



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## Letter to the Editor

## Psychological and coping responses to COVID-19 amongst residents in training across ACGME-I accredited specialties in Singapore



Dear Editor,

Previous studies examining psychological responses to past infectious disease outbreaks such as the Severe Acute Respiratory Syndrome (SARS) have demonstrated relatively high psychological morbidity amongst healthcare workers (Phua et al., 2005; Sim et al., 2004). Residents in training form a significant proportion of healthcare staff responding to the COVID-19 pandemic internationally. However data are sparse on the psychological impact of infectious disease outbreaks on residents. It is unclear how factors such as seniority in residency and exposure to high-risk areas affect their psychological and coping responses during the current pandemic. An understanding of COVID-19-related psychological outcomes could highlight areas where better psychological support can be provided for our residents. Our study aimed to examine the psychological responses (levels of perceived stress, traumatic stress symptoms, and perceived stigma) amongst our residents, explore associated factors of these psychological responses, and coping strategies used.

All residents from the US Accreditation Council for Graduate Medical Education International (ACGME-I) accredited National Healthcare Group (NHG) Residency in Singapore were invited to participate in this online survey (approved by NHG Institutional Review Board 2020/00220) during a 5-week period (5<sup>th</sup> of March 2020 until 10<sup>th</sup> April 2020). This included residents from 27 specialties, grouped into medical (medical specialties, family medicine, radiology), surgical disciplines (surgery, anaesthesia, emergency medicine), and psychiatry. The study instrument comprised four main outcome rating scales and socio-demographic details. The Perceived Stress Scale (PSS), Impact of Event Scale-Revised (IES-R), Healthcare Workers Stigma Scale (HWSS), and Brief COPE questionnaire were used to assess the level of perceived stress, traumatic stress, perceived stigma, and type and frequency of coping strategies employed by residents respectively. Independent samples t-test and chi-square tests were used to explore differences between groups (seniority and deployment to high risk area). Our cohort was split into residents in junior (1st 3 years) and senior years (4<sup>th</sup> year onwards) of training, henceforth termed junior and senior residents respectively. As a sizeable proportion of our residents has been deployed to clinical areas outside their usual work scope and to safeguard anonymity, we specifically examined mental health outcomes related to deployment to a high risk area (such as the National Centre of Infectious Diseases which sees the majority of suspected cases of COVID-19 infection within the country) and not by individual specialty. Multivariate linear regression analyses were used to examine predictors of our outcome variables of interest (level of perceived stress, traumatic stress symptoms, perceived stigma), while controlling for variables such as gender, marital status, and living arrangement.

Of the 274 participants (response rate of 49.2%), junior (61.7%) and senior (38.3%) residents did not differ on any of the main outcome

measures. Those deployed to high risk areas (N=81, 29.6%) were more likely to be working in areas outside their usual job scope (75.3% vs 14.0 %,  $\chi^2 = 98.40$ ,  $p < 0.001$ ), and had lower PSS scores (26.74 +/- 6.67 vs 28.74 +/- 6.54,  $t = 2.29$ ,  $p = 0.023$ ) than those who were not deployed. Multivariate linear regression analyses (Table 1) revealed that residents with higher PSS scores were associated with higher perceived stigma level (B = 0.20, 95% CI = 0.08–0.32,  $p = 0.001$ ), more frequent use of avoidance (B = 6.90, 95% CI = 4.80–8.99,  $p < 0.001$ ), and less frequent use of positive thinking (B = -2.84, 95% CI = -4.40–-1.28,  $p < 0.001$ ). Residents with greater traumatic stress symptoms had more frequent use of avoidance (B = 19.68, 95% CI = 15.72–23.65,  $p < 0.001$ ) and higher levels of perceived stigma (B = 0.43, 95% CI = 0.21–0.66,  $p < 0.001$ ). Residents with higher perceived stigma level also had more frequent use of avoidance (B = 4.10, 95% CI = 1.49–6.72,  $p = 0.002$ ) and greater traumatic stress symptoms (B = 0.11, 95% CI = 0.03–0.18,  $p = 0.008$ ).

