Original Contributions

The Psychological Reactions of Emergency Medical Services Personnel to COVID-19 in South Africa

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ABSTRACT

The onset of the COVID-19 crisis in South Africa has brought about changes in the lifestyles and livelihoods of many citizens. The drastic steps taken by governments worldwide have escalated concerns amongst the population about effective measures to address it. Emergency services personnel are at the forefront of measures to manage the pandemic. How their conditions of work and exposure to infected citizens affect their psychological health is key in ensuring a responsive health system. In this study, we investigated the psychological health of emergency services personnel in the Free State province of South Africa. 1023 personnel completed an online survey and exploratory factor analysis was employed to extract three factors of concern to the respondents. The first factor indicated that most respondents experienced feelings of vulnerability in respect of contracting COVID-19. The second factor indicated a marginal split in the levels of knowledge held by respondents in respect of behaviours aimed at containing the spread of COVID-19. The third factor indicated low levels of knowledge pertaining to signs and symptoms of the pandemic. The results of a correlation analysis indicated a positive correlation between the professional practices of personnel and their levels of perceived vulnerability. The need for support of health care workers in times of a pandemic were shown to be critical in the fight against the COVID-19.

Keywords: COVID-19; psychological health; vulnerability, emergency medical services.

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INTRODUCTION

On 31 December 2019, China reported an initial case of pneumonia due to an unknown cause and arising in the city of Wuhan. On 11 February 2020, the virus behind the case was named COVID-19 by the World Health Organization (WHO). Within a short space of time, China witnessed an outbreak of the disease and it soon spread across the globe, reaching South Africa in March (WHO, 2020b). Just four months after the start of the outbreak, the WHO had already declared COVID-19 a pandemic. As of 28 July 2020, WHO had recorded 16 301 736 confirmed cases and 650 069 confirmed deaths worldwide due to COVID-19, along with 445 433 confirmed cases and 6 769 deaths in South Africa (WHO, 2020a).

Business was severely affected across all sectors of society, world-wide, as the pandemic disrupted operations in all spheres. This was evidenced by the resultant international travel bans, cancellations of major international and national events, restrictions on all forms of gatherings and the call for employees to work remotely where possible. Such curtailment of normal human movement has the potential to induce fear, anxiety, anger and even depression amongst individuals as they attempt to adjust to what often becomes known as the "new normal". Studies conducted on how COVID-19 affects the psychological well-being of individuals confirm its manifestation in anxiety, fear, frustration, uncertainty and stress (Cao et al., 2020; Chen et al., 2020; Ho, Chee, & Ho, 2020; Roy et al., 2020). Serafini et al. (2020), in their review of the psychological impact of lockdown restrictions and quarantine, add acute stress disorder, depressive symptoms, post-traumatic stress disorder, avoidance behaviour, nervousness and sadness to the list. In yet another review, Brooks et al. (2020) draws a distinction between stressors that occurred both during and after the quarantine period – these include fear of being infected with the virus or of infecting loved ones (Ho et al., 2020), frustration and boredom. Poor information, insufficient guidelines and a lack of clarity about the different levels of risk were further found to increase the stress levels of individuals (Roy et al., 2020; Serafini et al., 2020). These studies illustrate the negative ramifications of COVID-19 and other health-related threats for individuals' psychological functioning.

The rapid spread of the pandemic across the globe resulted in government officials experiencing pressure to develop interventions that would curb its spread as well as prepare their health care systems to cope with the resultant increases in the consumption in health services that were anticipated (WHO, 2020a). Concerns [expressed by health care workers at the frontline of managing the pandemic] over

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the ability of health systems to cope with the pandemic may negatively impact health care workers' mental health status. The extent to which health workers feel uncertain about the disease, unpredictability in the response from officials, and misinformation may also contribute to the stress and mental morbidity for health care workers (Zandifar & Badrfam, 2020). It is for this reason that Pappa et al. (2020) advocate for the immediacy of interventions and clarity in communication as ways in which the capacity of health care systems and the psychological resilience of health care workers can be enhanced. According to Greenberg, Brooks, Wessely, and Tracy (2020), in order to positively influence the mental health of employees during times of infectious disease outbreaks, it is important for employers to communicate accurate and up-to-date information.

Research on the impact of COVID-19 on the mental health of health care workers tends to point to their specific vulnerability in this area. For instance, Rajkumar (2020) views health workers as particularly at risk of experiencing mental health challenges during COVID-19 outbreaks. In support, Ho et al. (2020) and Pappa et al. (2020) include high levels of stress, anxiety, depression and trauma as typical symptoms amongst health care workers in the face of COVID-19. A systematic review of empirical research studies (Pappa et al., 2020) highlighted gender and occupational differences in levels of vulnerability amongst health care workers. In their study on immediate and sustained psychological impact of an emerging infectious disease outbreak on health care workers, McAlonan et al. (2007, p.246) conclude that: "stress management for frontline health care workers is integral to a protocol for outbreak preparedness. In a similar vein, Greenberg et al. (2020) argue for supportive management practices (such as conversations with staff on their mental health and monitoring of staff likely to contract infectious diseases) as strategies for fostering better mental health amongst health care workers. These studies on the impact of COVID-19 on the mental health of health care workers influenced our interest in exploring the impact of COVID-19 on the psychological wellbeing of Emergency Medical Services personnel working in the Free State province of South Africa.

