PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Depression, anxiety and stress during the COVID-19 pandemic: Results from a New Zealand cohort study on mental wellbeing
AUTHORS	Gasteiger, Norina; Vedhara, Kavita; Massey, Adam; Jia, Ru; Ayling, Kieran; Chalder, Trudie; Coupland, Carol; Broadbent, E

VERSION 1 – REVIEW

REVIEWER	Yinglin Xia University of Illinois at Chicago, IL, Chicago, USA
REVIEW RETURNED	29-Oct-2020

GENERAL COMMENTS	Gasteiger et al. in this study investigated depression, anxiety and stress in New Zealand (NZ) during the first ten weeks of the COVID-19 pandemic, and associated psychological and behavioural factors as well as compared their results with a similar cross-sectional study in the United Kingdom (UK). They concluded that the NZ population had greater levels of depression and anxiety during the first ten weeks of the COVID-19 pandemic compared to population norms and found that younger people and most at-risk of COVID-19 experienced people had a poorer mental health. They also found that compared to the UK sample, the NZ sample had reported lower perceived risk of COVID-19 and less worry about COVID-19. Overall, this study was solid including study design (power analysis and sample collection), analysis and presentation and discussion. However, this manuscript could be improved if the authors : 1) can briefly describing the survey although there was a citation; 2) provide a formal normality test of variables; 3) how conducted variable selection in the multivariate analysis? Such as what cut-off p-values were used from univariate analysis to be included in multivariate modeling? 4) One sample t-tests were used to compare risk factors between NZ and UK samples. This should be explained further. How one-sample t-test was used to compare two-independent samples for categorical variables(depression, anxiety, stress and perceived risk of COVID-19 are categorical based on above description)?

REVIEWER	Roger Ho Department of Psychological Medicine National University of Singapore Singapore
REVIEW RETURNED	06-Feb-2021

GENERAL COMMENTS	I have the following comments for the authors to consider. I am

	happy to review this paper again. 1) Under the Introduction, under the paragraph, "A growing body of evidence documents clear and disproportionate clinical impacts of the COVID-19 pandemic on particular groups, such as older adults." The focus of this paragraph is too narrow. I recommend to have a global view and refer to a systematic review on mental health during COVID-19. The authors should discuss findings of the following study: Xiong J, Lipsitz O, Nasri F, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review [published online ahead of print, 2020 Aug 8]. J Affect Disord. 2020;277:55-64. doi:10.1016/j.jad.2020.08.001 2) The authors stated "d. Border closures and social distancing resulted in cancelled travel plans and changes to events (e.g. funerals and weddings)" This statement sounds like an opinion and personal encounter. It is important to refer to scientific findings on the impact on mental health due to social distancing, lock down and face mask use. Please refer to the following studies for each preventive measures: Face mask Wang C, Chudzicka-Czupała A, Grabowski D, et al. The Association Between Physical and Mental Health and Face Mask Use During the COVID-19 Pandemic: A Comparison of Two Countries With Different Views and Practices. Front Psychiatry. 2020;11:569981. Published 2020 Sep 9. doi:10.3389/fpsyt.2020.569981 Social distance Tran BX, Nguyen HT, Le HT et al Impact of COVID-19 on Economic Well-Being and Quality of Life of the Vietnamese During the National Social Distancing. Front Psychol. 2020 Sep 11;11:565153. doi: 10.3389/fpsyg.2020.565153. PMID: 33041928; PMCID: PMC7518066. Lockdown: Le HT, Lai AJX, Sun J, et al. Anxiety and Depression Among People Under the Nationwide Partial Lockdown in Vietnam. Front Public Health. 2020;8:589359. Published 2020 Oct 29. doi:10.3389/fpubh.2020.589359 3) This paper mainly compared NZ people with UK people, due to the colonial past.. Again, the authors should broaden their views. They should compare with other countries, especially Asia Pacific as NZ is a country in Asia Pacific and not Europe. The authors reported "younger people aged 18-24 years were also disproportionally affected and more likely to report 4 greater levels of anxiety, stress and depression." Is it true for other countries? Please refer to the following landmark studies in Asia Pacific and make comparison: China: Wang C, Pan R, Wan X, et al. (2020) Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17(5):1729. Published 2020 Mar 6. doi:10.3390/ijerph17051729