First, no differences were found between junior and senior residents in terms of psychological and coping responses to the pandemic which could be explained by the similar training in infection prevention and control (IPC) measures that both resident groups received in the course of their daily work. Also, a pandemic of this scale is a novel situation and regardless of seniority, all residents are faced with unprecedented circumstances. Second, those deployed to high-risk areas (NCID) had lower perceived stress levels and this relates to the level of psychological preparedness in those deployed to high-risk areas. Those deployed to NCID are aware that they will be screening and managing patients with suspected or confirmed COVID-19 infection in a well-equipped facility with ample staff support and training. In the group of residents who have not been deployed to high-risk areas, the anticipatory anxiety about changes in medical deployment due to rapidly evolving ground needs could have contributed to higher stress levels. Third, higher perceived stigma level was associated with higher levels of perceived stress and post-traumatic stress symptoms. This could be explained by increased self-conscious emotions as a result of stigma (Tracey and Robins, 2004). Stigma could also be a trigger for past negative experiences or memories related to the outbreak. Fourth, avoidance as a coping strategy was associated with higher levels of perceived stress, traumatic stress symptoms, and perceived stigma. Conscious efforts invested in the employment of avoidance as a coping strategy could paradoxically result in greater stress and emotional exhaustion (Mauder et al., 2004; Marjanovic et al., 2007). The internalization of stigma could also reinforce their avoidant behavior and social isolation (Gee and Skovdal, 2018) and further contribute to traumatic stress symptoms especially when triggered by negative reactions from others.

There are several practical applications that are generalizable across residency training programs. First, residents can be psycho-educated about the possible range of psychological responses during the COVID-19 pandemic and adaptive coping strategies that can be used. Second,

<https://doi.org/10.1016/j.psychres.2020.113146>

Received 22 May 2020; Received in revised form 25 May 2020; Accepted 25 May 2020

Available online 28 May 2020

0165-1781/ © 2020 Elsevier B.V. All rights reserved.

**Table 1**  
Risk Factors for Mental Health Outcomes Amongst Residents in Training.

	B	$\beta$	95% CI for B	p Value
<b>PSS, stress</b>				
Females (vs. males)	0.730	0.056	-0.664 – 2.125	0.303
Seniors (vs. juniors)	-0.133	-0.010	-1.562 – 1.296	0.855
Married (vs. single)	-0.146	-0.011	-1.536 – 1.244	0.836
Living with others (vs. alone)	-1.315	-0.056	-3.803 – 1.172	0.299
Exposed to patients with respiratory illness	-0.219	-0.014	-1.914 – 1.476	0.799
Deployed to NCID	-2.201	-0.152	-3.748 – -0.654	0.005
COPE Social Support	0.603	0.053	-1.112 – 2.319	0.489
COPE Problem Solving	0.114	0.012	-1.414 – 1.643	0.883
COPE Avoidance	6.895	0.451	4.803 – 8.986	< 0.001
COPE Positive Thinking	-2.840	-0.256	-4.399 – -1.282	< 0.001
HCWS total score	0.197	0.203	0.077 – 0.317	0.001
<b>IES-R, PTS symptoms</b>				
Females (vs. males)	-0.569	-0.020	-3.211 – 2.074	0.672
Seniors (vs. juniors)	0.397	0.013	-2.311 – 3.105	0.773
Married (vs. single)	0.312	0.011	-2.322 – 2.946	0.816
Living with others (vs. alone)	1.249	0.024	-3.465 – 5.963	0.602
Exposed to patients with respiratory illness	1.276	0.036	-1.935 – 4.487	0.434
Deployed to NCID	-1.847	-0.058	-4.778 – 1.084	0.216
COPE Social Support	1.591	0.063	-1.659 – 4.842	0.336
COPE Problem Solving	0.728	0.033	-2.168 – 3.623	0.621
COPE Avoidance	19.684	0.584	15.722 – 23.647	< 0.001
COPE Positive Thinking	-1.617	-0.066	-4.570 – 1.336	0.282
HCWS total score	0.434	0.203	0.206 – 0.662	< 0.001
<b>HCWS, Stigma</b>				
Females (vs. males)	0.523	0.039	-0.950 – 1.996	0.485
Seniors (vs. juniors)	-1.037	-0.075	-2.536 – 0.462	0.174
Married (vs. single)	-0.782	-0.058	-2.243 – 0.678	0.292
Living with others (vs. alone)	1.423	0.059	-1.201 – 4.048	0.286
Exposed to patients with respiratory illness	0.215	0.013	-1.573 – 2.003	0.813
Deployed to NCID	0.698	0.047	-0.957 – 2.352	0.407
COPE Social Support	0.993	0.085	-0.813 – 2.798	0.280
COPE Problem Solving	0.304	0.030	-1.306 – 1.913	0.710
COPE Avoidance	4.104	0.261	1.493 – 6.716	0.002
COPE Positive Thinking	-0.299	-0.026	-1.986 – 1.388	0.727
PSS total score	0.143	0.139	-0.005 – 0.291	0.059
IES-R total score	0.105	0.225	0.028 – 0.183	0.008

