

Impact of Social Isolation on Mental Health Amid COVID-19 Pandemic: A Nationwide Survey

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Research Article

Keywords: COVID-19, mental health, quarantine, social isolation, survey

Posted Date: April 30th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-442918/v1>

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Abstract

Background: Although social isolation is known to limit the spread of a pandemic, the impact of mental health for such measures is yet unknown. In this cross-sectional study, we investigated the impact on mental health among different age groups due to social isolation during the ongoing COVID-19 pandemic in Dhaka, Bangladesh.

Methods: We conducted a carefully designed cross sectional survey on mental health that was disseminated widely by way of email, personal contact and social media to subjects aged between 11 and >70 years. For our analysis we stratified data into three distinct groups: children/young adults (11-40), middle age (40-60) and older adult age (> 60) groups. 3214 respondents answered the survey. Bonferroni corrected Chi-square tests were used to find significant relationships between the demographic groups and mental health related variables.

Results: We observed a high percentage of insomnia (79%) in old age respondents compared to children/young adults (61%) and middle age (66%) groups, suggesting that 'age' is significantly associated ($p= 3.8 \times 10^{-06}$; odds ratio (OR) = 2.34) with 'insomnia'. Respondents who were retired also reported a higher prevalence (73%) of insomnia ($p = 2.79 \times 10^{-8}$) compare to employed individuals. A higher level of mental stress (84%) was observed in middle aged respondents followed by old adult (71%) respondents ($p=0.001$). Significantly higher rates ($p = 5.08 \times 10^{-27}$; OR = 2.06) of mental stress were detected in people with preexisting comorbidities compared with the healthy group. The old age participants were less familiar with the concept of social isolation and 54% of old age participants had a negative perception towards social isolation compared to children/young adults (12%) and middle-aged (7%) respondents.

Conclusion: Our results indicate an association between age and mental stress concomitant on the COVID-19 social isolation policy in Bangladesh. Social isolation increased insomnia and mental stress, particularly in old age and middle age group. Moreover, these older age groups also tended to have a negative perception of the COVID-19 isolation policy. Therefore, providing mental healthcare services and policy related education in developing countries should target these older age groups to ensure maintenance of their mental wellbeing and adherence to safe practice.

1 Introduction

The outbreak of SARS-CoV-2 from the Hubei province, Wuhan, China, has now affected the entire world with over 135 million confirmed cases and approximately 3 million deaths (1, 2). Following the outbreak, The World Health Organization (WHO) characterized this spread as a pandemic on the 11th March 2020(3). At the beginning of the pandemic, several containment measures had been taken by many countries to contain viral shedding and to slow down the spread of this transmissible disease. Since no preventive treatment or established vaccine was available at that time, a social isolation strategy was

adopted by almost all countries across the globe to stop the transmission. The term isolation refers to a full or partial closure of public/private institutions, to minimize close proximity human interactions.

Bangladesh reported the first confirmed COVID-19 case on 8th March 2020(4). The country observed a slow increase in COVID-19 cases and death toll. As a mitigation policy, the Govt. of Bangladesh restricted the regular movement or gathering of people to minimize viral shedding. While mitigating transmission of the virus and COVID-19 was the principal concern, mental health aspects of the pandemic have received relatively little attention. According to the WHO, anxiety and distress are expected to increase among people as a natural psychological consequence of the challenging condition brought about by the pandemic(5). Studies have shown that low mood, irritability and insomnia can also be precipitated by isolation(6). As expected, therefore, high levels of anxiety have been reported globally during the COVID-19 outbreak(7). Moreover, the increase in psychological distress is highly correlated with the rapid spread of SARS-CoV-2 infection and its associated mortality(8).

Although it was reported that people in isolation may experience mental symptoms(9), it may be compounded by uncertainty, clearly another characteristic of the pandemic on a global level. (10). which can vary according to the age, sex or medical comorbidities. Studies have also shown that older people are susceptible to frequent symptoms of insomnia(11), anxiety or depression(12) during any type of isolation. These are of particular concern among older people, who, as a group, experience disproportionate physical health problems such as heart disease, diabetes, and hypertension.(13–16) COVID patients who are above 55 years have three times the mortality rate (17) and 20 percent of deaths occurred in patients above 60 years of age (18). In addition, compare to other age groups, the mortality is 6 times greater for patients above 80 years of age(19). Likewise in Bangladesh 44 percent of fatality cases are above 60 years of age(20) although the young people were more infected(21).

