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

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Abstract

Background: The number of people testing positive for 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 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 between the ages of 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 18-24 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.

Introduction

In autumn 2020 there was growing alarm at the increase in the number of people testing positive for SARS-COV-2 in the UK. Initially, this increase was attributed to younger people who were being vilified by politicians and the media[1] 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 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 Study[2] 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 sector[4] 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 Study[2] 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 18-24 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.

Method

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 and over; 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

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, HRA regulatory approval enabled us to approach National Health Service (NHS) 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: GAD-7; α=0.88), depression (Patient Health Questionnaire: PHQ-9; α=0.92) and stress (Perceived Stress Scale: PSS4; α=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 between the ages of 18-24 years and 2,733 respondents over 24 years of age. Comparisons with available UK data reported previously[6] 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 18-24 years and those >24 years appear in supplementary appendix Table S1.

In relation to mental health, we observed that 18-24 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 18-24 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.

INSERT TABLES 1 AND 2 HERE

Discussion

Our analyses reveal that the mental health impact of the pandemic has been greater in 18-24 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 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 has, 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 18-24 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.

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Table 1: Depression (PHQ-9), anxiety (GAD-7) and stress (PSS-4) scores for 18-24 year olds compared with older respondents and published population normative data[†]

	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)***	7.2 (5.8)	2.91 (3.5)	9.02 (6.0)***	6.3 (5.4)	2.95 (3.4)	8.13 (3.3)***	6.3 (3.2)	6.11 (3.1)
Gender									
Male	9.68 (7.1)***	5.9 (5.7)	2.7 (3.5)	7.16 (6.5)***	4.9 (5.1)	2.66 (3.2)	6.83 (3.7)***	5.7 (3.2)	5.56 (3.0)
Female	11.66 (6.1)***	7.4 (5.8)	3.1 (3.5)	9.52 (5.7)***	6.5 (5.4)	3.20 (3.5)	8.47 (3.1)***	6.4 (3.2)	6.38 (3.2)

[†] PHQ-9, the 9-item Patient Health Questionnaire; GAD-7, the 7-item Generalized Anxiety Disorder Scale; PSS-4, the 4-item Perceived Stress Scale. Published population normative data for PHQ-9 (Kocalevent et al., 2013), GAD-7 (Löwe et al., 2008), PSS-4 (Warttig et al., 2013).

***Mean scores were significantly higher among young respondents aged between 18-24 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

	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)

*** statistically significantly different between the 2 age groups at $p<0.0001$

Acknowledgements

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Supplementary Appendix

Approach to Analyses

Young respondents were defined as individuals who aged 18-24 years at the time of completion of the online survey between 3/4/20 and 30/4/20.

Distributions of perceived risk of contracting COVID-19, perceived loneliness, and positive mood were checked visually by histograms. Histogram examination showed that perceived loneliness deviated from the normal distribution however transformation did not show improvements. Therefore raw scores were used in all analyses. Independent samples t-tests were used to explore the differences between young respondents and older respondents (aged >24 years) from the study cohort and previously published population norms in depression, anxiety, and stress (data not shown). A non-parametric test (Wilcoxon rank-sum test) was used to explore the differences between younger and older respondents in perceived loneliness. The differences between younger and older respondents in levels of perceived risk of contracting COVID-19, and positive mood were explored by independent samples t-tests. Chi-square tests were conducted to explore the differences between younger and older respondents in levels of worry about themselves and others contracting COVID-19 (four categories: no worry, occasional worry, much of time worry, most of time worry).

Multivariable linear regression analyses were then used to explore the independent contributions of non-modifiable factors (age, ethnic background, relationship status, being in a recognised COVID-19 risk group) and modifiable explanatory factors (perceived loneliness, perceived risk of COVID-19, positive mood, worry about contracting COVID-19 for self and others) to explaining variation in the outcome variables (depression, anxiety, stress). Variables assessing COVID-19 worry about self and about others were treated as categorical variables in all models, with “occasional worry” treated as the reference value as this was the most common response.

Statistical analyses were performed using STATA (version 16).

Table S1: Demographic characteristics of respondents in the COVID-19 Stress and Health Study (aged 18-24 years (n=364) and > 24 years (n=2733))