As part of the South African government's attempt at managing the COVID-19 pandemic, the Department of Health in the Free State province initiated a COVID-19 awareness training programme for its Emergency Medical Services (EMS) personnel immediately after the implementation of the lockdown restrictions imposed by the President of the Republic of South Africa. With the first cases of COVID-19 in South Africa having been detected only in March of 2020, there still exists a dearth of literature on the manifestation of the pandemic in the country. This is evidenced by research that was cited earlier and which emanates mainly from China and India (Cao et al., 2020; Ho et al., 2020; Rajkumar, 2020; Wang et al., 2020). With the current researchers investigating the EMS personnel's

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COVID-19 knowledge, attitudes and behaviour, as well as the impact of COVID-19 on their psychological wellbeing, the researchers hope to contribute towards relieving this dearth in the literature. In line with studies conducted elsewhere, which illustrate the negative impact of infectious disease outbreaks such as Ebola, H1N1 influenza, severe acute respiratory syndrome (SARS), and COVID-19 on individuals' psychological health (Brooks et al., 2020; Ho et al., 2020; Reynolds et al., 2008; Roy et al., 2020), the researchers working on the current study built in a component that sought to assess the psychological reactions of EMS personnel to COVID-19. It is hoped that such an understanding will contribute towards the provision of a holistic approach to the management of COVID-19 in the country.

The psychological statuses of individuals, when caused by emergencies or pandemics, are often associated with those individuals' levels of knowledge and attitude and may have a large influence on behaviour towards the disease (Roy et al., 2020). EMS personnel are at the frontline of health systems and thus provide an important service in the fight against the pandemic. Hence, the knowledge and psychological status of EMS personnel are key considerations in the management of the pandemic.

METHODS

STUDY SAMPLE

The target population for this study was EMS personnel in the Free State province of South Africa. The Department of Health in the province organised a series of COVID-19 awareness training workshops for all its EMS personnel at the beginning of March 2020. The researchers targeted participants from these workshops as their research respondents. A questionnaire was distributed to participants in the form of a link to allow research participants to complete it online at the site of training. Arrangements were made with the workshop facilitators to allow participants about twenty (20) minutes to fill in the questionnaire prior to conducting the workshops.

RESEARCH INSTRUMENT

We developed a structured questionnaire to assess participants' levels of COVID-19 knowledge, their attitudes and associated behaviours, as well as the impact of the pandemic on their psychological health. The questionnaire comprised four sections. Section one was aimed at gathering participants'

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demographic information (gender, age, highest level of education). In section two, the questionnaire inquired as to participants' knowledge and understanding of the signs and symptoms of COVID-19 and the attitudes they held towards the pandemic, as well as their knowledge on the kinds of behaviours that are required to contain the spread of COVID-19. Questions for this section were primarily derived from facts about COVID-19 as per the National Institute for Communicable Diseases (NICD, 2020) and the WHO (WHO, 2020c) guidelines. The content and accuracy of the questions were verified by the medical practitioner who was training the EMS personnel. The approach was largely informed by the knowledge, attitudes and behaviour (KAB) model to managing illness and disease (Kilale, 2016; Launiala, 2009). Section three of the questionnaire contained some of the items from section two, with a specific focus on contextualising these to EMS personnel's professional practice. This was aimed at understanding how their specific context contributed to the spread of the pandemic. The fourth section of the questionnaire was aimed at assessing the impact of COVID-19 on participants' psychological health. Items from this section were mainly aimed as assessing participants' perceived vulnerability in respect of contracting COVID-19, along with their resultant reactions. We used a 3-point Likert scale for all items. The final section consisted of an open-ended question inviting participants to share anything related to COVID-19 that may not have been covered in the study. For the purposes of this article, we will focus on the first four sections of the study only.

DATA ANALYSIS

We used the Python SciPy library and SPSS version 26 to analyse the data. Descriptive statistics were used to analyse the characteristics of the respondents. Exploratory factor analysis was carried out on the Likert items to determine the dimensionality of the questionnaire. Item analysis (Cronbach alpha) was performed on the scales to determine the reliability of the identified constructs. We explored significant associations between the demographic variables and psychological health. Significant variables were included in a multivariate logistic regression analysis to determine the impact on the psychological health of EMS personnel. Pearson's correlation coefficient was used to evaluate the association between constraints on EMS personnel work conditions and psychological health.