Several studies have demonstrated the impact of lockdown related isolation on mental health during COVID-19 outbreak in different countries(22, 23). These studies have helped national-level policy development, such as undertaking the necessary steps to minimize mental health complications such as depression and suicide. A recent study has altered to the real possibility of COVID-19 related suicide in Bangladesh(24). However, a systematic study of the mental health impact of COVID-19 on a large representative sample of individuals across different socio-demographic groups has not been investigated in Bangladesh or, indeed, in other developing countries. The aim of this study is to identify the impact of social isolation on mental health among different socio-demographic groups in Bangladesh.

2 Methods

Study Design

The study was approved by the Institutional Review Board (IRB) of North South University (2020/OR-NSU/IRB-No.0701). We conducted an online survey from 18th April to 20th May 2020 among the

Bangladeshi population. An anonymous online questionnaire form was sent through social media (Facebook) to people of all groups population (aged 11 to > 70 years) inside and outside Dhaka in Bangladesh. Based on COVID severity, mortality and considering life expectancy, these people were further categorized in three different classes: below 40, 40–60 and above 60 years of age. Partially completed forms were excluded such that only people who answered all questions were included in the analysis.

Construction of the Questionnaire

We developed a questionnaire to assess mental wellbeing during social isolation due to COVID-19. A structured questionnaire comprising 21 questions was used in this study (Supplementary Table 1). For privacy and anonymity, during the construction of the questions, we have not used any variables (name, phone number, ID, address etc.) that can be used to identify the participants. The questionnaire included a wide variety of demographic variables such as age, gender, occupation, income, urban versus rural location, comorbidity and questions related to activity, quarantine knowledge, viewpoints, and the perceived impact of the quarantine on mental health. To ensure face and content validity, the questionnaire was sent to a group of expert researchers who reviewed the survey for content accuracy, clarity, and comprehensiveness. The reviewers include expert from neuropsychiatry and public health background provided feedback on the questionnaire related to mental health symptoms. In this study, 9,400 people received the Google forms and 3,214 (34.19%) respondents returned completed forms. We included the participants in the range of 11 to > 70 years of age, and requested that children who are between the age of 11 and 17 complete the questionnaire with their parent's assistance. Participants who partially filled the forms were excluded from this study. The participants were categorized into three age groups: 'children/young adults' (11–40 years), 'middle age' (40–60 years) and 'older adult' (above 60 years). These age groups are based upon known severity of sCOVID-19 symptoms.

Statistical Analysis

Summary statistics, plots and association tests were performed using R packages. For each socio-demographic group, we quantified the baseline summary statistics. Association test was performed between participant response and participant groups for the same question. We have not conducted association tests between variables obtained from two independent questions. We analyzed the data by using the Chi-square (χ^2) test to explore the association between participant demographic and mental wellbeing related variables, with appropriate Bonferroni correction applied to the significance threshold.

3 Results

Socio-demographic profile and the clinical characteristics of the participants

The socio-demographic profile and the clinical characteristics of the respondents have been presented in Table 1a. 76% (2449), 16% (524) and 7% (241) respondents were within the '11–40', '40–60' and 'above 60' age ranges, respectively. Among all respondents, 58.5% (1,880) were male and 41.5% (1,333) were female. 61.3% and 37.8% of participants live in urban versus rural setting, respectively. The vocational characteristics included 46.4% (1,491) students, 34.9% (1,122) employed individual, 14.4% (462) private business and 4.3% (138) retirees. Among all the participants 31.3 % (1,006) were familiar with the word "Quarantine". 89.1% (2,863) respondents thought that quarantine could be one of the promising ways to fight against COVID-19 and 61.3% (1970) respondents agreed that quarantine might increase the social communication gap. Out of 3,214 respondents, 25.6% (823), 20.1% (643) and 51.4% (1652) reported anger, fear and anxiety & depression, respectively. 59.9% (1,925) of respondents reported having trouble in decision making during quarantine and 58.6% (1,883) of respondents were fearful about the risks associated with returning to normal life after quarantine. 82.8% (2,661) of respondents thought that quarantine hampered their daily activities, whilst 62.4% (2006) reported having difficulty sleeping and 76.9% (2,472) reported experiencing mental symptoms during the social isolation period.

Table 1a

Socio-demographic and clinical characteristics of the sample (N = 3214).