	18-24 years	>24 years
	n (%)	n (%)
Mean age (SD)	21.4 (1.7)	47.6 (13.2)
Gender		
Male	77 (21.2%)	399 (14.6%)
Female	287 (78.9%)	2331 (85.3%)
Prefer not to say	0	3 (0.11%)
Ethnicity		
White – British, Irish, other	300 (82.4%)	2496 (91.5%)
Black, Asian and other ethnic minorities[a]	64 (17.6%)	232 (8.5%)
Relationship status		
Single, never married	229 (62.9%)	345 (12.6%)
Single, divorced or widowed	0	263 (9.6%)
In a relationship/married but living apart	77 (21.2%)	177 (6.5%)
In a relationship/married and cohabiting	57 (15.7%)	1924 (70.4%)
Prefer not to say	1 (0.3%)	24 (0.9%)
Education (highest level of attainment)		
No qualifications	2 (0.6%)	31 (1.1%)
Completed GSCE/CSE/O-levels or equivalent	6 (1.7%)	246 (9.0%)
Completed post-16 vocational course	4 (1.1%)	97 (3.6%)
A-levels or equivalent (at school until aged 18)	149 (40.9%)	254 (9.3%)
Undergraduate degree or professional qualification	166 (45.6%)	1140 (41.7%)
Postgraduate degree	36 (9.9%)	940 (34.4%)
Prefer not to say	1 (0.3%)	25 (0.9%)
Place of residence		
South West England	29 (8.0%)	212 (7.8%)
East Midlands	123 (33.8%)	639 (23.4%)
Yorkshire and Humber	15 (4.1%)	278 (10.2%)
North East	14 (3.9%)	133 (4.9%)
East of England	23 (6.3%)	130 (4.8%)
North West	33 (9.1%)	324 (11.9%)
South East England	48 (13.2%)	367 (13.4%)
Greater London	39 (10.7%)	290 (10.6%)
West Midlands	25 (6.9%)	140 (5.1%)
Northern Ireland	2 (0.6%)	6 (0.2%)
Wales	6 (1.7%)	67 (2.5%)
Scotland	7 (1.9%)	147 (5.4%)
Keyworker status		
Keyworker	93 (25.6%)	1466 (53.6%)
Non-keyworker	271 (74.5%)	1267 (46.4%)
Living alone		
Living with someone	344 (94.5%)	2347 (85.9%)

Living alone	20 (5.5%)	386 (14.1%)
Covid-19 risk status		
Most at risk (e.g. suffering from advanced cancer, severe asthma/COPD, etc.)	14 (3.9%)	107 (3.9%)
At increased risk (e.g., being pregnant, aged over 70, etc.)	29 (8.0%)	499 (18.3%)
Not at-risk	321 (88.2%)	2127 (77.8%)

Table S2: Prevalence of depression and anxiety cases[†] among 18-24 year olds

		18-24 years		>24 years	
	Categories	**n**	**%**	**n**	**%**
Depression (PHQ-9[‡])	*No-Minimal Depression (0-4)*	59	16.2	1066	39.0
	Mild Depression (5-9)	103	28.3	891	32.6
	Moderate Depression (10-14)	88	24.2	437	16.0
	Moderately Severe Depression (15-19)	70	19.2	206	7.5
	Severe Depression (20-27)	44	12.1	133	4.9
Anxiety (GAD-7[‡])	*No-Minimal Anxiety (0-4)*	102	28.0	1242	45.4
	Mild Anxiety (5-9)	101	27.8	846	31.0
	Moderate Anxiety (10-14)	77	21.2	353	12.9
	Severe Anxiety (15-21)	84	23.1	292	10.7

[†] Cut-offs for categories in line with published guidelines for PHQ-9 (Spitzer et al., 2006) and GAD-7 (Diener et al., 2010).
[‡] PHQ-9, the 9-item Patient Health Questionnaire; GAD-7, the 7-item Generalized Anxiety Disorder Scale.

Table S3 Regression model showing associations between explanatory variables and depression scores in 18-24 year olds

	B	95% CI Lower	95% CI Upper	*β*	*p*
PHQ-9 (depression) Total Score[a]					
Female	-0.03	-0.24	0.18	-0.01	0.78
BAME[b]	-0.12	-0.34	0.10	-0.04	0.28
Relationship status[c]					
Single, divorced or widowed	..	..	..	..	..
In a relationship/Married but living apart	0.06	-0.14	0.27	0.02	0.56
In a relationship/married and cohabiting	0.17	-0.08	0.41	0.06	0.19
Prefer not to say	-0.65	-2.06	0.76	-0.04	0.36
Risk Group[d]					
Most at Risk	0.21	-0.21	0.63	0.04	0.33
Increased Risk	0.18	-0.12	0.49	0.05	0.24
Positive Mood (per unit)	-0.12	-0.14	-0.10	-0.56	<0.001***
Perceive Risk of COVID-19 (per unit)	-0.01	-0.05	0.04	-0.01	0.77
Perceived Loneliness (per unit)	0.09	0.05	0.13	0.23	<0.001***
COVID-19 Worry about self[e]					
No worry	-0.04	-0.24	0.15	-0.02	0.66
Much of time	0.12	-0.20	0.44	0.03	0.45
Most of time	-0.24	-0.79	0.32	-0.04	0.40
COVID-19 Worry about others[f]					
No worry	-0.02	-0.39	0.35	-0.00	0.91
Much of time	0.21	-0.01	0.44	0.08	0.06
Most of time	0.33	-0.00	0.66	0.09	0.05
Adjusted R^2=0.55, n=306					

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

[a] A square-root transformation was applied to the dependent variable.