**Abbreviations:** COPE = Brief COPE Inventory; HCWS = Healthcare Workers' Stigma Scale; IES-R = Impact of Event Scale-Revised; NCID = National Center for Infectious Diseases; PSS = Perceived Stress Scale; PTS = Post-traumatic stress

the importance of self-care should be emphasized (e.g adequate sleep, maintaining social connections, work-life balance). Third, residency programs and healthcare institutions should work together to identify sources of stigma such as public attitudes towards the pandemic, and seek to counter them through public education efforts. Fourth, healthcare institutions and residency programs should also demonstrate their long-term commitment to the well-being of residents in tangible ways (e.g obtaining resident feedback, maintaining constant communication, providing psychological help). This is particularly important given the likelihood of the COVID-19 pandemic being a long-drawn one.

There are several limitations in our study. Our current study employed a cross-sectional design, which limits our ability to establish causality amongst the variables. Further examination of the psychological impact within our residents in training over time could shed light on the longitudinal trends of psychosocial responses at different phases of the current pandemic. Second, we did not examine other factors such as intercurrent stressors (e.g. life events) or personality characteristics, which can also affect the psychological responses shared within the study.

In conclusion, with residents forming a sizable proportion of frontline healthcare workers in the current COVID-19 pandemic,

initiatives to raise awareness of psychological and coping responses, emphasize self-care, address issues of stigma, and provide access to resources for help can enhance psychological support for our residents in training.

Declaration of Competing Interest: All authors declare no competing interest. QHC, FLC, WKN, WCIL, PLLT, CSW, SHP, VGS, EJDS, CWTH, EJP, KS were involved in the conception and design, acquisition of data, analysis and interpretation of the data, drafting of the paper and revising the article critically for important intellectual content.

**CRedit authorship contribution statement**

**Qian Hui Chew:** Data curation, Project administration, Writing - original draft. **Faith Li-Ann Chia:** Funding acquisition, Project administration, Resources, Supervision. **Wee Khoon Ng:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Wan Cheong Ivan Lee:** Project administration. **Pei Lin Lynnette Tan:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Chen Seong Wong:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Ser Hon Pua:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Vishalkumar G Shelat:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Ee-Jin Darren Seah:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Cheong Wei Terence Huey:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Eng Joo Phua:** Conceptualization, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Kang Sim:** Data curation, Funding acquisition, Project administration, Resources, Supervision, Writing - original draft.

**Declaration of Competing Interests**

All authors declare no competing interest.

**Supplementary materials**

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2020.113146](https://doi.org/10.1016/j.psychres.2020.113146).

**References**

Gee, S., Skovdal, M., 2018. Public discourses of Ebola contagion and courtesy stigma: the real risk to international health care workers returning home from the West Africa Ebola outbreak? *Qual. Health Res* 28 (9), 1499–1508. <https://doi.org/10.1177/2F1049732318759936>.

Maunder, R., 2004. The experience of the 2003 SARS outbreak as a traumatic stress among frontline healthcare workers in Toronto: lessons learned. *Philos. Trans. R. Soc. Lond. B Biol. Sci.* 359 (1447), 1117–1125. <https://doi.org/10.1098/rstb.2004.1483>.

Marjanovic, Z., Greenglass, E.R., Coffey, S., 2007. The relevance of psychosocial variables and working conditions in predicting nurses' coping strategies during the SARS crisis: an online questionnaire survey. *Int. J. Nurs. Stud.* 44 (6), 991–998. <https://doi.org/10.1016/j.ijnurstu.2006.02.012>.