Age groups

11-20 – 6.8 %

21-30 – 54.4 %

31-40 – 15.1 %

41-50 – 6.9 %

51-60 – 9.3 %

61-70 – 5.6 %

Above 70 – 1.3 %

Gender

Female – 41.5 %

Occupation

Student – 46.4 %

Service holder – 34.9 %

Business – 14.4 %

Retired – 4.3 %

Familiar with word 'Quarantine' – 31.3 %

Think that quarantine can help to fight against COVID-19 – 89.1 %

Think that quarantine is increasing the social communication gap – 61.3 %

Problem commonly being faced during Quarantine

Anger and mood swing – 25.6 %

Fear or Panic – 20.1 %

Anxiety and Depression – 51.4 %

Health related risk

Diabetes – 7.6 %

Respiratory dysfunction – 4.3 %

Kidney disorder – 1.6 %

Mental disorder – 7.0 %

Hypertension – 16 %

None – 62.5 %

Working from home in quarantine – 51.3 %

Problems in decision making in quarantine – 59.9 %
Can easily come back to the normal life after Quarantine – 58.6 %
Think that quarantine time should be extended – 66.7 %
Think that quarantine life hampers daily life – 82.8 %
Facing insomnia (sleep disorder) during Quarantine – 62.4 %
Mental stress during Quarantine – 76.9 %
Location
Inside Dhaka – 61.3 %
Outside Dhaka – 37.8 %

Social Isolation and Insomnia

Out of three groups, insomnia was reported by 61% (1487), 66% (345) and 79% (172) of children/young adults, middle age and older adult groups, respectively (Fig. 1A). The more frequent reporting insomnia is significantly correlated with older age ($\chi^2 = 29.7$; $p = 3.88 \times 10^{-6}$; odds ratio (OR) = 2.34) (Table 1b) who suffered insomnia 2.3 times higher compared to the children/young adult group. Due to the known association between insomnia and mental symptoms (25, 26), we studied the prevalence of mental symptoms in the three age groups and observed 77% (1882/2440), 84% (434/517) and 70% (154/218) of children/young adults, middle age and older adult groups, respectively, reported experiencing mental wellbeing due to social isolation (Fig. 1A-B). A significant ($\chi^2 = 18.4$; $p = 0.001$) increase (1.5 times) of mental wellbeing was observed in middle age participants compared to the children/young age group. A similar age-related trend was observed between the groups in experiencing difficulties in decision making in their daily activities (Fig. 1C).

Table 1b

Age-dependent and gender-dependent association study data.

Category	Question addressed	Age-dependent		Gender-dependent	
		Corrected (Bonferroni) p-value	X ² value	Corrected (Bonferroni) p-value	X ² value
MENTAL STRESS	Do you find any problems in decision and thinking during Quarantine?	1	1.29	0.23474	5.30
	Do you face insomnia (sleep disorder) during Quarantine life?	3.88 X 10 ⁻⁰⁶	29.71	1	1.76
	Do you face mental stress during Quarantine life?	0.0011	18.40	0.98758	2.87
VIEW POINT	Do you think that Quarantine can help to fight against COVID-19?	5.90 X 10 ⁻¹⁰¹	466.36	1	1.22
	Do you think that Quarantine increases the social communication gap?	0.014	13.31	1	1.95
	Do you think you can easily come back to the normal life after Quarantine?	1.23 X 10 ⁻¹²	59.64	1	0.01
	Do you think Quarantine time should be extended?	5.33 X 10 ⁻¹⁹	88.94	0.089	7.00
	Do you think quarantine life hampers your daily life?	1.29 X 10 ⁻⁰⁷	36.52	6.00 X 10 ⁻⁰⁶	25.09
KNOWLEDGE	Have you been familiar with the word 'Quarantine' previously?	2.50 X 10 ⁻¹⁸	85.85	0.002	13.60
<p>X²- analysis was used to calculate the p-values for the highest and the lowest number of respondents witnessed among the three groups – Children & young adults, middle aged and old respondents in case of age-dependent data analysis and distribution between male and female respondents in case of gender-dependent data. The p-values were corrected using the Bonferroni correction method.</p>					

We next categorized the self-reported mental distress into three symptom clusters, a) anger and irritability, b) anxiety and depression and c) fear and panic. Children/young age group reported (29%) experiencing the most anger and irritability compared to other age groups (18% and 7% for middle age and older adult groups, respectively) (Fig. 2). The older age group reported (62%) experiencing the highest rates of anxiety and depression compared to the other age groups (51% and 50% for children/young adult and middle age group, respectively). Finally, the middle age group reported (30%) experiencing the highest rate of fear and panic compared to the other age groups (17% and 29% for children/young and older adult group, respectively) (Fig. 2).

