Depression, anxiety, stress and resilience among undergraduate health sciences students of a rural tertiary healthcare centre in Maharashtra during the Covid-19 lockdown: A cross-sectional, online survey

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ABSTRACT

Background. The Covid-19 pandemic caused a rapidly evolving and confused situation. Health sciences students (HSSs) are not immune to depression, anxiety and stress during such a pandemic. We aimed to assess the relation between depression, anxiety, stress and resilience among undergraduate HSSs during the Covid-19 lockdown.

Methods. We conducted a cross-sectional, online survey at a rural tertiary healthcare centre in Maharashtra. Data were recorded from study participants on sociodemographic details using the 21-item Depression, Anxiety and Stress Scale (DASS-21) and the Brief Resilience Scale (BRS). Data were analysed using SPSS software version 15.0.

Results. A total of 381 students participated in the online survey. The prevalence of depression, anxiety and stress were 7.6%, 6.3% and 1.0%, respectively. There was a positive correlation between all three sub-scales of DASS-21. On BRS, 5 (1.3%) participants had high resilience, 216 (56.7%) had normal resilience and 160 (42.0%) had low resilience. Those respondents who had high resilience had lower rates of depression, anxiety and stress on DASS-21 sub-scales.

Conclusion. A proportion of HSSs had anxiety, depression and stress during the Covid-19 outbreak and lockdown. Respondents with high resilience had less frequent depression, anxiety and stress. In the long run, strengthening resilience of HSSs may be useful.

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INTRODUCTION

In December 2019, the Covid-19 outbreak emerged in Wuhan, China.[1–3] It was declared a public health emergency of concern and pandemic by WHO in March 2020.[4,5] From 25 March 2020, there was a countrywide lockdown in India to contain the spread of Covid-19. Being socially isolated, working in high-risk situations and having contact with infected people are common causes of mental health problems among healthcare workers (HCWs).[6,7] Many studies have recorded the psychological impact of Covid-19 on the mental health status of the general public, patients and HCWs.[6–10] Similarly, undergraduate health sciences students (HSSs) were exposed to stressors during the virus outbreak, but this group is often overlooked.[11] Continuous spread of Covid-19 globally and a strict lockdown delayed the schedules of universities, schools and colleges, including health sciences colleges across the world, including in India. However, there is little literature on the mental health status of HSSs during the Covid-19 pandemic. During the Covid-19 pandemic, gaps in mental health services have been widened, which are testing the resilience of many, including HSSs.[12]

Resilience is defined as 'the ability to bounce back or recover from stress, to adapt to stressful circumstances, to not become ill despite significant adversity, and to function above the norm despite stress or adversity'.[13] During the current pandemic, there has been an increase in mental health issues such as stress, anxiety and depression among many, including HSSs.[14]

In India, the first case of Covid-19 was detected in Kerala on 30 January 2020. Since then, the count is increasing. Nowadays, health sciences colleges and universities are facing the challenge of developing methods of guiding students to appropriately and effectively manage their emotions during the Covid-19 pandemic and avoid as well as tackle academic loss of HSSs. One study has found that delays in academic activities during the Covid-19 lockdown were associated with symptoms of anxiety.[15] Therefore, we assessed the mental health status of undergraduate HSSs with the primary objective of assessing the magnitude of depression, anxiety, stress and its relation with resilience among HSSs during the Covid-19 lockdown at a rural tertiary healthcare centre in Maharashtra. Based on previous study findings,[15] we hypothesized that respondents with high

resilience will have lower rates of depression, anxiety and stress.

METHODS

Sample collection and study design

We conducted this cross-sectional, internet-based (*www.survey monkey.com*) online survey over a period of 10 days from 4 April to 14 April 2020 through a pre-designed questionnaire, using consecutive sampling. It was approved by the Institutional Ethics Committee (reference letter no. DMIMS(DU)/IEC/2020/8700-A, dated 4 April 2020). The inclusion criteria adopted for the study were participants in the age group of 18–25 years, and those belonging to the undergraduate HSSs category. Each participant's identity was kept anonymous. Before starting the survey, all study participants were provided details of the time taken to complete the survey, the nature of survey and information that filling in the survey implies the provision of informed consent by participants. The survey questionnaire was circulated using WhatsApp to HSSs of a rural tertiary healthcare centre in Maharashtra. It was an open and voluntary online survey.