ETHICAL CONSIDERATIONS

This study received ethical clearance from the Unisa Research Ethics Committee. Participation was voluntary and information about the study was provided to participants prior to commencing with the

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questionnaire. Participants gave informed consent to participate in the study after being notified of the confidential considerations that will be used.

RESULTS

1023 EMS practitioners consented and completed the questionnaire. The sample was made up of 52% males and 45% females. 3% of the sample identified their gender as *other*. The age distribution was mostly in the thirties (36.8%) and forties (48.1%). The other age groups were the fifties and above (10.5%) and those under 30 (4.6%). The highest level of education was predominantly a post-school certificate or diploma (95.7%). Participants with an undergraduate degree constituted 2.5% and those with a postgraduate qualification constituted 1.8%.

DIMENSIONS OF THE QUESTIONNAIRE

The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA) (0.8) and Bartlett's test of sphericity ($p < 0.001$) indicated that the questionnaire could be factorised (Costelo & Osborne, 2005). The characteristics of the dataset necessitated the use of principal axis factoring with oblique rotation (Osborne, 2014). Using information from the scree plot and loadings on the pattern matrix, three factors were extracted (Table 1).

Table 1: Initial Eigenvalues of the extracted factors

Factor[a]	Initial Eigen values			Rotation Sums of Squared Loadings[b]
	Total	% of Variance	Cumulative %	Total
1. Psychological status	3.008	18.798	18.798	2.302
2. Knowledge of containing behaviours	1.773	11.078	29.877	1.127
3. Knowledge of signs and symptoms	1.447	9.041	38.917	0.946

Note: [a]Extraction Method: Principal Axis Factoring. [b]When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

PSYCHOLOGICAL STATUS OF PRACTITIONERS (FACTOR 1)

The first factor was made up of six variables measuring perceived vulnerability to contracting COVID-19 and resultant reactions, with an alpha reliability of 0.8. The items loading on this factor are:

- I am afraid of contracting the COVID-19 virus
- I am always pre-occupied with the thought of contracting the COVID-19 virus
- I lay awake at night thinking about my chances of contracting the COVID-19 virus
- I have lost my appetite since I started thinking about the possibility of contracting the COVID-19 virus
- I worry about infecting my loved ones with the COVID-19 virus
- As a result of worrying about the COVID-19 virus, I tend to avoid the company of others and prefer to be by myself

Psychological Reactions of EMS Practitioners towards Contracting COVID-19

Analysis of descriptive statistics shows that the majority of EMS personnel exhibited heightened levels of vulnerability towards contracting COVID-19. 57.58% of personnel felt slightly vulnerable towards contracting the virus while 32.94% perceived themselves as most vulnerable of contracting COVID-19. Only 9.48% of participants did not see themselves as vulnerable to contracting the virus. The results are indicative of a large proportion of EMS personnel who feel vulnerable to contracting COVID-19, possibly due to the nature of their work, which predisposes them to the virus. The large proportion of individuals concerned about contracting the virus has implications for the provincial health system, demonstrating support for the provision of mental health services for practitioners during the pandemic (Roy et al., 2020).

Factors Affecting the Vulnerability Levels of EMS Personnel

The results of univariate analysis depicting the relationship between demographic variables and levels of personnel vulnerability are shown in Table 2. Gender and age had no significant influence on the levels of vulnerability of EMS personnel. Participants' level of education had a significant effect on their levels of vulnerability ($p < 0.05$). In particular, personnel with a post-school certificate or diploma (32.06%) exhibited greater levels of perceived vulnerability towards contracting COVID-19. This may imply that exposure to some form of post-schooling education raises the level of awareness to the reality

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and possible risk that such personnel are subjected to in their line of work, hence the high levels of perceived vulnerability.