	Vietnam: Le XTT, Dang AK, Toweh J, Nguyen QN et al Evaluating the Psychological Impacts Related to COVID-19 of Vietnamese People Under the First Nationwide Partial Lockdown in Vietnam. Front Psychiatry. 2020 Sep 2;11:824. doi: 10.3389/fpsyt.2020.00824. PMID: 32982807; PMCID: PMC7492529. Philippines: Tee ML, Tee CA, Anlacan JP et al . Psychological impact of COVID-19 pandemic in the Philippines. J Affect Disord. 2020 Aug 24;277:379-391. doi: 10.1016/j.jad.2020.08.043. Epub ahead of print. PMID: 32861839. In fact, some Asian studies explain why "though there is a lack of research to explain why younger people were more impacted during the COVID-19 pandemic" due to disruption of public examination and progress to universities. Please refer to the above studies to look for explanation. 4) The authors stated "Poor mental health status was also associated with worry and heightened perceptions of risk of COVID-19. In the NZ cohort, worry about COVID-19 was associated with anxiety, and perceived risk of COVID-19 was associated with stress". The authors also stated "Greater positive mood and lower perceived loneliness were protective factors for all outcomes". I think this is inqdeuate. The authors should mention online psychological intervention that will work during the pandemic. Please discuss and refer to the following studies: The most evidence-based treatment is cognitive behaviour therapy (CBT), especially Internet CBT that can prevent the spread of infection during the pandemic. Use of Cognitive Behavior Therapy (CBT) to treat psychiatric symptoms during COVID-19: Ho CS et al Mental Health Strategies to Combat the Psychological Impact of COVID-19 Beyond Paranoia and Panic. Ann Acad Med Singapore. 2020;49(3):155-160. Cost-effectiveness of iCBT: Zhang MW et al Moodle: The cost effective solution for internet cognitive behavioral therapy (I-CBT) interventions. Technol Health Care. 2017;25(1):163-165. doi: 10.3233/THC-161261. PMID: 27689560. Internet CBT can treat psychiatric symptoms such as insomnia: Soh HL et al Efficacy of digital cognitive behavioural therapy for insomnia: a meta-analysis of randomised controlled trials. Sleep Med. 2020 Aug 26;75:315-325. doi: 10.1016/j.sleep.2020.08.020. Epub ahead of print. PMID: 32950013. 5) Beside self-selection bias, please add the following limitation: This study mainly used self-reported questionnaires to measure psychiatric symptoms and did not make clinical diagnosis. The gold standard for establishing psychiatric diagnosis involved structured clinical interview and functional neuroimaging (Husain et al 2020, Husain et al 2020, Ho et al 2020).

	References: Husain SF, Yu R, Tang TB, et al. Validating a functional near-infrared spectroscopy diagnostic paradigm for Major Depressive Disorder. Sci Rep. 2020;10(1):9740. Published 2020 Jun 16. doi:10.1038/s41598-020-66784-2 Husain SF, Ong SK, Cuizhen L et al. Functional near-infrared spectroscopy during a decision-making task in patients with major depressive disorder. Aust N Z J Psychiatry. 2020 Dec 10:4867420976856. doi: 10.1177/0004867420976856. Epub ahead of print. PMID: 33300367. Ho CSH, Lim LJH, Lim AQ, et al. Diagnostic and Predictive Applications of Functional Near-Infrared Spectroscopy for Major Depressive Disorder: A Systematic Review. Front Psychiatry. 2020;11:378. Published 2020 May 6. doi:10.3389/fpsyt.2020.00378

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Dr. Yinglin Xia, University of Illinois at Chicago College of Medicine

Comments to the Author:
Gasteiger et al. in this study investigated depression, anxiety and stress in New Zealand (NZ) during the first ten weeks of the COVID-19 pandemic, and associated psychological and behavioural factors as well as compared their results with a similar cross-sectional study in the United Kingdom (UK). They concluded that the NZ population had greater levels of depression and anxiety during the first ten weeks of the COVID-19 pandemic compared to population norms and found that younger people and most at-risk of COVID-19 experienced people had a poorer mental health. They also found that compared to the UK sample, the NZ sample had reported lower perceived risk of COVID-19 and less worry about COVID-19.

Overall, this study was solid including study design (power analysis and sample collection), analysis and presentation and discussion. However, this manuscript could be improved if the authors:

1) can briefly describing the survey although there was a citation;

We describe the survey and its content under the section ‘Procedures and measures’ on page 6. To make this clearer, we have now signposted this, when first referring to the survey on page 5). We have added slightly more information about these scales.

