



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.



Short Communication

Young people, mental health and COVID-19 infection: the canaries we put in the coal mine

Ru Jia ^a, Kieran Ayling ^a, Trudie Chalder ^b, Adam Massey ^a, Elizabeth Broadbent ^c,
Joanne R. Morling ^d, Carol Coupland ^a, Kavita Vedhara ^{a,*}

^a Division of Primary Care, University of Nottingham, University Park, Nottingham, NG7 2RD, UK

^b Department of Psychological Medicine, Institute of Psychiatry, Psychology & Neuroscience, King's College London, 16, De Crespigny Park, London, SE5 8AF, UK

^c Department of Psychological Medicine, University of Auckland, Private Bag 92019, Auckland, New Zealand

^d Division of Epidemiology and Public Health, University of Nottingham, B116, Clinical Sciences Building, City Hospital Campus, Nottingham, NG5 1PB, UK

ARTICLE INFO

Article history:

Received 2 October 2020

Received in revised form

9 October 2020

Accepted 18 October 2020

Available online 28 October 2020

Keywords:

COVID-19

Behaviour

Young people

Mental health

ABSTRACT

Objectives: The number of people testing positive for Severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) in the UK, particularly among young adults, is increasing. We report here on the mental health of young adults and related psychological and behavioural responses to the pandemic and consider the role of these factors in fuelling the increase in coronavirus disease 2019 (COVID-19) in this group.

Methods: An online survey was completed during the first six weeks of the first UK-wide lockdown by 3097 respondents, including data for 364 respondents aged 18–24 years. The survey included measures of mental health and indices capturing related psychological and behavioural responses to the pandemic. **Results:** The mental health of 18- to 24-years-olds in the first 6 weeks of lockdown was significantly poorer than that of older respondents and previously published norms: with 84% reporting symptoms of depression and 72% reporting symptoms of anxiety. Young adults also reported significantly greater loneliness and reduced positive mood, both of which were also associated with greater mental health difficulties.

Conclusions: We contend that the combination of mental health, social and economic considerations may have contributed to the rise of COVID-19 infections in young adults, and ascribing blame to this group will not aid our efforts to regain control of the disease.

© 2020 The Royal Society for Public Health. Published by Elsevier Ltd. All rights reserved.

Introduction

In autumn 2020, there was growing alarm at the increase in the number of people testing positive for Severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) in the UK. Initially, this

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, a worldwide licence to the Publishers and its licensees in perpetuity, in all forms, formats and media (whether known now or created in the future), to i) publish, reproduce, distribute, display and store the Contribution, ii) translate the Contribution into other languages, create adaptations, reprints, include within collections and create summaries, extracts and/or, abstracts of the Contribution, iii) create any other derivative work(s) based on the Contribution, iv) to exploit all subsidiary rights in the Contribution, v) the inclusion of electronic links from the Contribution to third party material where-ever it may be located; and, vi) licence any third party to do any or all of the above.

* Corresponding author. Tel.: +44 115 8466931.

E-mail address: Kavita.vedhara@nottingham.ac.uk (K. Vedhara).

increase was attributed to younger people who were being vilified by politicians and the media¹ and being implored to 'stick to the rules'. However, this admonishment was being offered in a vacuum, without any consideration given to how the coronavirus disease 2019 (COVID-19) pandemic has affected young people or some of the legitimate and understandable reasons why they may be being infected with COVID-19 in greater numbers. We consider here some of those reasons and, in particular, provide evidence from the COVID-19 Stress and Health Study² on the mental health consequences of the pandemic on young people which, we suggest, may also have played a role.

First, it is relevant to note that the context in which lockdown was eased, particularly in England, was such that the risk of ongoing transmission was high. Furthermore, the public health messaging then, and subsequently, has been criticised for being increasingly unclear and, therefore, ineffective. While neither of

these factors impinged on young people alone, it is possible that the social, employment and mental health circumstances of this group led them to be among the first to resume participation in this disease context.

In terms of employment and social circumstances, we know that young adults are much more likely to have precarious contracts of employment such as zero-hour contracts,³ to be employed in the hospitality sector⁴ and potentially more likely to use public transport to get to their place of work.⁵ Thus, it is likely they were among the first to return to work when lockdown eased; the first to resume participation in society *per se* but also the first to find themselves in contexts harbouring elevated risks of infection.

