Investigating the Impact of COVID-19 on Psychological Health of University Students in UAE and their Attitudes Towards m-Mental Health Solutions: A Questionnaire Study

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Abstract

Background: The COVID-19 outbreak started in the 31 December 2019, and was officially declared a public health emergency of international concern by the world health organization on the 30 of January 2020. The outbreak and the safety measures taken to control it, caused many global psychological issues like depression, anxiety, and stress.

Objective: The objectives of this study are to assess the psychological effect that the COVID-19 outbreak had on university students in the United Arab Emirates (UAE), and to investigate their awareness on mobile mental care applications (apps), and their attitudes towards the use of such apps.

Methods: A self-administered online questionnaire was delivered to random students of the UAE University. Students were invited to participate via social media and mailing lists. The questionnaire constructed of two parts. The first part assessed the mental state of the participants using the 12 item General Health Questionnaire (GHQ-12). And the second part contained questions investigating the participants' awareness and attitudes towards mental care apps.

Results: also revealed a lack of awareness on mental care apps, and uncertainty of willingness to use such apps. Participants also described a list of preferred functionalities and characteristics they would like to find in mobile mental care apps. Among their suggestions: affordable price, simple design, ease of use, online therapy, communication with others with the same issues, and tracking mental status.

Conclusions: Like many groups of people around the world, university students in the UAE were also psychologically affected by the COVID-19 outbreak and the related safety measures. And even though mobile apps are an innovative tool for mental care delivery, especially in circumstances like the ones produced by the outbreak, students showed a lack of awareness and mixed attitudes towards them. Improving digital health literacy of university student in UAE by increasing their awareness of existing treatment methods and benefits offered by mental care apps, as well as involving them in the co-creation process of such apps might encourage them to use mobile apps for their mental care

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Objective: The objectives of this study are: (i) to assess the psychological effect that the lockdown caused by the COVID-19 outbreak had on university students in the United Arab Emirates (UAE); and (ii) to investigate their awareness of mobile mental care applications (apps), and their attitudes towards the use of such apps.

Methods: A self-administered online questionnaire, constructed of two parts, was delivered to students of the United Arab Emirates University. The first part of the questionnaire assessed the mental state of the participants using the 12 item General Health Questionnaire (GHQ-12), while the second part contained questions investigating the participants' awareness and attitudes towards mental care apps. Students were invited to fill out the online questionnaire via social media and mailing lists.

Results: A total of 154 students participated in the survey, with the majority being females. Results of the GHQ-12 analysis showed that the students were experiencing psychological issues related to depression and anxiety, as well as social dysfunction. Results also revealed a lack of awareness of mental care apps, and uncertainty to use such apps. Third of the participants (28.6% (44/154)) suggested a list of preferred functionalities and characteristics, which they would like to find in mobile mental care apps, such as: affordable price, simple design, ease of use, online therapy, communication with others experiencing same issues, and tracking mental status.

Conclusions: Like many groups of people around the world, university students in the United Arab Emirates were also psychologically affected by the lockdown due to the COVID-19 outbreak. Even though apps could be useful tools for mental care delivery, especially in circumstances like the ones produced by the outbreak, students showed a lack of awareness and mixed attitudes towards them. Improving digital health literacy of university student in the UAE by increasing their awareness of mental care apps and their treatment methods and benefits, as well as involving them in the co-creation process of such apps might encourage students to use them for their mental care.

Keywords: COVID-19; GHQ-12; mobile; apps; m-health; m-mental health; UAE; attitudes; university students; Questionnaire.

Introduction

The world health organization (WHO) was informed on December 31, 2019 of several cases of pneumonia from unknown causes detected in Wuhan City, China [CITATION Wor20 \l 1033]. On the 7th of January 2020, the cause was reported to be a new type of the coronavirus, referred to as (2019-nCoV) [CITATION Wor20 \l 1033]. By January 20, 2020, the virus has spread, and multiple cases were reported from four countries [CITATION Wor20 \l 1033]. On

30 January, 2020 the WHO declared the outbreak to be a public health emergency of international concern [CITATION Wor201 \l 1033]. By February 11, 2020, the virus has spread to more than 24 countries other than China, and the coronavirus disease was officially named COVID-19 [CITATION Wor202 \l 1033]. By May 2020, the virus has spread to all regions of the world[CITATION Wor203 \l 1033]. More than three million cases, and 248,847 deaths were reported worldwide as of May 04, 2020, 13:13 GMT. To limit the spread and the risk of the virus, the WHO advised people to practice social distancing and to stay at home [CITATION Wor204 \l 1033]. Countries took different safety measures and precautions against the spread. Several countries declared obligatory lockdowns, travel and airports were stopped, many work spaces, schools and universities were closed.