2) provide a formal normality test of variables;

Consistent with procedures conducted by Jia et al. (2020), we assessed normality using histograms and scatterplots (page 7). As explained on page 7, “Square root transformations were applied to depression and anxiety scores, to satisfy assumptions of normality and homoscedasticity of residuals and linearity with continuous variables.”

It is not necessary to carry out formal tests of normality as they are too stringent with large sample sizes. Formal normality tests (e.g., Shapiro-Wilks) are commonly considered over-sensitive in the case of large samples. As the sample size increases the test has more and more statistical power to detect small deviations from perfect normality. Consequently, formal normality tests will almost always

come back showing significant deviation from normality. The analyses are also robust to some deviation from normality. Lumley et al. (2002) provide evidence for the robustness of non-normal data in regression models.

Lumley et al. (2002). The importance of the normality assumption in large public health data sets. Annu. Rev. Public Health, 23: 23:151–69. DOI: 10.1146/annurev.publheath.23.100901.140546

3) how conducted variable selection in the multivariate analysis? Such as what cut-off p-values were used from univariate analysis to be included in multivariate modeling?

Cut-off p-values of 0.05 were used. This has now been added to the text.

4) One sample t-tests were used to compare risk factors between NZ and UK samples. This should be explained further. How one-sample t-test was used to compare two-independent samples for categorical variables (depression, anxiety, stress and perceived risk of COVID-19 are categorical based on above description)?

We conducted one sample t-tests to determine whether the NZ sample mean was statistically different from a known mean (i.e. population norm or UK sample). In order to do this, we calculated means for the outcome measures (depression, anxiety and stress) of all demographic groups (i.e. total sample, male, female, age groups) in our NZ sample. We also calculated the overall mean for perceived risk in the NZ sample. The variables were therefore continuous, not categorical. We then compared the NZ means with the same known means for the equivalent variables in the UK sample.

Reviewer: 2
Prof. Roger Ho, National University of Singapore

Comments to the Author:
I have the following comments for the authors to consider. I am happy to review this paper again.

1) Under the Introduction, under the paragraph, "A growing body of evidence documents clear and disproportionate clinical impacts of the COVID-19 pandemic on particular groups, such as older adults." The focus of this paragraph is too narrow. I recommend to have a global view and refer to a systematic review on mental health during COVID-19. The authors should discuss findings of the following study: Xiong J, Lipsitz O, Nasri F, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review [published online ahead of print, 2020 Aug 8]. J Affect Disord. 2020;277:55-64. doi:10.1016/j.jad.2020.08.001

We have cited the systematic review and described the key findings (see page 4).

2) The authors stated "d. Border closures and social distancing resulted in cancelled travel plans and changes to events (e.g. funerals and weddings)" This statement sounds like an opinion and personal encounter. It is important to refer to scientific findings on the impact on mental health due to social distancing, lock down and face mask use. Please refer to the following studies for each preventive measures:

Face mask: Wang C, Chudzicka-Czupała A, Grabowski D, et al. The Association Between Physical and Mental Health and Face Mask Use During the COVID-19 Pandemic: A Comparison of Two Countries With Different Views and Practices. Front Psychiatry. 2020;11:569981. Published 2020 Sep 9. doi:10.3389/fpsyt.2020.569981

Social distance: Tran BX, Nguyen HT, Le HT et al Impact of COVID-19 on Economic Well-Being and Quality of Life of the Vietnamese During the National Social Distancing. Front Psychol. 2020 Sep 11;11:565153. doi: 10.3389/fpsyg.2020.565153. PMID: 33041928; PMCID: PMC7518066.

Lockdown: Le HT, Lai AJX, Sun J, et al. Anxiety and Depression Among People Under the Nationwide Partial Lockdown in Vietnam. Front Public Health. 2020;8:589359. Published 2020 Oct 29. doi:10.3389/fpubh.2020.589359

We have changed our wording to be more tentative and added the citations for the impact of these stressors (page 4).

This section now reads:
The pandemic and related containment efforts also introduced a multitude of additional stressors to populations, beyond bereavement and fear of infection. Changes such as wearing face masks,12 ceased interpersonal interaction through social distancing, loss of income13 and lockdowns have also been reported to impact mental health. Other possible stressors may include redundancies, border closures, changed events (e.g. funerals and weddings) and significant changes in the working hours of the employed. In many countries like NZ and the UK, which enforced a lockdown, changes to daily living also included home schooling and working remotely.