In terms of mental health, we established the COVID-19 Stress and Health Study² to prospectively examine the mental health impact of the pandemic on adults living in the UK. We have previously reported high levels of psychological morbidity in the cohort as a whole.⁶ Here, we present additional analysis examining the mental health impact of the pandemic and related psychological and behavioural responses in 18- to 24-year-olds. We consider the differences between this group and older participants and hypothesise how these differences may have further increased their risk of infection.

Methods

Ethics, recruitment, eligibility

Ethical approval was granted from the University of Nottingham Faculty of Medicine and Health Sciences (ref: 506–2003) and the NHS Health Research Authority (ref: 20/HRA/1858). The study was launched on 3/4/20 with participants recruited in the community through a social and mainstream media campaign. Recruitment continued until 30/4/20.

Eligibility criteria specified that participants should be aged 18 years and older, able to give informed consent, able to read English, residing in the UK at the time of completing the survey and able to provide a sample of hair at least 1 cm long. The latter was collected for the determination of the stress biomarker cortisol.

Procedures

The procedures are described in detail elsewhere.⁶ In brief, participants were recruited in the community through a social and mainstream media campaign involving, but not limited to, Facebook and Twitter. In addition, Health Research Authority (HRA) regulatory approval enabled us to approach National Health Service organisations and request they advertise the research through their routine communications. Participants completed an online survey which included validated measures capturing anxiety (Generalised Anxiety Disorder Scale; $\alpha = 0.88$), depression (Patient Health

Questionnaire; $\alpha = 0.92$) and stress (Perceived Stress Scale; $\alpha = 0.76$),^{7–9} as well as indices capturing a range of psychological and behavioural responses to the pandemic.

Results

Data were available from 364 respondents aged 18–24 years and 2733 respondents aged older than 24 years. Comparisons with available UK data reported previously⁶ indicate that women were proportionally over-represented and participants older than 75 years, and from Northern Ireland, were under-represented in the current cohort. Otherwise, the sample was reasonably representative of the wider UK population. Demographic comparisons between participants aged 18–24 years and those >24 years appear in [supplementary appendix Table S1](#).

In relation to mental health, we observed that 18- to 24-year-olds reported significantly increased levels of stress, anxiety and depression, compared with older participants and also previously published population norms ([Table 1](#)). Further analysis according to clinical thresholds on the measures of anxiety and depression revealed that 84% of 18- to 24-year-olds reported symptoms of depression and 72% reported symptoms of anxiety (with 56% meeting the threshold for high intensity psychology support for depression and 44% for anxiety: [supplementary appendix Table S2](#)). We also observed that young adults reported significantly greater loneliness (despite only 5.5% reporting living alone) and reduced positive mood ([Table 2](#)), both of which were consistently associated with greater stress, anxiety and depression after controlling for demographic covariates ([supplementary appendix Tables S3–S5](#)).

An examination of other psychological and behavioural responses to the pandemic revealed that young adults were less likely to worry about contracting COVID-19 than older adults ($X^2 = 45.6, P < 0.001$) but that they were as likely to worry about their close relative(s) or friend(s) getting COVID-19 ($X^2 = 7.30, P = 0.06$) and as likely to engage in social distancing ([Table 2](#)), when compared with older respondents.

Discussion

Our analyses reveal that the mental health impact of the pandemic has been greater in 18- to 24-year-olds, compared with older adults. This age group also reported significantly greater loneliness and reduced positive mood, both of which were also associated with greater mental health difficulties. We suggest that, in combination with the social and employment considerations described earlier, this unprecedented increase in psychological morbidity and loneliness may also have contributed to the increased risk of infection in young adults. Two mechanisms can be considered. First, the easing of lockdown provided a much needed opportunity for increased social interaction and with it a means of

Table 1 Depression (PHQ-9), anxiety (GAD-7) and stress (PSS-4) scores for 18- to 24-year-olds compared with older respondents and published population normative data.^a

| Scales | PHQ-9 score | | | GAD-7 score | | | PSS-4 score | | |
|--------------------|--------------------------|-----------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------|
| | 18–24 years | >24 years | Norms | 18–24 years | >24 years | Norms | 18–24 years | >24 years | Norms |
| | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) |
| Total score | 11.23 (6.4) ^b | 7.2 (5.8) | 2.91 (3.5) | 9.02 (6.0) ^b | 6.3 (5.4) | 2.95 (3.4) | 8.13 (3.3) ^b | 6.3 (3.2) | 6.11 (3.1) |
| Gender | | | | | | | | | |
| Male | 9.68 (7.1) ^b | 5.9 (5.7) | 2.7 (3.5) | 7.16 (6.5) ^b | 4.9 (5.1) | 2.66 (3.2) | 6.83 (3.7) ^b | 5.7 (3.2) | 5.56 (3.0) |
| Female | 11.66 (6.1) ^b | 7.4 (5.8) | 3.1 (3.5) | 9.52 (5.7) ^b | 6.5 (5.4) | 3.20 (3.5) | 8.47 (3.1) ^b | 6.4 (3.2) | 6.38 (3.2) |