The participants were not provided any incentives for participation in the survey. The participants could fill the survey form only once through a device, i.e. users with the same IP address were not able to access the survey twice, thus preventing duplication of responses. The survey was in the English language. We used two scales: the 21-item Depression, Anxiety and Stress Scale (DASS-21) and the Brief Resilience Scale (BRS).

The DASS-21[16] has a set of three self-report sub-scales designed to measure depression, anxiety and stress. Each item is rated on a scale of 0–3. Each sub-scale contains seven items for depression, anxiety and stress. Scores of all three sub-scales are calculated by summing up scores for relevant items. Final scores are obtained by multiplying the total scores of all three sub-scales by two. Table I shows the recommended cut-off scores for conventional severity labels of depression, anxiety and stress.[16]

Reliability of DASS-21 showed that it has excellent Cronbach alpha values of 0.81, 0.89 and 0.78 for sub-scales of depression, anxiety and stress, respectively.[17] It has excellent internal consistency, discriminative, concurrent and convergent validities. Depression and anxiety sub-scales of DASS-21 had good correlations with self-rating depression scale and state-trait anxiety inventory.[17] It is reliable, valid and easy to administer.[17] Its utility by clinicians can enhance diagnoses of depression, anxiety and stress among university students.[17]

The BRS assesses the ability to bounce back or recover from stress.[13] It provides unique, important information about people coping with health-related stressors. It is the measurement of coping with difficulties. The BRS consists of six items. Each item is rated on a scale of 1 to 5. For scoring, responses are added varying from 1 to 5 for all six items giving a range from 6 to 30. The total is then divided by the total number of questions/items answered. BRS scores of 1–2.99 indicate low resilience, 3–4.30 indicate normal resilience, and 4.31–5 indicate high resilience.[13] Factor analysis reveals a single factor with eigenvalues above 1.0, which accounted for 73.54% of the total variance. Reliability analysis using Cronbach alpha was 0.93, indicating that the scale has good reliability.[18] The study shows that the BRS is appropriate for use by college personnel and counsellors to examine and identify resilience among college students.[18]

Apart from the DASS-21 and BRS scales, we had observed a set of few Covid-19 lockdown-related common worries and concerns among undergraduate HSSs. We divided HSSs into medical, dental, physiotherapy and nursing faculties. We randomly chose 5 students of either gender from each faculty (i.e. a total of 20 undergraduates). The worries and concerns related to the Covid-19 lockdown included the worry related to academic loss as well as academic delay and future employment on a scale of 0–10, the worry about contracting Covid-19 to self, the worry about contracting Covid-19 by the family member(s), change in internet use, common 'time pass' activities, and affected sleep pattern. These common worries and concerns related to the Covid-19 lockdown were included in our study after a detailed discussion between all authors and a group of selected 20 undergraduate students, who were randomly chosen to gather their common worries and concerns regarding the Covid-19 lockdown. Data from those 20 students were not included in the final result of the present study.

Analysis

Data were entered using Microsoft Excel version 2007. Final data were analysed using SPSS statistical software version 15 (IBM, Chicago, Illinois, United States of America). A total of 430 responses were received; 49 responses were excluded as they were incomplete. Hence, the final sample size was 381. Continuous data were presented as mean and standard deviation, categorical data were presented as frequency and percentage. Chi-square test and Fisher exact test were used to determine the level of significance. Pearson test of correlation was used to test the correlation between three sub-scales of the DASS-21. Association of resilience with the presence of depression, anxiety and stress was assessed by Chi-square test and Fisher exact test. The level of significance was set at 0.05.

RESULTS

Sociodemographic parameters of the study population

A majority of study participants (59.1%) were in the age group of 18–21 years. A majority were girls (72.2%), medical students (61.2%), from urban residence (77.2%), from nuclear families (72.2%), and from Hindu religion (87.7%; Table II).