Phua, D.H., Tang, H.K., Tham, K.Y., 2005. Coping responses of emergency physicians and nurses to the 2003 severe acute respiratory syndrome outbreak. *Acad. Emerg. Med.* 12 (4), 322–328. <https://doi.org/10.1197/j.aem.2004.11.015>.

Sim, K., Chong, P.N., Chan, Y.H., Soon, W.S.W., 2004. Severe Acute Respiratory Syndrome – related psychiatric and post-traumatic morbidities and coping responses in medical staff within a primary health care setting in Singapore. *J. Clin. Psychiatry* 65 (8), 1120–1127. <https://doi.org/10.4088/jcp.v65n0815>.

Tracy, J.L., Robins, R.W., 2004. Putting the self into self-conscious emotions: a theoretical model. *Psychol. Inq.* 15 (2), 103–125. [https://doi.org/10.1207/s15327965pli1502\\_01](https://doi.org/10.1207/s15327965pli1502_01).

Qian Hui Chew<sup>a</sup>, Faith Li-Ann Chia<sup>b</sup>, Wee Khoon Ng<sup>c</sup>,  
 Wan Cheong Ivan Lee<sup>d</sup>, Pei Lin Lynnette Tan<sup>e</sup>, Chen Seong Wong<sup>f</sup>,  
 Ser Hon Puah<sup>g</sup>, Vishalkumar G Shelat<sup>h</sup>, Ee-Jin Darren Seah<sup>i</sup>,  
 Cheong Wei Terence Huey<sup>j</sup>, Eng Joo Phua<sup>k</sup>, Kang Sim<sup>l,\*</sup>

<sup>a</sup> Research Staff, Department of Research, Institute of Mental Health,  
 Buangkok Green Medical Park, 10 Buangkok View 539747, Singapore

<sup>b</sup> Designated Institutional Official, National Healthcare Group (NHG)  
 Residency and Senior Consultant, Department of Rheumatology, Allergy and  
 Immunology, Tan Tock Seng Hospital, 11 Jln Tan Tock Seng 308433,  
 Singapore

<sup>c</sup> NHG Internal Medicine Program Director and Consultant, Department of  
 Gastroenterology and Hepatology, Tan Tock Seng Hospital, 11 Jln Tan Tock  
 Seng 308433, Singapore

<sup>d</sup> Executive, Education Office, National Healthcare Group, 3 Fusionopolis  
 Link #03-08, Nexus@one-north Singapore 138543, Singapore

<sup>e</sup> Senior Consultant, Department of Psychological Medicine, Tan Tock Seng  
 Hospital, 11 Jln Tan Tock Seng 308433, Singapore

<sup>f</sup> NHG Infectious Diseases Residency Program Director and Consultant,  
 Department of Infectious Diseases, Tan Tock Seng Hospital, 11 Jln Tan Tock  
 Seng 308433, Singapore

<sup>g</sup> NHG Respiratory Medicine Residency Program Director and Consultant,  
 Department of Respiratory and Critical Care Medicine, Tan Tock Seng  
 Hospital, 11 Jln Tan Tock Seng 308433, Singapore

<sup>h</sup> NHG PGY1 Training Program Director and Senior Consultant, Department  
 of General Surgery, Tan Tock Seng Hospital, 11 Jln Tan Tock Seng 308433,  
 Singapore

<sup>i</sup> NHG Family Medicine Residency Program Director and Senior Consultant,  
 National Healthcare Group Polyclinics, 3 Fusionopolis Link Nexus@one-  
 north (South Lobby) #05-10 Singapore 138543, Singapore

<sup>j</sup> NHG General Surgery Residency Program Director and Senior Consultant,  
 Department of General Surgery, Tan Tock Seng Hospital, 11 Jln Tan Tock  
 Seng 308433, Singapore

<sup>k</sup> Associate Designated Institutional Official, NHG Residency and Senior  
 Consultant, Department of General Medicine, Khoo Teck Puat Hospital, 90  
 Yishun Central 768828, Singapore

<sup>l</sup> NHG National Psychiatry Residency Program Director and Senior  
 Consultant, West Region, Institute of Mental Health, Buangkok Green  
 Medical Park, 10 Buangkok View 539747, Singapore  
 E-mail address: [kang\\_sim@imh.com.sg](mailto:kang_sim@imh.com.sg) (K. Sim).

\* Corresponding author.