Table 2: Univariate analysis of EMS personnel's mental health characteristics

	Gender (%)		Age (%)				Education (%)		
	Male	Female	<30	30-39	40-49	>50	C/D	UD	PG
Vulnerability levels									
None	52 (5.08)	45 (4.4)	6 (0.59)	36 (3.52)	41 (4.01)	14 (1.37)	87 (8.5)	5 (0.49)	5 (0.49)
Slightly high	310 (30.3)	279 (27.27)	31 (3.03)	221 (21.6)	276 (26.98)	61 (5.96)	564 (55.13)	14 (1.37)	11 (1.08)
Severely high	170 (16.62)	167 (16.32)	9 (0.88)	120 (11.73)	176 (17.2)	32 (3.13)	328 (32.06)	7 (0.68)	2 (0.2)
Statistics	127567.5[a]		3.210234[b]				8.752750[b]		
P	0.2585		0.3603				0.0126		
Knowledge of containing behaviours									
low	18 (1.76)	17 (1.66)	1 (0.1)	10 (0.98)	21 (2.05)	3 (0.29)	493 (48.19)	16 (1.56)	12 (1.17)
medium	249 (24.34)	218 (21.31)	20 (1.96)	169 (16.52)	229 (22.39)	49 (4.79)	451 (44.09)	10 (0.98)	6 (0.59)
high	265 (25.9)	256 (25.02)	25 (2.44)	198 (19.35)	243 (23.75)	55 (5.38)	35 (3.42)	0	0
Statistics	128215.0[a]		1.4777[b]				7.2175[b]		
P	0.3031		0.6874				0.0271		
Knowledge of signs & symptoms									
low	41	57	8	34	47	9	394	8	4
medium	286	233	27	210	239	43	495	17	7
high	205	201	11	133	207	55	90	1	7
Statistics	127315.0[a]		13.8107[b]				8.2761[b]		
P	0.2357		0.0032				0.01595		

Note: [a]Mann-Whitney test. [b]Kruskal-Wallist test. C/D = post-matric certificate or diploma. UD = undergraduate degree. PG = postgraduate qualification.

KNOWLEDGE OF BEHAVIOURS CONTAINING SPREAD OF CORONAVIRUS (FACTOR 2)

Factor 2 had six items that measured the behavioural practices curbing the spread of COVID-19. The reliability of this scale was 0.5. Items loading on this factor were:

- It is safe for me to touch someone who is infected with the COVID-19 virus, as long as they have covered their nose and mouth.
- If someone has a fever and a runny nose, it is safe for me to touch them, as long as they are not coughing or feeling tired.
- It is not necessary for me to wash my hands with soap after touching my patients, as long as the patients did not display serious symptoms of the COVID-19 virus.
- It is sufficient for me to wash my hands with soap and water or an alcohol-based hand rub three times a day.
- It is safe for me to cover my mouth and nose with my bare hands when I cough or sneeze, as long as I keep a distance of 1 meter from those around me
- If someone contracts the COVID-19 virus, they deserve to be isolated because they called the virus upon themselves.

From the study's analysis, 50.9% of the EMS personnel possess high levels of knowledge about behaviours that contain the spread of the pandemic while 45.65% possess moderate knowledge about behaviours that contain the spread of the pandemic. Only 3.42% of the personnel possess very low levels of knowledge about behaviour that contain the spread of the pandemic. These results indicate that this group of EMS personnel seem unsure of the types of behaviours that are required to curb the spread of the pandemic.

Factors Affecting Personnel's Knowledge of Behaviours Containing the Spread of COVID-19

Table 2 shows the relationship between EMS personnel's knowledge of behaviours containing the spread of COVID-19 and demographic variables. No significant interaction effects were found for gender and age. Educational background however had significant effects on personnel's knowledge of behaviours containing the spread of the coronavirus. This implies that those with post-schooling education tend to be more informed about the types of behaviours that are necessary to contain the spread of the pandemic.

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KNOWLEDGE OF THE SIGNS AND SYMPTOMS OF COVID-19

The third factor is made up of items measuring individuals' knowledge of the signs and symptoms of COVID-19. Three items loaded on the third factor with an alpha reliability of 0.4:

- If I treat a patient who suffers from a heart condition, they are more likely to die from COVID-19 complications
- If I have a fever and dry cough, but do not experience difficulty breathing, I am likely to be suffering from COVID-19
- If I assist a patient who suffers from acute respiratory infections, I run the risk of being infected with the COVID-19 virus

The analysis of the findings of this study indicate that only 39.69% of the EMS personnel possess high levels of knowledge on the signs and symptoms of COVID-19. A large proportion of the personnel, 50.73%, possess a moderate amount of knowledge on the signs and symptoms of COVID-19, while only 9.58% possess very low levels of knowledge on the signs and symptoms of COVID-19. This shows a relatively less informed group of EMS personnel on how COVID-19 is manifested.

Factors Affecting Personnel's Knowledge of COVID-19 Related Signs and Symptoms

EMS personnel's knowledge of signs and symptoms of the pandemic is shown in Table 2. There was a significant relationship between this knowledge and age ($p < 0.05$). Similarly, there was a significant relationship between personnel's knowledge of coronavirus signs/symptoms and levels of education ($p < 0.05$). No significant relationships were found for gender. These relationships may mean that the more exposure to post-schooling that one has, the more they are likely to detect the signs and symptoms of COVID-19. The relationship between knowledge of the signs and symptoms of COVID-19 is rather difficult to understand as there does not seem to be a clear pattern in relation to age. It might have been reasonable to expect knowledge of the signs and symptoms of COVID-19 to be either greater/lesser in respect of an older/younger respondent. However, in the current findings, there is no such pattern in the profile of the results.