3) This paper mainly compared NZ people with UK people, due to the colonial past.. Again, the authors should broaden their views. They should compare with other countries, especially Asia Pacific as NZ is a country in Asia Pacific and not Europe. The authors reported "younger people aged 18-24 years were also disproportionally affected and more likely to report 4 greater levels of anxiety, stress and depression." Is it true for other countries? Please refer to the following landmark studies in Asia Pacific and make comparison:

China: Wang C, Pan R, Wan X, et al. (2020) Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17(5):1729. Published 2020 Mar 6. doi:10.3390/ijerph17051729

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In fact, some Asian studies explain why "though there is a lack of research to explain why younger people were more impacted during the COVID-19 pandemic" due to disruption of public examination and progress to universities. Please refer to the above studies to look for explanation.

Thank you for your suggestion. To clarify- we make comparisons between NZ and the UK as this research was a collaborative effort by researchers in the UK and NZ, which intended to compare these countries, using the same measures and methods of data collection for consistency. We have now drawn on your work and made some comparisons with other countries, including Vietnam, the Philippines and China. See page 24.

4) The authors stated "Poor mental health status was also associated with worry and heightened

perceptions of risk of COVID-19. In the NZ cohort, worry about COVID-19 was associated with anxiety, and perceived risk of COVID-19 was associated with stress". The authors also stated "Greater positive mood and lower perceived loneliness were protective factors for all outcomes". I think this is inqdeuate. The authors should mention online psychological intervention that will work during the pandemic. Please discuss and refer to the following studies:

The most evidence-based treatment is cognitive behaviour therapy (CBT), especially Internet CBT that can prevent the spread of infection during the pandemic.

Use of Cognitive Behavior Therapy (CBT) to treat psychiatric symptoms during COVID-19:

Ho CS et al Mental Health Strategies to Combat the Psychological Impact of COVID-19 Beyond Paranoia and Panic. Ann Acad Med Singapore. 2020;49(3):155-160.

Cost-effectiveness of iCBT:
Zhang MW et al Moodle: The cost effective solution for internet cognitive behavioral therapy (I-CBT) interventions. Technol Health Care. 2017;25(1):163-165. doi: 10.3233/THC-161261. PMID: 27689560.

Internet CBT can treat psychiatric symptoms such as insomnia:
Soh HL et al Efficacy of digital cognitive behavioural therapy for insomnia: a meta-analysis of randomised controlled trials. Sleep Med. 2020 Aug 26;75:315-325. doi: 10.1016/j.sleep.2020.08.020. Epub ahead of print. PMID: 32950013.

To clarify, the statements referred to are our overall findings. In the Discussion (page 25) we provide some population-based implications (e.g. addressing loneliness, promoting exercise and reducing alcohol and tobacco consumption) that we can infer from our findings. We have now added CBT as an additional strategy that could be used to help reduce anxiety or depression.

This reads:
Other interventions that may be effective in reducing anxiety and depression during the COVID-19 pandemic include cognitive behavioural therapy, which can be made available online or over smartphones.53

5) Beside self-selection bias, please add the following limitation: This study mainly used self-reported questionnaires to measure psychiatric symptoms and did not make clinical diagnosis. The gold standard for establishing psychiatric diagnosis involved structured clinical interview and functional neuroimaging (Husain et al 2020, Husain et al 2020, Ho et al 2020).

References:
Husain SF, Yu R, Tang TB, et al. Validating a functional near-infrared spectroscopy diagnostic paradigm for Major Depressive Disorder. Sci Rep. 2020;10(1):9740. Published 2020 Jun 16. doi:10.1038/s41598-020-66784-2

Husain SF, Ong SK, Cuizhen L et al. Functional near-infrared spectroscopy during a decision-making task in patients with major depressive disorder. Aust N Z J Psychiatry. 2020 Dec 10:4867420976856. doi: 10.1177/0004867420976856. Epub ahead of print. PMID: 33300367.

Ho CSH, Lim LJH, Lim AQ, et al. Diagnostic and Predictive Applications of Functional Near-Infrared Spectroscopy for Major Depressive Disorder: A Systematic Review. Front Psychiatry. 2020;11:378. Published 2020 May 6. doi:10.3389/fpsyt.2020.00378

We have added this limitation on page 26. As suggested, we have also cited your three articles.

VERSION 2 – REVIEW

REVIEWER	Yinglin Xia University of Illinois at Chicago
REVIEW RETURNED	12-Mar-2021

GENERAL COMMENTS	The authors have addressed all my questions.

REVIEWER	Roger Ho National University of Singapore Singapore
REVIEW RETURNED	06-Mar-2021

GENERAL COMMENTS	I recommend publication.