Regarding comorbidities, 77% participants reported no comorbidities, whereas 8%, 16%, 2%, 7%, and 4% participants have diabetes, hypertension, renal impairments, mental health symptoms (fear or panic disorder), and respiratory dysfunction, respectively (Table 1a; Supplementary Fig. 1–2). Among the comorbid condition participants, 80% (191/239) with diabetes, 87% (442/510) with hypertension, 88% (46/52) with renal impairments, 78% (108/138) people with respiratory dysfunction reported mental wellbeing during this COVID-19 related social isolation (Supplementary Fig. 2). Mental stress is significant high ($\chi^2 = 56.51$; $p = 5.08 \times 10^{-27}$) in participants with any kind of disorder in comparison with the control group (absence of disorders) (Supplementary Fig. 2). People with any kind of health related risk reported 2 times higher (OR 2.06) mental wellbeing than the control group.

We next examined the occurrence of insomnia in relation to vocation. We found that retired individuals reported higher rates of insomnia (72%) compared to students or those in active employment (Supplementary Fig. 3). ($\chi^2 = 36.17$; $p = 2.79 \times 10^{-8}$). The prevalence of mental health symptoms was higher among the participants who ran businesses ($\chi^2 = 11.67$; $p = 0.005$) compared with other groups (Supplementary Fig. 3–4). Prevalence of insomnia among different income groups suggests a correlation between income level and insomnia (Supplementary Fig. 5–6). We also observed participants who live in an urban setting reported a significantly ($\chi^2 = 21.623$; $p = 0.000006$) higher incidence of insomnia compared to their rural counterparts. Additionally, mental symptoms were 1.30 times higher among those living in Dhaka. Next, we analyzed the sleeping time duration among in different aged groups. Consistent with our insomnia association, old adult group showed a reduced sleep duration (3–4 hours) compared to other groups ($\chi^2 = 392.7$; $p = 3.7016 \times 10^{-77}$) (Supplementary Fig. 9).

Correlation of Age with the COVID-19 Social Isolation

We asked respondents whether they felt that social isolation was a helpful strategy to protect against COVID-19 transmission (Fig. 3 and Table 1b). 93% (2,277/2,443) of children/young adults, 88% (456/520) of middle aged and 46% (100/219) old adult respondents agreed with the social isolation strategy (Fig. 3A). In comparison between the three groups the older adult participants showed (16.3 times) a more negative perception regarding social isolation strategy. The same group of participants were less favorable of social isolation and more fearful of coming back to normal life. In contrast children/young adults were the most enthusiastic (63%) regarding going back to normal life as well as being equally comfortable extending (72%) the social isolation if required (Fig. 3D-E). Finally, the children/young aged group were also the most knowledgeable regarding the COVID-19 policies.

Gender association with COVID-19 related social isolation

On the whole there were no gender differences across all questionnaire items, with the exception of daily living impact ($\chi^2 = 25.095$; $p = 5.4 \times 10^{-07}$) (Fig. 4 and Supplementary Fig. 10) indicating that perception about daily life along with quarantine might gender wise.

4 Discussion

To our knowledge, this is the first study conducted in Bangladesh to examine the impact of the COVID-19 pandemic on the mental health of a large group of individuals. In particular, it examined the effect of social isolation on mental distress and insomnia. Social isolation is known to be associated with insomnia(29) and other psychological symptoms, including anger and irritability,, anxiety and depression(14, 30, 31) Our findings of high rates of insomnia are consistent with similar studies conducted during other infectious outbreaks(6, 32). Our findings also reported a more severe impact on the mental health and well-being of older respondents. Similarly, the older age group reported a higher prevalence of decision making difficulties.. Such cognitive difficulties are known to be related to insomnia due to the impact of sleep deprivation on cognitive acuity (27).

