with social support network	0.17 (0.11; 0.24)	**0.000**	0.085 (0.0007; 0.17)	**0.048**
Discussing impact of COVID-19 on mental health	0.12 (0.06; 0.17)	**0.000**	0.003 (-0.07; 0.053)	0.929

Table by authors.

Resilience Model 2

A simple linear regression was used to predict participants' resilience from the same five specific behaviours (Table 6). Each individual construct included in the model significantly explained a portion of the variance *(p < 0.001)* in participants' resilience. The greatest effect was observed for coping mechanisms for stress as a one-point increase from the pre-test to post-test of coping mechanisms for stress corresponded, on average, to an increase in the resilience score of 0.20-points (95%CI [0.13, 0.27], *p* < 0.001). Conversely, the weakest effect was observed for discussing the impact of COVID_19 on mental health as a one-point increase of discussing the impact of COVID-19 on mental health, on average, to an increase in the resilience score of 0.12 points (95% CI [0.06, 0.17], *p* < 0.001).

Multivariate regression was used to predict the participants' resilience from the same five specific behaviours (Table 6). The results show that the fitted model did not explain much of the variation in the resilience of the participants ($F_{4,1745}$ = 9.2, *p < 0.0001*, R^2 = 0.026, $R^2_{adjusted}$ = 0.023), as approximately only 2.6% of the variation in resilience can be accounted for by the combined effects of the predictors. After adjusting for other variables in the multivariable analysis, the mindfulness activities (β = 0.02, 95%CI [-0.07, 0.11], *p* = 0.621), self-care behaviours (β = 0.05, 95%CI [-0.05, 0.15], *p* = 0.328), and discussing the impact of COVID-19 on mental health (β = 0.003, 95%CI [-0.07, 0.053], *p* = 0.929) were not significant predictors of participants' resilience. However, coping mechanisms for stress and connecting with a social support network were significant predictors of participants' resilience. A one-point increase from the pre-test to post-test of coping mechanisms corresponded, on average, to an increase in resilience score of 0.12-points (95%CI [0.036, 0.21], *p* = 0.006). Similarly, a one-

point increase from the pre-test to post-test of connecting with social support network corresponded, on average, to an increase in resilience score of 0.09 points (95%CI [0.0007, 0.17], $p < 0.05$).

The Well-being and Resilience models were combined and compared with socio-demographic variables to create Well-being model 1*2** and Resilience model 1* 2** (Table 7).

Table 7. Crude analyses of sociodemographic characteristic on well-being and resilience of participants

	Variable	Well-being Model 1*		Well-being Model 2**	
		β (95% CI)	P-value	β (95% CI)	P-value
	Female	1.691 (1.62; 1.76)	0.56	0.02 (-0.01; 0.18)	0.81
Area of work	Peri-urban	1.72 (1.65, 1.79)	0.93	-0.20 (-0.38; -0.02)	**0.03**
	Rural	1.58 (1.41; 1.75)			
	Private Sector	1.61 (1.51; 1.70)	**0.009**	0.20 (0.07; 0.34)	**0.003**
Function	Clinical	1.72 (1.64; 1.79)	0.109	-0.13 (-0.28; 0.03)	0.114
	Nonclinical	1.62 (1.48; 1.76)			
Pre-test well-being score		2.02 (1.93; 2.10)	**0.000**	1.37 (1.27; 1.47)	**0.000**
	Variable	Resilience Model 1*		Resilience Model 2**	
		β (95% CI)	P-value	β (95% CI)	P-value
	Female	1.28 (1.22; 1.35)	0.512	1.47 (0.59;2.36)	**0.001**
Area of work	Peri-urban	1.30 (1.24; 1.36)	0.901	0.99 (-0.5; 2.02)	0.062
	Rural	1.20 (1.05; 1.34)			
	Private Sector	1.22 (1.14; 1.31)	**0.033**	0.053 (-0.69; 0.80)	0.890
Function	Clinical	1.30 (1.24; 1.37)	0.902	1.31 (0.42; 2.19)	**0.004**
	Nonclinical	1.21 (1.09; 1.33)			

Outpatients/Primary care		
Pre-test resilience score	1.58 (1.50; 1.65)	**0.000**

Table by authors.