Covid-19 lockdown-related parameters among the study participants

Table III shows that 30.4% of HSSs had rated '8' on a scale of 0–10 points for the 'worry about academic loss, academic delay and future employment because of Covid-19'. About 39% had the mild worry of contracting Covid-19 by themselves and by their family members (31.0%). About 47% had a moderate increase in internet use, 64.0% were sleeping less than usual during the lockdown, and boredom (31.2%) was the most common thing that bothered during the lockdown and to deal

TABLE I. Cut-off scores for labelling the severity of depression, anxiety and stress by using DASS-21

Grade	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Extremely severe	28+	20+	34+

DASS Depression, Anxiety and Stress Scale

TABLE II. Sociodemographic data of the study participants (n=381)

Characteristic	*n* (%)
Age group (years)	
18–21	225 (59.1)
22–25	156 (40.9)
Mean (SD)	20.10 (1.49)
Gender	
Men	106 (27.8)
Women	275 (72.2)
Faculty	
Medical	233 (61.2)
Dental	8 (2.1)
Physiotherapy	92 (24.1)
Nursing	48 (12.6)
Residence	
Rural	87 (22.8)
Urban	294 (77.2)
Family type	
Nuclear	275 (72.2)
Joint	95 (24.9)
Extended	11 (2.9)
Religion	
Hindu	334 (87.7)
Muslim	16 (4.2)
Christian	4 (1.0)
Others	27 (7.1)

with it, the most common activity to pass the time was the use of internet (49.9%).

Distribution of DASS-21 sub-scale scores-based severity of depression, anxiety and stress

Table IV shows that 5.2% had mild and 2.4% had moderate depression. On the anxiety sub-scale of DASS-21, 2.9% had mild, 2.9% had moderate and 0.5% had severe anxiety. On the stress sub-scale of DASS-21, 0.8% had mild and 0.2% had moderate stress.

Correlation between DASS-21 sub-scale scores of depression, anxiety and stress (n=381)

Table V shows that there was a high positive correlation between all three sub-scales of DASS-21. All correlations were significant at 0.01 level (2-tailed).

Level of resilience among the study participants

On the BRS scale, 160 (42.0%) had low, 216 (56.7%) had normal and 5 (1.3%) had high resilience. The mean (SD) score on BRS was 2.89 (0.76).

Relation of resilience with depression, anxiety and stress among the study participants

Table VI shows that respondents with high resilience had less frequent depression, anxiety and stress. This suggests that an individual's capacity to bounce back may protect him/her from experiencing depression, anxiety and stress.

DISCUSSION

The Covid-19 pandemic has brought on unbearable psychological pressure. Covid-19 has a mortality rate of 2%, but higher transmission and mortality rates than those combined of SARS and Middle East respiratory syndrome (MERS).[19] Covid-19 has

TABLE III. Covid-19 lockdown-related parameters among the study participants (n=381)

Lockdown-related parameter	*n* (%)
Worry related to academic loss/delay and future employment due to the Covid-19 lockdown on the scale of 0–10	
0	1 (0.3)
1	5 (1.3)
2	5 (1.3)
3	8 (2.1)
4	10 (2.6)
5	46 (12.1)
6	45 (11.8)
7	65 (17.1)
8	116 (30.4)
9	46 (12.1)
10	34 (8.9)
Worry about contracting Covid-19	
None	31 (8.1)
Mild	148 (38.8)
Moderate	141 (37.0)
Severe	61 (16.0)
Worry about family member(s) contracting Covid-19	
None	81 (21.3)
Mild	118 (31.0)
Moderate	104 (27.3)
Severe	78 (20.5)
Change in internet use	
No change	22 (5.8)
Mild	26 (6.8)
Moderate	178 (46.7)
Severe	155 (40.7)
Common activity to pass time	
Watching television	30 (7.9)
Using the internet over mobile phone	190 (49.9)
Reading books/novels	56 (14.7)
Playing indoor games	50 (13.1)
Other	55 (14.4)
Sleep pattern affected	
Not at all	84 (22.1)
Sleeping more than usual	33 (8.7)
Sleeping less than usual	244 (64.0)
Not able to fall asleep	20 (5.2)
Most bothersome thing	
Boredom	119 (31.2)
Fatigue and bodyache	10 (2.6)
Thoughts about Covid-19	48 (12.6)
Sleep disturbances	41 (10.8)
Media news about Covid-19	111 (29.1)
Interpersonal conflicts	17 (4.5)
Non-availability of substances of abuse	1 (0.3)
Financial crisis	24 (6.3)
Non-availability of domestic needs	10 (2.6)