ORDINAL REGRESSION ANALYSIS

The results of the factor analysis pointed to the possible association of factors 2 and 3 with EMS personnel's vulnerability due to COVID-19. We therefore included the two factors, together with the

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significant factors from the univariate analysis, in an ordinal regression analysis (Table 3). Education was a significant predictor of vulnerability (Wald $\chi^2(1) = 6.918$, p = 0.009). The log odds of being least vulnerable were 0.552 for personnel with higher educational backgrounds, compared with those with lower education. The odds of personnel with higher education being least vulnerable due to COVID-19 were 1.737 (95% CI, 1.151 to 2.620) times those of personnel with lower educational backgrounds. Similarly, the odds of personnel with higher knowledge of behaviours containing the spread of COVID-19 being least vulnerable were 1.51 (95% CI, 1.216 to 1.876) times those of personnel with lower knowledge, a statistically significant effect (Wald $\chi^2(1) = 13.922$, p = 0.000). Surprisingly, the results show that the odds of personnel with low knowledge of signs and symptoms of COVID-19 being least vulnerable are 0.727 (95% CI, 0.597 to 0.885) times less than the odds of those with higher knowledge of signs and symptoms of COVID-19, a statistically significant effect (Wald $\chi^2(1) = 10.142$, p = 0.001).

Table 3: Ordinal logistic regression of factors influencing the vulnerability of EMS personnel

Factors	B	OR	P	OR (95% CI)
Education	0.552	1.737	0.009	1.151-2.620
Factor 2	0.412	1.51	0.000	1.216-1.876
Factor 3	-0.319	0.727	0.001	0.597-0.885

Note: B (parameter estimate), OR (odds ratios), CI (confidence interval)

EFFECTS OF EMS' PROFESSIONAL PRACTICE ON COVID-19

We hypothesised that, irrespective of the level of personnel's knowledge of COVID-19, the context within which they conduct their work can either inhibit or promote their ability to practise behaviours that contain the spread of the pandemic. Furthermore, we would like to know the extent to which the impact of these contexts affects the EMS personnel's level of vulnerability to contracting COVID-19. Table 4 shows the correlation between this level of vulnerability and three behavioural variables which are impacted by professional practice. Inability to maintain social distance due to work constraints was positively correlated with the EMS personnel's level of vulnerability (r = 0.107, p < 0.001). In other words, EMS personnel who found their work context to be inhibiting their ability to practice social distancing perceived themselves to be most vulnerable to contracting the virus. Similarly, touching one's face while busy with work was positively correlated with personnel's levels of vulnerability (r = 0.148, p < 0.001). This means that those EMS personnel who were not able to refrain from touching

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their faces perceived themselves as most vulnerable to contracting COVID-19. The relationship between washing hands regularly and vulnerability to contracting COVID-19 was, however, not statistically significant.

Table 4: Work constraints impacting on behaviours containing spread of coronavirus

Work constraints	Vulnerability to contracting COVID-19	
	Pearson r	P
Not possible to maintain social distance	0.107	0.001
Able to wash hands repeatedly	0.001	0.969
Impossible not to touch face	0.148	0.000

DISCUSSION

Most of the EMS personnel in this study expressed perceived feelings of vulnerability towards contracting COVID-19. While a review of existing mental health literature on COVID-19 confirms the significant risk of health care workers towards mental health outcomes during COVID-19, the reasons mentioned for these include long working hours, risk of infection, shortages of protective equipment, loneliness, physical fatigue and separation from families (Rajkumar, 2020). Our study reflects an additional contributor to the risk. It is possible that the nature of participants' work, which often entails having to perform mouth-to-mouth resuscitation, checking the heartbeat of their patients as well as checking for the dilation of their patients' pupils, to name just a few of their key performance areas, is a key driver of these perceived feelings. Their responses as to whether they are able to maintain social distancing in their line of duty confirms this. This particular response has also been found to have a significant correlation with these perceived feelings of vulnerability. It is therefore not surprising that they tend to be preoccupied with thoughts of contracting COVID-19 as well as subject to lying awake at night thinking about their chances of contracting the virus. Closely related to these are their expressed feelings of fear and worry, not only about the possibility of themselves being infected by the virus, but the possibility of also infecting their loved ones. Their resultant behavioural reactions include isolating themselves and withdrawing from interacting with others, lack of proper sleep and loss of appetite. These are reactions typically associated with anxiety and depressive symptoms.