Well-being Model 1/ Well-being Model 2***

In Model 1, the well-being score of those working in the private sector, increased from pre-test to post-test by 1.61-points (95% CI [1.51, 1.70], *p* = 0.009) compared to those working in the publicly-funded sector (adjusted for baseline well-being scores). In Model 2, the well-being score of those working in the private sector increased from pre-test to post-test by 0.20-points (95%CI [0.07, 0.34], *p* = 0.003) compared to those working in the publicly-funded sector. However, the well-being score of those working in peri-urban settings decreased from pre-test to post-test by 0.20-points (95% CI [-0.38, -0.02], *p* = 0.03) compared to those working in urban areas (adjusted for baseline well-being scores).

Resilience Model 1/ Resilience Model 2***

In Model 1, the resilience score for those working in the private sector increased from pre-test to post-test by 1.22 points (95% CI [1.14, 1.31], *p* = 0.033) compared to those working in the publicly-funded sector (adjusted for baseline resilience scores). In Model 2, being female resulted in an increase of 1.47-points (95% CI [0.59, 2.236], *p* = 0.001) from pre-test to post-test compared to males and for those working in a clinical setting their resilience score increased from pre-test to post-test by 1.31 points (95% CI [0.42, 2.19], *p* = 0.004) compared to those working in a non-clinical setting (adjusted for baseline resilience scores).

Discussion

The study evaluated the outcome results of an online mental health resilience course undertaken by HCWs during the second wave of the COVID-19 pandemic in SA. The highest proportion of participants were from SA (93.7%) and female (78.7%). There were slightly more participants from the publicly-funded sector and most of the participants worked in clinical settings predominately in urban areas. The demographic profile of the sample is similar to the population of HCWs in SA which is dominated by females working in urban areas (Mumbauer *et al.,*2021).

The outcomes of participants' self-reported knowledge, confidence in course outcomes, behaviour, resilience, and well-being showed positive results. Manyaapelo *et al.* (2021) state that HCWs who received training in more areas on COVID-19 management were more likely to be confident in their knowledge about COVID-19 than those who received training in fewer areas showed that knowledge (acquired through training) leads to confidence in HCWs' overall knowledge about COVID-19.

Each individual item that together comprises the four domains of interest (participants' self-reported confidence in the course outcomes, behaviour, resilience, and well-being) showed reported improvement after the completion of the course. In the Well-being Model 1 and Resilience Model 1, all the individual constructs included in the models explained a significant amount of variation in participants' well-being and resilience in both models using simple linear regression. The greatest effect was observed for confidence in the course outcomes in both the well-being model as well as the resilience model. Frontline workers' confidence in their ability to deliver and implement an intervention is a crucial factor for successful implementation (Pollock *et al.*, 2020) and reflects their self-efficacy and ultimately the way they will attempt to manage a stressor and cope during the pandemic and beyond.

In Well-being Model 2 and Resilience Model 2, mindfulness activities and self-care behaviours were significant predictors of participants' well-being; and coping mechanisms for stress and connecting with a social support network were significant predictors of participants' resilience. This finding that mindfulness activities were a significant predictor of well-being differs somewhat from the ICWR-1 model that links mindfulness to resilience rather than well-being (Rees et al., 2015). The study results are also similar to Kelly *et al.*'s findings (2021) that report that, among those who completed the same online course as the participants in this study, coping skills for stress were associated with improved resilience scores (Kelly et al., 2021). However, the Kelly et al. (2021) study showed a significant association between coping skills for stress and improved well-being scores and between self-care behaviour and improved resilience scores, which was not found in this study.

HCWs are generally self-reliant which may pose a problem to disclose any mental health challenges (Salazar de Pablo *et al.*, 2020). Therefore, there should be an emphasis on the importance of putting mindfulness and cognitive behavioural therapy intervention programmes in place to support and protect HCWs.

Those working in the private sector, those working in clinical settings and those who were female showed significant associations with increased well-being and resilience. In contrast, those residing in peri-urban settings showed a decline in well-being scores compared to their urban counterparts. Badahdah *et al.* (2021) reported that female HCWs interacting with COVID-19 patients had poorer mental health well-being in terms of depression and anxiety. (Badahdah, *et al.* 2021). A Spanish study explored differences in symptoms of anxiety, burnout, depression, resilience and symptoms of posttraumatic stress among healthcare staff before and after the first wave of the COVID-19 pandemic (Luceno-Moreno et al., 2022). The study concluded that female HCWs scored poorer than their male counterparts for all the conditions. Therefore, the course on mental health resilience in our study appears to be particularly beneficial for female HCWs given the significant increase in well-being and resilience scores compared to their male counterparts.