The consistency of our results in relation to the association of both insomnia and mental health symptoms in older age is perhaps unsurprising. In general terms, the rates of physical and mental health symptoms are known to be significantly higher in this group. The social isolation, therefore, will have merely compounded this existing tendency to mental health symptoms, including insomnia. Anxiety is a key risk factor for insomnia, with the relationship between the two also echoed in our own results. Indeed, the older age group also reported greater difficulties with decision making, another key indicator of raised levels of anxiety. It is interesting that the older age group also had a more negative attitude towards lockdown, presumably reflecting, in part at least, that the younger age groups were better informed about policies, and better able to understand the rationale. Of course, a negative attitude towards social isolation may also reflect their insight into the impact of lockdown on their mental wellbeing. We also found that people living in urban Dhaka reported higher rates of insomnia compare to those living in other areas. This is very likely secondary to anxiety about risk of spread in the more densely populated areas.

Clearly our results have policy implications, both in terms of the need to more closely monitor mental health symptoms among the older population during the current and possible future lockdowns, as well as the need to more fully inform this group about the reasons for lockdown and time scale to allay their anxiety. There may be a need, for example, for a public health initiative that targets the older sector of society so that they understand the policy and, importantly, have the opportunity to ask questions about it.

There are inherent limitations in cross sectional based survey data. For example, we were unable to cover the full gamut of mental health symptoms to avoid a burdensome questionnaire. Moreover, the wording of questions may have been misunderstood, and ideally the responses would be corroborated by interview or follow up. Clearly, with the numbers included in this study such an undertaking would be very challenging. We did seek consultation from experts in the design of our questionnaire, however, and therefore believe that we have captured the most important symptoms in a reliable and valid manner. Another key issue is the generalizability of our results, given that our contact methods did not necessarily capture all sectors of society. We do believe that urban Dhaka was well-represented among respondents,

for example, but we are uncertain how generalizable our results are to the rest of the country. A survey capturing data from rural groups in a country such as Bangladesh is very challenging, however. In summary, therefore, our analysis indicates that older adults in Bangladesh experience greater mental health issues due to social isolation.. Policymakers should take into account how to best provide a comprehensive strategy to monitor mental health and offer counseling and education. Conflict of Interest

Declarations

Ethics approval and consent to participate

The study was approved by the Institutional Review Board (IRB) of North South University (2020/OR-NSU/IRB-No.0701). All methods were carried out in accordance with relevant guidelines and regulations of the North South University, Bangladesh. Informed consent was obtained from all the participants within the survey questionnaire to participate in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Funding

This project is funded by Department of Pharmaceutical Sciences, School of Health & Life Sciences, North South University, Dhaka, Bangladesh; and Sandoq Al Watan, College of Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai, UAE. The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Authors' contributions

HMR and MU conceived the idea. MAR, TM, AR, MH, BB, HA, TBE, MOF, ES, MWS, MG, HMR and MU participated in data collection. MAR, TR and MU designed and conducted necessary analysis. MAR, TR, MWS, HMR and MU wrote the manuscript and all authors reviewed and approved the manuscript.

Acknowledgements

Not applicable.