TABLE IV. Distribution of the severity of depression, anxiety and stress among the study participants (n=381)

Level	Depression*, *n* (%)	Anxiety†, *n* (%)	Stress‡, *n* (%)
None	352 (92.4)	357 (93.7)	377 (99.0)
Mild	20 (5.2)	11 (2.9)	3 (0.8)
Moderate	9 (2.4)	11 (2.9)	1 (0.2)
Severe	0	2 (0.5)	0
Mean (SD)	*3.34 (3.77)	†2.46 (2.94)	‡3.39 (3.40)

TABLE V. Correlation between depression, anxiety and stress sub-scales scores among the study participants

DASS-21 sub-scale	Depression score	Anxiety score	Stress score
Depression			
Correlation	1.0	0.753	0.823
Significance (2-tailed)	–	<0.001	<0.001
Anxiety			
Correlation	0.753	1.0	0.812
Significance (2-tailed)	<0.001	–	<0.001
Stress			
Correlation	0.823	0.812	1.0
Significance (2-tailed)	<0.001	<0.001	–

DASS Depression, Anxiety and Stress Scale

TABLE VI. Relation of resilience with depression, anxiety and stress (*n*=381)

DASS-21 sub-scale	High resilience (*n*=5)	Normal resilience (*n*=216)	Low resilience (*n*=160)	p value
Depression				
Present	3 (60.0)	22 (10.2)	4 (2.5)	0.000001
Absent	2 (40.0)	194 (89.8)	156 (97.5)	
Anxiety				
Present	2 (40.0)	21 (9.7)	1 (0.6)	0.00001
Absent	3 (60.0)	195 (90.3)	159 (99.4)	
Stress				
Present	2 (40.0)	1 (0.5)	1 (0.6)	<0.0000001
Absent	3 (60.0)	215 (99.5)	159 (99.4)	

DASS Depression, Anxiety and Stress Scale

created a lot of stress among HSSs not only by creating delay in starting their college academic activities but by the postponement of their examinations. The literature has shown that HSSs were exposed to stressors during the virus outbreak, but this group is often neglected.[11] Hence, there is need to pay attention to the psychological problems and the needs of HSSs during the Covid-19 pandemic.

Sociodemographic characteristics

A total of 381 of 430 study participants (88.6%) completed the survey. A survey done by Lai *et al.* had a completion rate of 68.7% response.[20] The lower completion rate in their study might be due to its multicentric nature, as collecting data from multiple centres would be a tedious task. The majority of participants in our survey were women (72.2%). In the study by Lai *et al.* too women (76.7%) outnumbered men.[20] Wong *et al.* also observed that a majority of healthcare personnel were women (65.7%).[21] These findings suggest that women were more interested and responsive towards participating in the study. Our study was done at a rural tertiary healthcare centre in Maharashtra, but the majority of students had an urban residence (77.2%). A similar finding was observed by Lai *et al.* with the majority of the study participants from an urban area (97.1%).[20] A majority of the study participants were from nuclear families (72.2%). Joint families obviously have more family members who might share responsibilities among themselves to take care of a person suffering from any physical and psychological problems. The study found that 11% of the participants came from joint families living with biological parents, while 89% of the study participants had some form of disruption in their family structure.[22] Thus, family type plays an important role in the management of health problems, including psychological issues among sufferers, which holds true for HSSs also. Many researchers interested in relating the family type to mental health have studied nuclear family where mother and father were absent. Schneider concluded that there was a strong consensus among the study participants that the presence of the mother/father family was inherently superior.[23]