^a PHQ-9, the 9-item Patient Health Questionnaire; GAD-7, the 7-item Generalised Anxiety Disorder Scale; PSS-4, the 4-item Perceived Stress Scale. Published population normative data for PHQ-9; SD, standard deviation (Kocalevent et al., 2013)¹², GAD-7 (Löwe et al., 2008)¹⁴, PSS-4 (Warttig et al., 2013)¹³.

^b Mean scores were significantly higher among young respondents aged between 18 and 24 years compared with older respondents (age >24 years) and published population normative data (age ≥18 years), all $P < 0.0001$.

Table 2
Psychological and behavioural response to the pandemic in young respondents and older respondents.

| Scales | 18–25 years | >24 years |
|--|-------------|--------------|
| Engaged in social distancing | | |
| Yes | 345 (94.8%) | 2523 (92.3%) |
| No | 19 (15.2%) | 210 (7.7%) |
| Positive mood (scale 1–30) | 17.7 (4.9)* | 19.2 (5.1) |
| Perceived risk of getting COVID-19 (scale 1–10) | 4.1 (2.0)* | 4.8 (2.2) |
| Perceived loneliness (scale 1–10) | 5.3 (2.7)* | 3.7 (2.7) |
| COVID-19 worry about self | | |
| 'I do not worry about getting COVID-19' | 105 (28.9%) | 407 (14.9%) |
| 'I occasionally worry about getting COVID-19' | 209 (57.4%) | 1841 (67.4%) |
| 'I spend much of the time worrying about getting COVID-19' | 39 (10.7%) | 374 (13.7%) |
| 'I spend most of the time worrying about getting COVID-19' | 11 (3.0%) | 111 (4.1%) |
| COVID-19 worry about others | | |
| 'I do not worry about my close relative(s)/friend(s) getting COVID-19' | 19 (5.2%) | 89 (3.3%) |
| 'I occasionally worry about close relative(s)/friend(s) getting COVID-19' | 214 (58.8%) | 1654 (60.5%) |
| 'I spend much of the time worrying about close relative(s)/friend(s) getting COVID-19' | 92 (25.3%) | 769 (28.1%) |
| 'I spend most of the time worrying about close relative(s)/friend(s) getting COVID-19' | 39 (10.7%) | 221 (8.1%) |

Data are n (%) or mean (SD). COVID-19, coronavirus disease 2019; SD, standard deviation.

*Statistically significantly different between the two age groups at $P < 0.0001$.

restoring emotional well-being, assuaging loneliness and rediscovering positive emotional experiences. In the absence of any other strategies to restore their well-being, concurrent economic messages encouraging greater social interaction ('eat out to help out') and public health messaging which, from the outset, minimised the risk of the disease to this group; it is perhaps not remarkable that young adults seized this opportunity. As such, the very social interaction which became necessary to restore their mental health may have become the vector through which the risk of infection was increased in this group.

Second, the constellation of psychological risk factors identified in young people in this cohort (i.e. poorer mental health and increased loneliness) have been shown time and again to dysregulate the immune system and increase the risk of viral infections, including coronavirus infections.¹⁰ Thus, the psychological repercussions of lockdown may also have directly affected their immunological competence and ability to resist COVID-19 infection.

The results also illustrated that during this first lockdown, 18- to 24-year-olds were as likely to report adhering to social distancing rules, as likely to be worried about the risk of COVID-19 to others, although less worried about the risk of COVID-19 to themselves, when compared with the rest of the cohort. These indicators do not support the caricature that is being presented by some of young people being reckless. Indeed, one could argue that the evidence of elevated infections, at a time when obtaining a test is increasingly difficult, is testament to the fact that they are being responsible.