It is also possible that these findings are linked to the timing of our research. This research was conducted at the time when the first cases of COVID-19 had just been diagnosed in South Africa and

at the same time there were media reports on the high spikes in infection rates and deaths across the world (as a result of COVID-19), particularly in Italy, China and the UK. Such an environment can heighten feelings of fear and anxiety, most especially amongst EMS personnel who are at the frontline of health care service provision. This appears to approximate what Rajkumar, (2020) (in his review of existing COVID-19 mental health literature) refers to as excessive health anxiety, brought about by exaggerated and inaccurate media reports during an infectious disease outbreak. According to Ho et al. (2020), fear is associated with the outbreak of an infectious disease, especially when there is still much speculation about its mode of transmission and treatment. In South Africa, confounding issues pertain to concerns about personal protective equipment (Dhai, Veller, Ballot, & Mokhachane, 2020; McQuoid-Mason, 2020), equitable access to services (Labuschaigne, 2020) and how these could impact on the psychological wellbeing of health care workers.

This particular finding has implications for the mental health of not only EMS personnel, but health care workers in general who find themselves exposed to the risk of contracting the virus. This signals the importance of instituting support programmes for health care workers who are at the forefront of managing the fight against infectious diseases in general, as they present a real threat of infection. Given the findings of this study on the significant relationship between EMS personnel's levels of education and their perceived levels of vulnerability, any such support programmes should focus particularly on those health care workers whose levels of education are at a lower level in order to educate them about the pandemic and particularly the preventative measures.

A study that reviewed literature on psychological resilience and post-traumatic growth in disaster-exposed organisations revealed that health care workers who were adequately trained/prepared to deal with a disaster/disease outbreak, those with prior experience in working with a particular disaster/disease outbreak, and those with adequate social support and effective coping strategies were less likely to report lasting mental health issues or even report mental health problems (Brooks, Amlôt, Rubin, & Greenberg, 2020). Within the context of the current study, it is thus not surprising that the findings reveal high levels of stress and anxiety amongst EMS personnel, as this appears to be their first exposure to a COVID-19 working environment.

The levels of EMS personnel's knowledge of the signs and symptoms of COVID-19 were found to be very low, with only 39.69% having high levels of knowledge of the pandemic. This raises concerns with the safety of personnel and their patients. If EMS personnel are not aware of COVID-19 symptoms,

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the chances of infecting their patients, or being infected by their patients, are much higher. As COVID-19 is new, even for EMS personnel, care should be taken that myths or lack of proper knowledge do not compromise the prevention and management of the disease. Incorrect knowledge may translate to wrong behaviour or attitudinal dispositions that may increase the spread of the disease. In a country where literacy levels are not high, role models such as EMS personnel may serve as validators of correct information and so their knowledge and disposition are critical in the fight against the coronavirus.

From the analysis of the correlation between EMS personnel's knowledge of the signs and symptoms of COVID-19 and their demographic characteristics, the more educated the EMS personnel, the more knowledge of the signs and symptoms of COVID-19 they will possess. The analysis also found a significant relationship between age and knowledge about COVID-19 signs and symptoms. One would assume that the older a person becomes, the more aware and exposed to situations in general they will be and the more likely they will be to be informed about illnesses, including COVID-19. However, such an assumption would be too optimistic as experience tends to be a more reliable determinant than mere awareness because the latter depends on personal curiosity and interest. It is thus difficult to understand what this correlation means.

The level of knowledge about behaviours that contain the spread of COVID-19 was also not very convincing. There was a near equal split amongst the EMS personnel on this, with 50.9% possessing high levels of such knowledge and 45.65% possessing moderate levels of such knowledge. Safety considerations for both EMS personnel and their patients is emerging as a theme that needs to be incorporated in the design of interventions that are aimed at supporting health care workers who are at the frontline of the fight against COVID-19. Again, the level of education that EMS personnel have influences their knowledge of behaviours that contain the spread of COVID-19. As a priority, COVID-19 intervention programmes should be targeted at those health care workers with lower educational qualifications. The ability of communities to effectively apply containment measures such as self-isolation and social distancing may cause panic in health sectors that are not well-resourced and may negatively affect psychological well-being (Brooks et al., 2020).

Lastly, the EMS personnel that participated in this study find themselves in a position where they are not able to practice social distancing, including being unable to refrain from touching their faces, behaviours that place them at increased vulnerability to contracting the virus. While the nature of their work may not promote health protective behaviours, it becomes incumbent upon the health authorities

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to ensure adequate protective equipment is provided to health care workers so as to reduce their levels of anxiety regarding the pandemic. Studies have shown that social support provided to health care workers provides effective protective mechanisms and alleviates psychological vulnerability (Brooks, Dunn, Amlôt, Greenberg, & James Rubin, 2016; Opie, Brooks, Greenberg, & Rubin, 2020). Ensuring the safety of staff by providing them with adequate personal protective equipment is one way in which management can demonstrate their social support towards their employees, an act that is critical in responding to disaster situations in order to lessen staff's feelings of vulnerability (Brooks et al., 2015).