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Figures

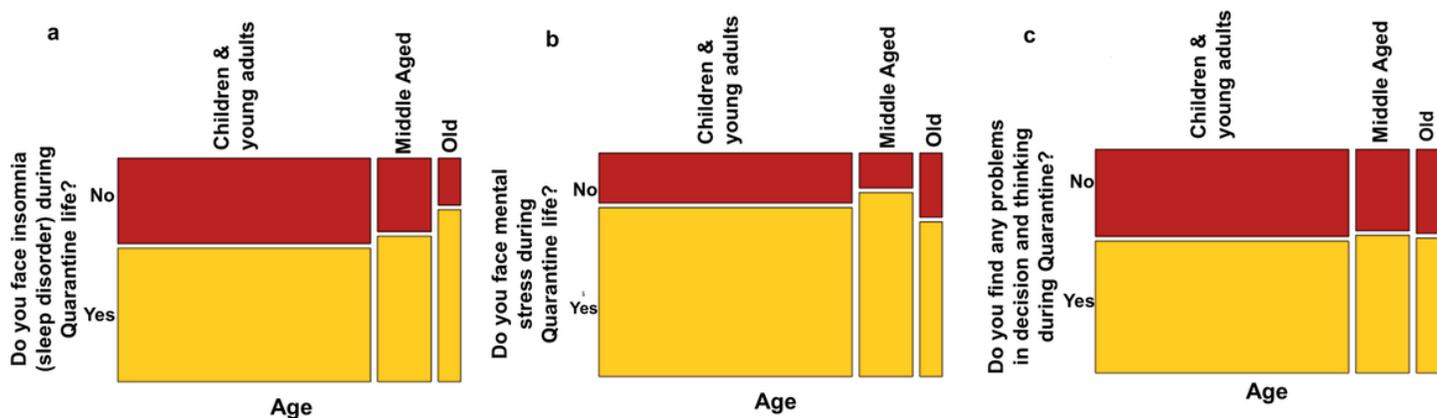


Figure 1

Mosaic plot illustrating the effect of COVID-19 quarantine on the mental health of the respondents with respect to their age. (A) Relation between COVID-19 quarantine and sleep disorder among children and young adults, middle age and old population. (B) Impact of quarantine on mental stress among the respondents. (C) Effect of social isolation on the decision making and thinking capabilities of the children and young adults, middle age and old respondents. The plot was built using R where area of boxes of the plot are proportional to the number of respondents belonging to each group. 'Age' is defined on the x-axis and 'response' on the y-axis, where 'no' is color-coded in red and 'yes' is color-coded in yellow.