Covid-19 lockdown-related parameters among the study participants

HSSs were not able to attend their theory and practical classes and clinical postings due to the Covid-19 lockdown. Al-Rabiaah *et al.* stated that medical students were exposed to stressors during the virus outbreak because students had adverse effects on their academic achievement through increased avoidance of learning activities and reduced psychomotor concentration.[11] Mei *et al.* observed that public health emergencies such as Covid-19 can have various psychological effects on college-going students and they might be expressed as anxiety, worry and fear among others.[24] 30.4% had rated their worry related to academic loss, academic delay and future employment due to the Covid-19 lockdown on the point of '8.0' of Likert scale of 0–10. Wong *et al.* had recorded mental distress caused by the virus outbreak by a single item 10-point Likert scale where the majority of respondents scored '6.19', which was nearer to the value recorded in our study.[21] Cornine *et al.* found that psychological issues of college students, mainly anxiety about Covid-19 was due to its effect on their studies.[25] Wang *et al.* observed that psychological issues of college students, mainly anxiety about Covid-19, have been due to their effect on future employment.[1] Depression, anxiety and stress among college students may have been caused by the gradually increasing social distance between students/peers, resulting from the ongoing Covid-19 lockdown. Xiao and Kmietowicz observed that among psychological issues of college students during the Covid-19 lockdown, anxiety disorders were more likely to occur and worsen in the absence of interpersonal interaction.[26,27] As regards the worry about contracting Covid-19 by self, 38.8% had a 'mild degree of worry'. As regards the worry about contracting Covid-19 by family members, 31.0% had a 'mild degree of worry'. Wong *et al.* observed that sources of stress among health sciences personnel include feelings of vulnerability, loss of control and concerns about the health of self, others and family, spread of the virus, changes in work and being isolated from loved ones, which also holds true for HSSs during the Covid-19 lockdown.[21] The most bothering thing during the Covid-19 lockdown was boredom (31.2%) and to cope with it, 49.9% had reported spending most of the time surfing the internet. About 46.7% reported a moderate increase in internet use during the Covid-19 lockdown. Al-Rabiaah *et al.* observed that students who use internet more often were more informed about the impact of viral disease, which might increase their psychological distress.[11] Another study found that the more the disease was mentioned in the media, the more its seriousness was overlooked by students and vice versa.[28]

A majority of HSSs (64.0%) had reported that they were sleeping less than usual during the Covid-19 lockdown. Since the outbreak of the Covid-19 pandemic and its social consequence of home and institutional confinement/quarantine, a global stressful condition had developed. Being socially isolated,

forced to stay at home for self-quarantine, studying from home, home-schooling, restricted outings, hampered social interaction, studying or attending classes for many hours online using smartphones/computers under stressful conditions, and facing own and family members' health risks, would have a major impact on day-time functioning and on night-time sleep of HSSs. While spending many hours on online-classes or e-learning using smartphones/computers, there are high chances that HSSs might come across or surf on the internet the news related to the Covid-19 pandemic, which itself can act as an additional source of depression, anxiety, stress and insomnia. Huang *et al.* observed that being younger than 35 years of age and following Covid-19 news updates for >3 hours a day was associated with increased levels of anxiety, which could have resulted in sleep disturbances.[29]

Most of the studies that had investigated effects of the lockdown during the viral outbreak have not used specific sleep-related questionnaires and had focused on HCWs or those who were exposed to or suffered from the virus itself with a quarantine period of 10–14 days.[30] No data are available on the assessment of sleep quality and severity of insomnia among HSSs during viral pandemics. This emphasizes the importance of using sleep specific questionnaires for HCWs and HSSs.

Distribution and the relation of depression, anxiety, stress and resilience
The DASS-21 total score ranged from 0 to 96, with a mean (SD) score of 9.14 (9.35). The total score on the depression sub-scale of DASS-21 ranged from 0 to 40 with a mean (SD) score of 3.34 (3.77); 20 respondents (5.2%) had mild and 9 (2.4%) had moderate depression. The prevalence of depression among HSSs was 7.6%. Tan *et al.* observed that 42 (8.9%) health sciences personnel had depression on the DASS-21 depression sub-scale. The mean (SD) score of depression sub-scale in their study was 2.54 (5.23).[31] The total score on the anxiety sub-scale of DASS-21 ranged from 0 to 32, with a mean (SD) score of 2.46 (2.94); 11 respondents (2.9%) had mild, 11 (2.9%) had moderate and 2 (0.5%) had severe anxiety. The prevalence of anxiety among HSSs was 6.3%. Al-Rabiaah *et al.* observed that 134 (77.0%) had minimal, 32 (18.4%) had mild, 8 (4.6%) had moderate anxiety.[11] Tan *et al.* found that 68 (14.5%) HCWs had anxiety based on the DASS-21 anxiety sub-scale, with a mean (SD) score of 2.45 (4.28).[31] Not only HCWs working in isolation units and hospitals but HSSs also do not receive any training for maintaining their mental health.[9]