[b] Binary variable of ethnicity background: white British or Black, Asian and other Minority Ethnicity.

[c] Comparison reference group “Single, never married”.

[d] Comparison reference group “I am in neither risk category”.

[e] Comparison reference group “I occasionally worry about myself getting COVID-19”.

[f] Comparison reference group “I occasionally worry about my close relative(s)/friend(s) getting COVID-19”.

Table S4 Regression model showing associations between explanatory variables and anxiety scores in 18-24 year olds

	B	95% CI Lower	95% CI Upper	*β*	*p*
GAD-7 (Anxiety) Total Score[a]					
Female	0.14	-0.11	0.38	0.05	0.27
BAME[b]	-0.34	-0.60	-0.09	-0.11	0.009**
Relationship status[c]					
Single, divorced or widowed	..	..	..	..	..
In a relationship/Married but living apart	0.07	-0.17	0.31	0.02	0.55
In a relationship/married and cohabiting	0.21	-0.08	0.49	0.06	0.16
Prefer not to say	-0.72	-2.37	0.93	-0.03	0.39
Risk Group[d]					
Most at Risk	0.10	-0.39	0.59	0.02	0.70
Increased Risk	-0.10	-0.45	0.26	-0.02	0.60
Positive Mood (per unit)	-0.13	-0.16	-0.11	-0.53	<0.001***
Perceive Risk of COVID-19 (per unit)	-0.01	-0.06	0.04	-0.02	0.72
Perceived Loneliness (per unit)	0.06	0.02	0.11	0.14	0.005**
COVID-19 Worry about self[e]					
No worry	-0.20	-0.43	0.03	-0.07	0.09
Much of time	0.48	0.11	0.85	0.12	0.01*
Most of time	0.67	0.02	1.32	0.09	0.04*
COVID-19 Worry about others[f]					
No worry	-0.13	-0.56	0.30	-0.02	0.54
Much of time	0.34	0.08	0.60	0.12	0.01*
Most of time	0.55	0.17	0.94	0.14	0.005**
Adjusted R^2=0.54, n=306					

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

[a] A square-root transformation was applied to the dependent variable.

[b] Binary variable of ethnicity background: white British or Black, Asian and other Minority Ethnicity.

[c] Comparison reference group “Single, never married”.

[d] Comparison reference group “I am in neither risk category”.

[e] Comparison reference group “I occasionally worry about myself getting COVID-19”.

[f] Comparison reference group “I occasionally worry about my close relative(s)/friend(s) getting COVID-19”.

Table S5 Regression model showing associations between explanatory variables and stress scores in 18-24 year olds

	B	95% CI Lower	95% CI Upper	*β*	*p*
PSS-4 (Stress) Total Score					
Female	0.25	-0.41	0.91	0.03	0.46
BAME[a]	-0.29	-0.99	0.40	-0.03	0.41
Relationship status[b]					
Single, divorced or widowed	..	..	..	..	..
In a relationship/Married but living apart	-0.04	-0.69	0.62	-0.00	0.91
In a relationship/married and cohabiting	0.33	-0.46	1.11	0.03	0.41
Prefer not to say	-3.69	-8.17	0.79	-0.06	0.11
Risk Group[c]					
Most at Risk	-0.01	-1.35	1.32	-0.00	0.98
Increased Risk	-0.36	-1.33	0.62	-0.03	0.47
Positive Mood (per unit)	-0.40	-0.46	-0.33	-0.57	<0.001***
Perceive Risk of COVID-19 (per unit)	-0.12	-0.26	0.01	-0.07	0.07
Perceived Loneliness (per unit)	0.24	0.12	0.36	0.20	<0.001***
COVID-19 Worry about self[d]					
No worry	-0.39	-1.01	0.24	-0.05	0.22
Much of time	0.13	-0.88	1.15	0.01	0.79
Most of time	0.15	-1.62	1.92	0.01	0.87
COVID-19 Worry about others[e]					
No worry	0.03	-1.14	1.20	0.00	0.96
Much of time	0.65	-0.06	1.35	0.08	0.07
Most of time	1.46	0.40	2.51	0.13	0.007**
Adjusted R^2=0.55, n=306					

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

[a] Binary variable of ethnic background: white British or Black, Asian and other Minority Ethnicity.

[b] Comparison reference group “Single, never married”.

[c] Comparison reference group “I am in neither risk category”.

[d] Comparison reference group “I occasionally worry about myself getting COVID-19”.

[e] Comparison reference group “I occasionally worry about my close relative(s)/friend(s) getting COVID-19”.