Although the COVID-19 pandemic is a global risk to the mental health of all, it is possible to improve mental health well-being and resilience through a short asynchronous online course while still working.

Study limitations

The results are self-reported data which may be susceptible to social desirability and acquiescent effects. There are no guarantees that the positive effects observed during this study are sustained over time. The study sample was selective in that it excluded those who did not consent to the use of their data and those who did not complete the course.

Conclusion

A short online course is a valuable method to promote mental health resilience and well-being among HCWs, especially female HCWs. This finding holds significant practical importance, considering that the existing literature portrays female HCWs as a demographic that experiences poorer mental health outcomes compared to their male counterparts. Healthcare workers have demanding schedules that often include long shifts and irregular hours. Online learning allows them to access mental health education at their convenience, fitting it around their work commitments without disrupting patient care. The consequences of elevated levels of stress, burnout, and fatigue in HCWs include increases in clinical errors, a decrease in productivity,

breaches in infection control and overall poorer quality of care. Therefore, prioritising the mental health of HCWs to ensure an effective response to everyday stress and special stress - such as in a pandemic - is important. It is recommended that employers should consider the strategy of online short courses when the topic is personal and potentially stigmatising for employees

Conflict of interest

The authors have no conflict of interest to declare.

Funding

No funding was received for this study.

References

Badahdah A., Khamis F., Al Mahyijari N., Al Balushi M., Al Hatmi H., Al Salmi I., Albuushi Z., Al Noomani J. (2021). "The mental health of health care workers in Oman during the COVID-19 pandemic", *International Journal of Social Psychiatry*, doi: 10.1177/0020764020939596.

Bride B.E., Radey M., Figley C.R. (2007). "Measuring compassion fatigue". *Clinical Social Work Journal,* Vol. 35, pp: 155–63. doi:10.1007/s10615-007-0091-7
Centers for Disease Control and Prevention (2022). "Healthcare Workers: Work Stress and Mental Health", available at:
https://www.cdc.gov/niosh/topics/healthcare/workstress.html (accessed 5 August 2022)

Connor, K.M. and Davidson, J.R. (2003). "Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC)" *Depression and Anxiety*, Vol. 18 No. 2, pp. 76-82. doi:10.1002/da.10113

Docrat, S., Besada, D., Cleary, S., Daviaud, E. and Lund C. (2019). "Mental health system costs, resources, and constraints in South Africa: A national survey". *Health Policy and Planning*, Vol. 34 No. 9, pp:706-19. doi:10.1093/heapol/czz085

Dunn, L.B., Iglewicz A., Moutier C. (2008). "A Conceptual Model of Medical Student Well-Being: Promoting Resilience and Preventing Burnout". *Academic Psychiatry* Vol 32, pp 44–53.

Figley C.R. (2002). "Compassion fatigue: psychotherapists' chronic lack of self care". *Journal of Clinical Psychology,* Vol. 58, 1433-41. doi:10.1002/jclp.10090

Foundation for Professional Development (2021). "Mental health resilience course for healthcare workers", available at: https://www.foundation.co.za. Accessed 1 July 2021.

Hannah S.T., Perez A.L.U., Lester P.B., Campbell Quick J. (2020). "Bolstering Workplace Psychological Well-Being Through Transactional and Transformational Leadership", *Journal of Leadership & Organizational Studies,* Vol. 27 No.3, pp: 222-40. doi: 10.1177/1548051820933623Kelly F., Uys M., Bezuidenhout D., Mullane S.L. and Bristol C. (2021). "Improving Healthcare Worker Resilience and Well-being During COVID-19 Using a Self-Directed E-Learning Intervention", *Frontiers in Psychology,* doi: 10.3389/fpsyg.2021.748133. PMID: 34925152.

Keyes C.L.M. (2002). "The mental health continuum: From languishing to flourishing in life." *Journal of Health and Social Behavior*, Vol. 43 No. 2, pp: 207-22. doi.org/10.2307/3090197

Kumar N., Jin Y. (2022). "Impact of nurses' emotional labour on job stress and emotional exhaustion amid COVID-19: The role of instrumental support and coaching leadership as moderators". *Journal of Nursing Management*, Vol. 30, pp: 2620-32. doi/10.1111/jonm.13818

Luceno-Moreno L., Talavera-Velasco B., Vazquez-Estevez D. Martın-Garcıa J. (2022), "Mental Health, Burnout, and Resilience in Healthcare Professionals After the First Wave of COVID-19 Pandemic in Spain", *Journal of Occupational and Environmental Medicine*, Vol. 64 No. 3, pp: e115-123.