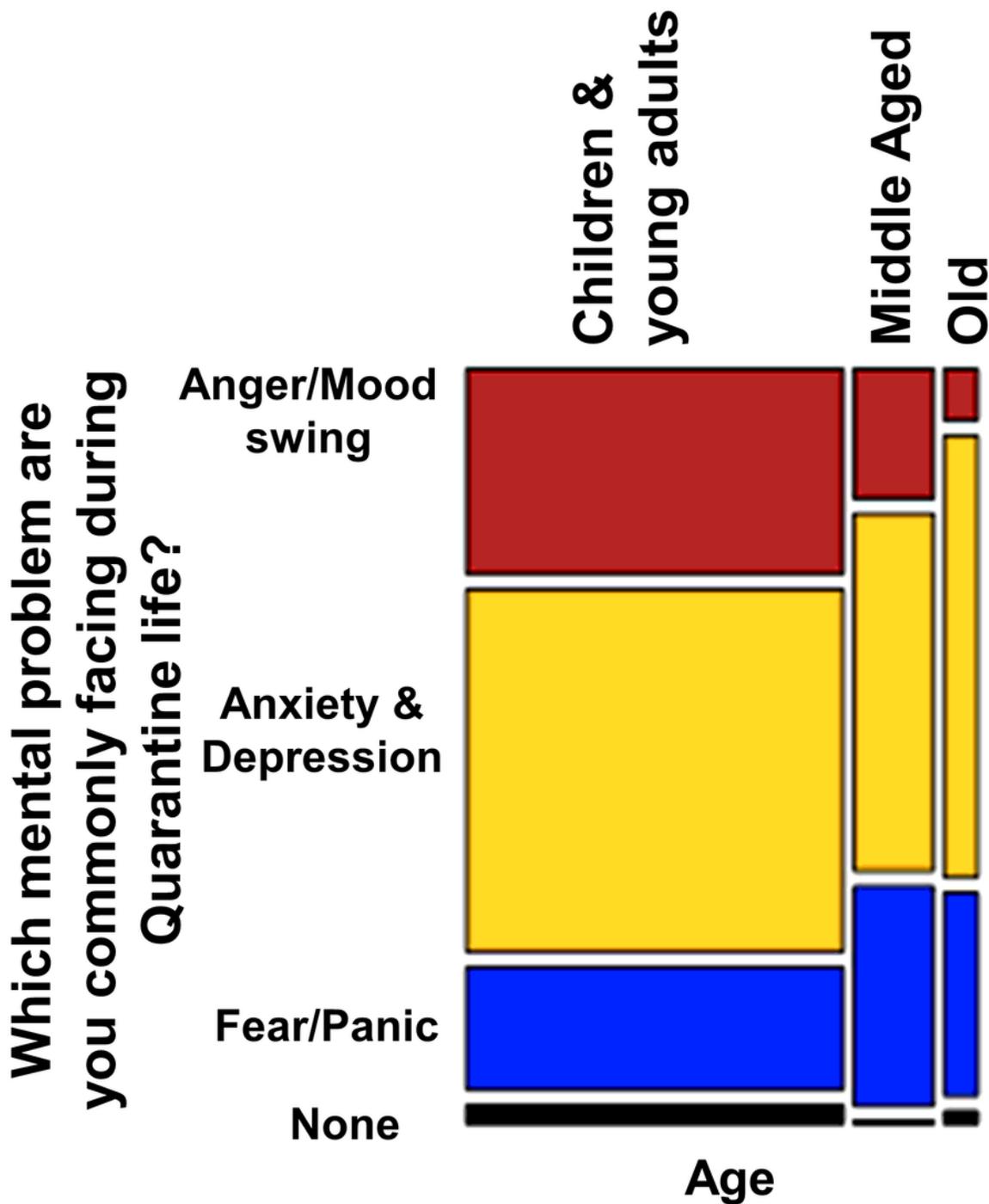


Figure 2

Impact of COVID-19 quarantine on the type of psychological problem faced by children and young adults, middle age and old population. The mosaic plot was built using R where area of boxes of the plot are proportional to the number of respondents belonging to each group. 'Age' is defined on the x-axis and 'type of associated problem' on the y-axis. Anger or Mood Swing, Fear or Panic, Anxiety and Depression, None are color coded in red, yellow, blue and black, respectively.