Anxiety among HSSs may rise following increased media reporting and an increasing number of new cases. Anxiety among HSSs may rise following the academic loss and academic delays due to the Covid-19 lockdown. Cornine *et al.* observed that anxiety due to the Covid-19 pandemic had affected the studies of college students.[25] Wang *et al.* observed that Covid-19 had caused anxiety among college students as students perceived that they might not get future employment due to academic loss during the Covid-19 outbreak.[1] Xiao and Kmietowicz found that anxiety disorders among college students had occurred and worsened in the Covid-19 lockdown due to the absence of interpersonal communication.[26,27] Mass lockdown is likely to raise anxiety significantly. Increased anxiety may also have knock-on implications for other health measures, including mental health measures among HSSs.[32]

The total score on stress sub-scale of DASS-21 ranged from 0 to 42, with a mean (SD) score of 3.39 (3.40); 3 respondents (0.8%) had mild and 1 (0.2%) had moderate stress. The prevalence of stress among HSSs was 1.0%. Tan *et al.* found that 31 (6.6%) study participants had stress. The mean (SD) score of the stress sub-scale in respondents was 3.82 (5.74).[31] In our study, there was a high positive correlation between all three sub-scales of DASS-21. All correlations were significant at the 0.01 level (2-tailed).

The government had taken many measures to limit the spread of Covid-19, which has included ban on travelling and extending the lockdown. However, it has disrupted routine life, inevitably resulting in anxiety in many, which was true for HSSs too.[33] Many universities, including health sciences universities, have postponed classes and examinations and used distant or remote learning methods such as internet-based e-lectures.[34] Such sudden and drastic change in the pattern of learning may have caused a major impact on education and growth of college students. Social support plays a pivotal role in everyone's mental health, including that of HSSs. Cao *et al.*,[15] Thompson *et al.*[35] and Chen *et al.*[8] observed that social support was negatively correlated with anxiety among college students.

Resilience among HSSs can be strengthened through social support programmes arranged by health sciences colleges and universities by taking professional help from people qualified in providing mental health support such as psychiatrists and psychologists. Social support not only decreases psychological burden but also leads to a change in attitude towards help-seeking behaviour among HSSs. Hence, HSSs should receive psychological, social support during public health emergencies such as the Covid-19 lockdown, which is consistent with the findings of a study by Bai *et al.*[36]

In our study, the total BRS score ranged from 1 to 5, with the mean (SD) score being 2.89 (0.76). Based on the BRS scores, 5 respondents (1.3%) had high, 216 (56.7%) had normal and 160 (42.0%) had low resilience. Liu *et al.* observed that the Covid-19 outbreak had highlighted potential gaps in mental health services during emergencies while testing the resilience of HCWs and the medical system, which included HSSs.[12] In our study, the respondents who had high resilience had shown lower scores of depression, anxiety and stress. This suggests that an individual's capacity to bounce back may protect him/her from experiencing depression, anxiety and stress during a stressful period such as the Covid-19 lockdown. Duan *et al.* observed similar findings and stated that psychological problems such as depression, anxiety and stress had increased during the Covid-19 outbreak.[14] Thus, resilience helps a person to cope with psychological problems. Peng *et al.* observed a similar finding that resilience moderated negative life events and mental health issues among Chinese HSSs.[37] They concluded that promoting resilience among HSSs can be helpful for their psychological adjustments.[37]

Limitations
First, the study was conducted in a single centre, thus limiting the generalizability of the results found. Second, although respondents answered self-administered questionnaires based on their actual performance, overestimation or exaggeration may be a factor.

Conclusions
We recommend that health sciences colleges and health authorities should address the psychological needs of HSSs,

especially during a crisis such as the Covid-19 lockdown. The results of our study highlight the importance of instituting psychological support programmes for HSSs during infectious disease outbreaks to strengthen their mental health through boosting their resilience. It is advisable that the government in collaboration with professional bodies and relevant experts develop a plan for implementation of psycho-educational programmes in emergency preparedness. Such programmes would help HSSs to deal effectively with depression, anxiety and stress through the strengthening of resilience and coping skills.

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