It is perhaps timely to consider the possibility that the political and public health decisions that have been taken throughout the course of the pandemic, combined with the economic, social and emotional circumstances of young adults, has put them on a course whereby they have been exposed to COVID-19 sooner, and for longer, since lockdown was eased. While this may not wholly explain the increase in new infections in young adults, it is the case that a culture of blame will not provide the key to unlocking this issue,¹¹ and we should be mindful of this as we plan to welcome back students to universities across the UK.

Author statements

Ethical approval

Ethical approval was granted from the University of Nottingham Faculty of Medicine and Health Sciences (ref: 506-2003) and the NHS Health Research Authority (ref: 20/HRA/1858).

Funding

K.A. is supported by funding from the National Institute for Health Research School for Primary Care Research, United Kingdom (NIHR SPQR). T.C. acknowledges the financial support of the Department of Health via the National Institute for Health Research, United Kingdom (NIHR) Specialist Biomedical Research Centre for Mental Health award to the South London and Maudsley NHS Foundation Trust (SLaM) and the Institute of Psychiatry at King's College London. J.R.M. is funded by a Medical Research Council Clinician Scientist Fellowship [grant number MR/P008348/1]. J.R.M. is an editor of the *Public Health* and has been in no way involved in the editorial decision-making in the consideration of this manuscript. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care. No other funding supported the work described in this manuscript.

Competing interests

J.R.M. is an editor of *Public Health* and has been in no way involved in the editorial decision-making in the consideration of this manuscript. No other competing interests declared.

Author contributions

K.V. had the idea for this opinion piece and wrote the first draft, with R.J. performing analyses and all other authors contributing to content and reviewing and approving the final version. As the corresponding author, K.V. attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2020.10.018>.

References

1. The Guardian. <https://www.theguardian.com/world/2020/sep/07/coronavirus-young-people-urged-to-follow-rules-as-uk-cases-rise> [Accessed 10/09/2020].
2. COVID-19 Stress and Health Study. <https://www.covidstresstudy.com/> [Accessed 10/09/2020].
3. Office for National Statistics. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/>

- datasets/emp17peopleinemploymentonzerohourscontracts [Accessed 10/09/2020].
4. People 1st. skills and workforce profile, hospitality and tourism. <https://www.people1st.co.uk/getattachment/Insight-opinion/Latest-insights/Industry-profiles/Hospitality-tourism-skills-and-workforce-profile-2016.pdf?lang=en-GB>.
 5. International Longevity Centre UK. <https://ilcuk.org.uk/age-and-the-national-travel-survey/>[Accessed 14/09/2020].
 6. Jia R, Ayling K, Chalder T, et al. Mental health in the UK during the COVID-19 pandemic: early observations. *BMJ Open* 2020:e040620. <https://doi.org/10.1136/bmjopen-2020-040620>.
 7. Kroenke K, Spitzer RL, Williams JB, et al. The patient health Questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. *Gen Hosp Psychiatr* 2010;**32**(4):345–59. <https://doi.org/10.1016/j.genhosp-psych.2010.03.006> [published Online First: 2010/07/17].
 8. Spitzer RL, Kroenke K, Williams JB, et al. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;**166**(10):1092–7. <https://doi.org/10.1001/archinte.166.10.1092> [published Online First: 2006/05/24].
 9. Diener E, Wirtz D, Tov W, et al. New well-being measures: short scales to assess flourishing and positive and negative feelings. *Soc Indic Res* 2010;**97**:143–56.
 10. O'Connor DB, Thayer JF, Vedhara K. Stress and health: a review of psychological processes. *Annu Rev Psychol* 2021;**72**(1). <https://doi.org/10.1146/annurev-psych-062520-122331>.
 11. Abraham T. Risk and outbreak communication: lessons from alternative paradigms. *Bull World Health Organ* 2009;**87**(8):604–7.
 12. Kocalevent RD, Hinz A, Brähler E. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. *Gen Hosp Psychiatry* 2013;**35**(5):551–5. <https://doi.org/10.1016/j.genhosp-psych.2013.04.006> [published Online First: 2013/05/15].
 13. Warttig SL, Forshaw MJ, South J, et al. New, normative, English-sample data for the Short Form Perceived Stress Scale (PSS-4). *J Health Psychol* 2013;**18**(12):1617–28. <https://doi.org/10.1177/1359105313508346> [published Online First: 2013/10/25].
 14. Löwe B, Decker O, Müller S. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care* 2008;**46**(3):266–74. <https://doi.org/10.1097/MLR.0b013e318160d093> [published Online First: 2008/04/05].