Manyaapelo T., Mokhele T., Sifunda S., Ndlovu P., Dukhi N., Sewpaul R., Naidoo, I., Jooste, S., Tlou, B., Moshabela M., Mabaso M., Zuma, K., Reddy P. (2021), "Determinants of Confidence in Overall Knowledge About COVID-19 Among Healthcare Workers in South Africa: Results from an Online Survey", *Frontiers in Public Health.* doi: 10.3389/fpubh.2021.614858.

Maslach C., Jackson S.E., Leiter M.P. (2019). The Maslach Burnout Inventory Manual. Third Edition, available at: https://www.researchgate.net/publication/277816643_The_ Maslach_Burnout_Inventory Manual. Accessed 3 May 2023.

Mealer M., Jones J., Newman J., McFann K.K., Rothbaum B., Moss M. (2012). The presence of resilience is associated with a healthier psychological profile in intensive care unit (ICU) nurses: results of a national study. *International Journal of Nursing Studies,* Vol. 49, pp: 292–9. doi:10.1016/j.ijnurstu.2011.09.015

Mumbauer A., Strauss M., George G., Ngwepe P., Bezuidenhout C., de Vos L., Medina-Merino, A. (2021). "Employment preferences of healthcare workers in South Africa: Findings from a discrete choice experiment", *PLoS ONE*, Vol. 16 No. 4: doi:org/10.1371/journal.pone.025065

Muthuri, R., Senkubuge, F., and Hongoro, C. (2020). "An investigation of healthcare professionals' motivation in public and mission hospitals in Meru County, Kenya". *Healthcare, Vol.* 8 No 4, pp: 530. doi:10.3390/healthcare8040530

Pollock A., Campbell P., Cheyne J., Cowie J., Davis B., McCallum J., McGill K., Elders A., Hagen S., McClurg D., Torrens C., Maxwell M. (2020), "Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic, or pandemic: a mixed methods systematic review", *Cochrane Database of Systematic Reviews,* doi: 10.1002/14651858.CD013779.

Rees C., Breen L.J., Cusack L., Hegney D. (2015). "Understanding individual resilience in the workplace: the international collaboration of workforce resilience model", *Frontiers in Psychology.* Vol. 6, doi: 10.3389/fpsyg.2015.00073

Salazar de Pablo G., Vaquerizo-Serrano J., Catalan A., Arango C., Moreno C., Ferre F., Shin JI., Sullivan S., Brondino N., Solmi M., Fusar-Poli P. (2020). "Impact of coronavirus syndromes on physical and mental health of health care workers: Systematic review and meta-analysis", *Journal of Affective Disorders,* doi: 10.1016/j.jad.2020.06.022.

Santos M.C., Barros L., Carolino E. (2010). Occupational stress and coping resources in physiotherapists: a survey of physiotherapists in three general hospitals. "*Physiotherapy",* Vol. 96, pp: 303-10. doi:10.1016/j.physio.2010.03.001

Shanafelt T., Ripp J. and Trockel M. (2020). "Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic". *Journal of the American Medical Association*, Vol. 323 No. 21, pp: 2133-34.

Sharma S. (2017). "Pros and cons of different sampling techniques" International *Journal of Applied Research*, Vol. 3 no. 7, pp: 749-52.

Tan L., Wang M., Modini M., Joyce S., Mykletun A., Christensen H., et al. (2014). "Preventing the development of depression at work: a systematic review and meta-analysis of universal interventions in the workplace". *BMC Medicine,* Vol. 12 No. 74. doi:10.1186/1741-7015-12-74

Topp C.W., Østergaard S.D., Søndergaard S., Bech P. (2015). "The WHO-5 Well-Being Index: A Systematic Review of the Literature", *Psychotherapy and Psychosomatics*, Vol.83, No. 3, pp: 167-76. https://doi.org/10.1159/000376585

World Health Organization: Coronavirus (COVID-19) Dashboard, available at: https://covid19.who.int/. Accessed May 2023

World Health Organization (2021). "World Health Organization's-5 well-being index", available at: https://www.corc.uk.net/outcome-experience-measures/the-world-health-organisation-five-well-being-index-who-5/ Accessed 4 July 2021