LIMITATIONS OF THE STUDY

In this study our aim was to assess the levels of knowledge of EMS personnel who were attending a COVID-19 education training programme. As part of that process, we developed a section in the questionnaire that assessed their psychological responses to the virus. The fact that we did not use a standardized scale to assess participants' anxiety and depression levels, and instead relied on a broad understanding of psychological theory to tap into their psychological reactions, represents a limitation of this study. We therefore regard this as a pilot study and we thus recommend that future studies expand on this study by adopting a more standardised scale to assess the psychological wellbeing of health care workers.

Having designed our own instrument, it would have been ideal to first pilot it with a few groups of people before rolling it out to a larger sample. However, due to time limitations related to the commencement of this study and the need to catch up with the nature and dynamics of the pandemic, we could not pilot the research instrument, and this poses another limitation to our current study. As we designed the research instrument for this study, we had the opportunity to conduct factor and item analyses of the items used in the instrument to determine their levels of correlation.

CONCLUSION

This study has focussed on the psychological reactions of EMS personnel to COVID-19. Overall, the EMS personnel perceived themselves as vulnerable to contracting COVID-19 and this seems to be influenced by their low levels of knowledge of the signs and symptoms of COVID-19 and of the behaviours required to contain its spread. In addition, their education level and work conditions contribute to their perceived levels of vulnerability. Our findings have implications for interventions

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aimed at managing the spread of the COVID-19 virus.

Firstly, it is our view that intervention programmes that are aimed at containing the spread of COVID-19, or any other infectious disease of this nature, should incorporate a mental health element. While the first line of defence is to educate people on the disease, those at the frontline, such as health care workers, are constantly exposed to the virus and cannot help it and they do experience feelings of vulnerability towards contracting the virus. Thus, education programmes should incorporate a section that deals with defining stress and its signs and symptoms, as well as with how it can be managed. In addition, consideration should be given to providing a telephone or email hotline where personnel can have easy access to a counsellor to discuss their psychological issues (Rajkumar, 2020). Appropriate training has been shown to be necessary in enhancing the skills, knowledge and confidence of health care workers during emergencies (Brooks et al., 2015), with the potential to positively affect their psychological wellbeing.

Secondly, given that the kind of health protective behaviours that are required to combat the spread of the coronavirus mirror basic hygiene behaviours, we would like to propose that for those health workers, whose level of education is lower than matric (or grade 12), further education in these basic hygiene behaviours should be integrated into their induction programme at the point of employment. For those already employed, this should be offered as part of their continuous professional development.

Lastly, personal protective equipment (PPE) in the case of COVID-19, most especially amongst EMS personnel, will serve the purpose of mitigating against feelings of anxiety and fear, thus allowing health care workers to focus their undivided attention towards caring for their patients. Stress has been found to impair cognitive functioning and task performance (McAlonan et al., 2007). In addition, Wang et al. (2020), in their study on the psychological responses of the general population during the initial phases of COVID-19 in China, found that wearing masks was associated with lower levels of anxiety and depression. Furthermore, perceived and actual social support provided to health care workers provides an effective protective mechanism and alleviates psychological vulnerability (Brooks et al., 2016; Opie et al., 2020). Ensuring the safety of staff and providing them with adequate personal protective equipment is critical as a response to disasters, otherwise staff experience vulnerability (Brooks et al., 2015).

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REFERENCES

Brooks, S., Amlôt, R., Rubin, G. J., & Greenberg, N. (2020). Psychological resilience and post-traumatic growth in disaster-exposed organisations: Overview of the literature. *BMJ Military Health, 166*(1), 52-56. https://doi.org/10.1136/jramc-2017-000876

Brooks, S. K., Dunn, R., Amlôt, R., Greenberg, N., & James Rubin, G. (2016). Social and occupational factors associated with psychological distress and disorder among disaster responders: A systematic review. *BMC Psychology*, *4*(1), 1–13. https://doi.org/10.1186/s40359-016-0120-9

Brooks, S. K., Dunn, R., Sage, C. A. M., Amlôt, R., Greenberg, N., & Rubin, G. J. (2015). Risk and resilience factors affecting the psychological wellbeing of individuals deployed in humanitarian relief roles after a disaster. *Journal of Mental Health*, *24*(6), 385–413. https://doi.org/10.3109/09638237.2015.1057334

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*, *395*(10227), 912–920. https://doi.org/10.1016/S0140-6736(20)30460-8

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*, 1-5. https://doi.org/10.1016/j.psychres.2020.112934

Chen, Q., Liang, M., Li, Y., Guo, J., Fei, D., Wang, L., … Zhang, Z. (2020). Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry*, *7*(4), e15–e16. https://doi.org/10.1016/S2215-0366(20)30078-X

Costelo, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment Research & Evaluation*, *10*(7), 1–9. https://doi.org/10.7275/JYJ1-4868