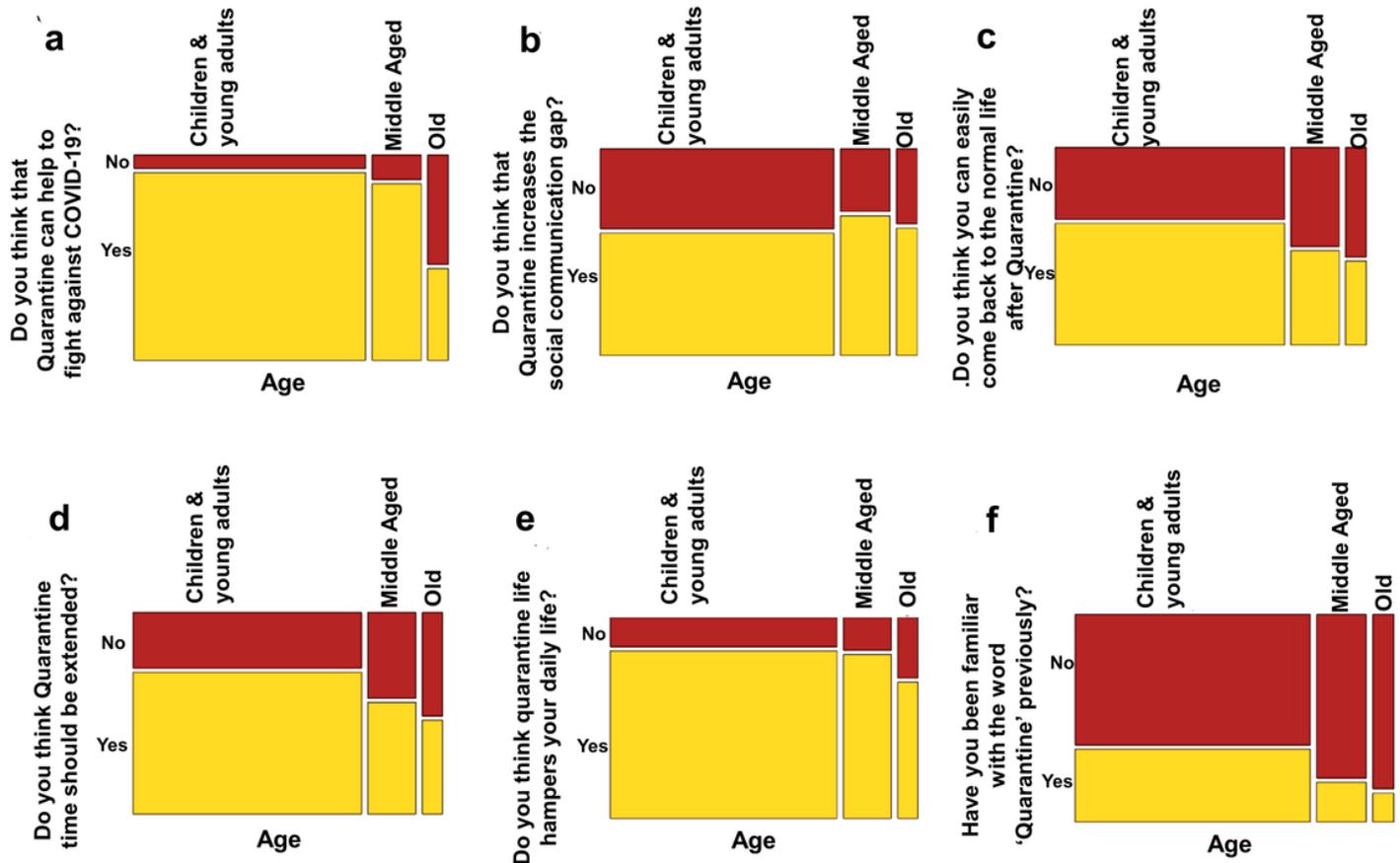


Figure 3

Overall outlook towards COVID-19 quarantine of the children and young adults, middle age and old population. Age-wise respondent's view regarding (A) the positive effect of quarantine for impeding the spread of COVID-19. (B) the correlation between communication gap and quarantine (C) reverting back to normal life after finishing the social isolation period (D) extending the duration of mandatory quarantine (E) the negative effect of quarantine on day-to-day activities and (F) prior familiarity with the term 'quarantine'. The mosaic plot was built using R where area of boxes of the plot are proportional to the number of respondents belonging to each group. 'Age' is defined on the x-axis and 'yes/no response' on the y-axis.

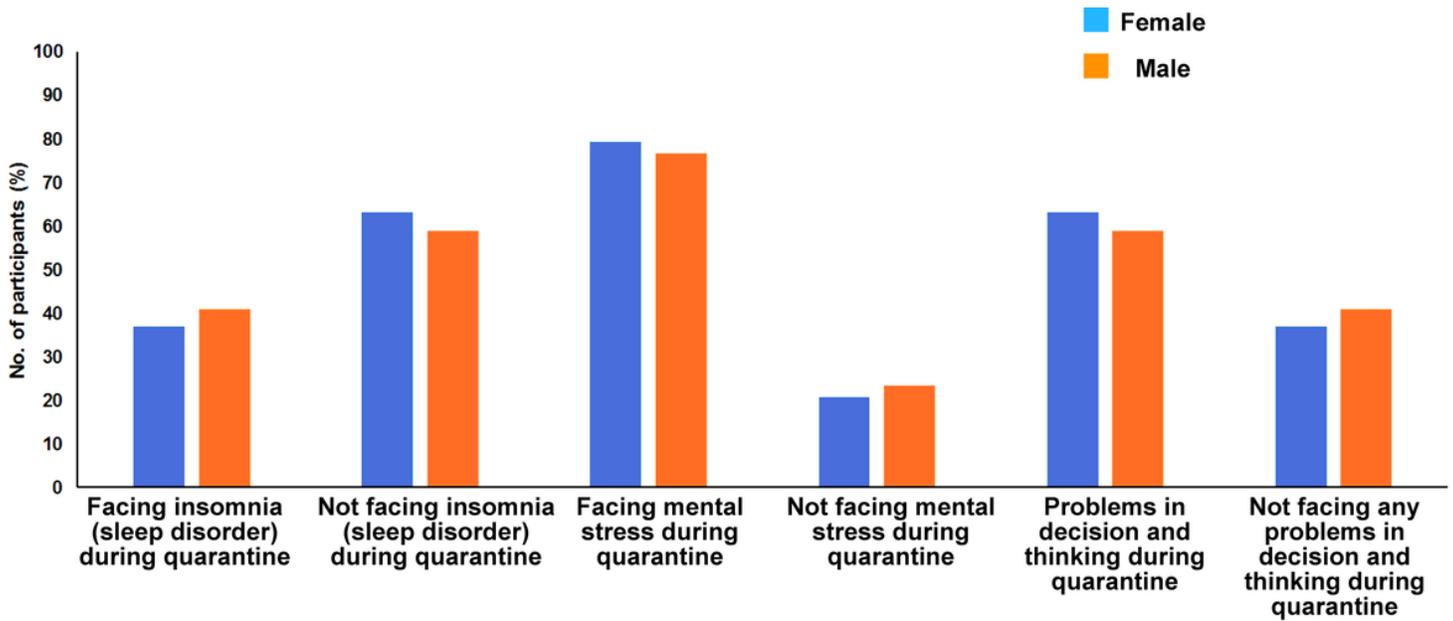


Figure 4

Mosaic plot illustrating the effect of COVID-19 quarantine on the mental health of the respondents with respect to gender. (A) Histogram illustrating the effect of COVID-19 quarantine on the mental health of the respondents with respect to gender. Relation between COVID-19 quarantine and sleep disorder, its impact on mental stress and its effect on the decision making and thinking capabilities of the female and male respondents is depicted in the plot.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryMaterial.docx](#)