Dhai, A., Veller, M., Ballot, D., & Mokhachane, M. (2020). Pandemics, professionalism and the duty of care: Concerns from the coalface. *South African Medical Journal*, *110*(6), 1–4. https://doi.org/http://dx.doi.org/10.7196/SAMJ.2020.v110i6.14901

Greenberg, N., Brooks, S. K., Wessely, S., & Tracy, D. K. (2020). How might the NHS protect the mental health of health-care workers after the COVID-19 crisis? *The Lancet Psychiatry*, *7*(9), 733–734. https://doi.org/10.1016/S2215-0366(20)30224-8

Ho, C. S., Chee, C. Y., & Ho, R. C. (2020). Mental health strategies to combat the psychological impact of coronavirus disease 2019 (COVID-19). Beyond paranoia and panic. *Annals of the Academy of Medicine, Singapore*, *49*(3), 155–160.

Kilale, A. (2016). A critical review of the use of knowledge, attitude and practice (KAP) studies to guide health communication: Strengths and weaknesses. *Presentation*, 1–37. https://doi.org/10.13140/RG.2.1.3248.7922

Labuschaigne, M. (2020). Ethicolegal issues relating to the South African government's response to COVID-19. *South African Journal of Bioethics and Law*, *13*(1), 6–11. https://doi.org/10.7196/SAJBL.2020.v13i1.722

Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. *Anthropology Matters*, *11*(1), 1–13. https://doi.org/10.22582/am.v11i1.31

McAlonan, G. M., Lee, A. M., Cheung, V., Cheung, C., Tsang, K. W. T., Sham, P. C., … Wong, J. G. W. S. (2007). Immediate and sustained psychological impact of an emerging infectious disease outbreak on health care workers. *Canadian Journal of Psychiatry*, *52*(4), 241–247. https://doi.org/10.1177/070674370705200406

McQuoid-Mason, D. (2020). COVID-19: May health care practitioners ethically and legally refuse to work at hospitals and health establishments where frontline employees are not provided with personal protective equipment? *South African Journal of Bioethics and Law*, *13*(1), 16–19. https://doi.org/https://doi.org/10.7196/SAJBL.2020.v13i1.720

NICD. (2020). COVID-19 frequently asked questions. *NICD*. Retrieved from https://www.nicd.ac.za/diseases-a-z-index/covid-19/frequently-asked-questions/

Opie, E., Brooks, S., Greenberg, N., & Rubin, G. J. (2020). The usefulness of pre-employment and pre-deployment psychological screening for disaster relief workers: A systematic review. *BMC Psychiatry*, *20*(211), 1–13. https://doi.org/10.1186/s12888-020-02593-1

Osborne, J. (2014). Best practices in exploratory factor analysis. In J. Osborne, A. B. Costello, & J. T. Kellow (Eds.), *Best practices in quantitative methods* (pp. 86–99). Scotts Valley: Sage.

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among health care workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity*, *88*, 901–907. https://doi.org/10.1016/j.bbi.2020.05.026

Rajkumar, R. P. (2020). COVID-19 and mental health: A review of the existing literature. *Asian Journal of Psychiatry*, *52*, 102066. https://doi.org/10.1016/j.ajp.2020.102066

Reynolds, D. L., Garay, J. R., Deamond, S. L., Moran, M. K., Gold, W., & Styra, R. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiology and Infection*, *136*(7), 997–1007. https://doi.org/10.1017/S0950268807009156

Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of knowledge, attitude, anxiety & perceived mental health care need in Indian population during COVID-19 pandemic. *Asian Journal of Psychiatry*, *51*, 102083. https://doi.org/https://doi.org/10.1016/j.ajp.2020.102083

Serafini, G., Parmigiani, B., Amerio, A., Aguglia, A., Sher, L., & Amore, M. (2020). The psychological impact of COVID-19 on the mental health in the general population. *QJM: An International Journal of Medicine*, *00*(0), 1–7. https://doi.org/10.1093/qjmed/hcaa201

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., … Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, Behavior, and Immunity*, *87*, 40–48. https://doi.org/10.1016/j.bbi.2020.04.028

WHO. (2020a). Coronavirus Disease 2019 (COVID-19) Situation Report - 190. *World Health Organization*. Retrieved from from www.who.int

WHO. (2020b). Coronavirus Disease 2019 (COVID-19). Situation Report - 46 (Vol. 6 March). *World Health Organization*. Retrieved from https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200306-sitrep-46-covid-19.pdf?sfvrsn=96b04adf_4

WHO. (2020c). Q&As on COVID-19 and related health topics. *World Health Organization*. Retrieved from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub

Zandifar, A., & Badrfam, R. (2020). Iranian mental health during the COVID-19 epidemic. *Asian Journal of Psychiatry*, *51*, 101990. https://doi.org/https://doi.org/10.1016/j.ajp.2020.101990