Lockdown related stressors like its duration, fear of infection, boredom, inadequate information [CITATION Bro20 \l 1033], as well as fear of the unknown [CITATION Lin20 \l 1033], had significant psychological effects on people, including posttraumatic stress symptoms, anger, confusion, fear, worry, sadness, and elevated anxiety and stress [CITATION Bro20 \l 1033][CITATION The20 \l 1033]. As a part of its applied precautions and safety measures to face the outbreak, the United Arab Emirates (UAE), closed its universities and stopped all related activities. To investigate the impact of the lockdown on university students in UAE, we conducted a mental health assessment test based on the 12-item General Health Questionnaire (GHQ-12). The GHQ-12 has been used in previous studies to assess the mental health of students and has shown positive reliability results. A study using the GHQ-12 to assess the psychological state of Malaysian college students affirmed that the GHQ-12 is a good tool for assessing the overall psychological well-being of students [CITATION Zul10 \l 1033]. Another study, which used the questionnaire with Australian college students, suggested that it is a viable tool with a good clinical utility, and that it can be implemented as part of routine school screening procedures to help with the identification of young people at risk of depressive and anxiety disorders [CITATION Bak11 \l 1033]. Another study used the GHQ-12 with Tehrani university students and concluded that the questionnaire is suitable for screening psychopathology in university students [CITATION Yag12 \l 1033].

Moreover, the GHQ-12's psychometric properties were investigated in several studies that yielded assertive results on its validity. The GHQ-12 was assessed against the Clinical Interview Schedule (CIS) in three primary care settings in Brazil, and was found to be acceptable and valid [CITATION Mar09 \l 1033]. The GHQ-12 was also assessed in a sample of dermatological patients, against the Skindex-29, which is a tool to evaluate the impact of skin conditions on the quality of life of the patients. Results showed that the GHQ-12 is a reliable and valid instrument [CITATION APi01 \l 1033]. Furthermore, the GHQ-12 was reported to be robust and suitable to be used as a screening instrument in a study conducted by the WHO, comparing the GHQ-28 to the GHQ-12 [CITATION Gol97 \l 1033].

Identifying the existing psychological issues is an important step, but more importantly, is delivering mental care when needed, which is currently challenging because of the applied safety measures against the spread of the COVID-19 disease. Tele-health is a method of health care delivery that, just like tele-education or telework seems to be the safest approach. Tele-health can be applied to mental care via several methods, one being mobile application (apps). Apps check all the boxes of the applied safety measures. They could provide mental care with no need for human contact, and the user can benefit from the delivered care via the app without the need to go out risking exposure to the virus. Apps could also help overcome several pre-existing barriers of mental care delivery besides the ones created by the COVID-19 outbreak, like cost problems, stigma, and distance or shortage of mental health professionals. Apps have also shown promising results in the management of many mental issues like anxiety, depression, and stress [CITATION Lip19 \l 1033][CITATION Cou16 \l 1033].

This study has two main goals. The first one is to assess the mental state of university students during the first period of the lockdown caused by COVID-19 outbreak. The second goal of the study is to investigate their awareness of mobile apps for mental care, and their willingness to use them, as well as to discover what features would they like to have in a mental care app and what would encourage them to use such apps. A two-part online questionnaire, was delivered to UAE University (UAEU) students, via social media and emails, during the first two weeks of the lockdown imposed in the UAE. The first part of the form consists of the GHQ-12 questionnaire, and the second part of the form includes questions investigating the students' attitudes towards mobile apps for mental care. The study verifies the following hypotheses: (h1) *the lockdown has an impact on the psychological state of the university students in UAE*; (h2) *university students are aware of the existence of mobile apps for mental care*; and (h3) *university students have positive attitudes towards mobile mental care apps, and are open to use such solutions*.

Methods

Research design

This study is constituted of two main parts. The objective of the first part is to assess psychological health of university students. The objective of the second part is to investigate their awareness of, and attitudes towards mobile health applications for mental health care.

Recruitment and data collection

A self-administered online questionnaire, created using Google Forms, was sent to UAEU students via social media and mailing lists. Recruiting participants through social media has been found to be effective and time efficient[CITATION Gau19 \l 1033]. The included participants were a self-selecting sample, as the participation in the survey was voluntary and participants were not offered any incentives. The questionnaire, constituted of 20 questions, was available online for two weeks starting from 15/03/2020 to 29/03/2020. Thirteen questions with predefined multiple choices, four Yes\No questions, and three open questions. None of the questions were personal questions that could reveal participants' identity. The questionnaire was tested by the authors before sending it to students. The estimated time to complete the questionnaire was 4 minutes, which was stated in the questionnaire. The questionnaire also stated that the responses will be anonymous. Prior to data collection, permission was obtained from the relevant authorities at the UAEU, and a phycologist was consulted to determine the appropriateness of the questionnaire for the target respondents. Information provided about the questionnaire is based on The Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [CITATION Eys04 \l 1033].

Survey questions

The online questionnaire contained 20 questions. The first three questions were basic questions to get information and characteristics of participants (age, gender and academic major). The rest of the questions were divided into two parts.

Part 1: GHQ-12

In this part, we used the GHQ-12 [CITATION Gol72 \l 1033] to measure the psychological health of participants. The GHQ-12 can be analyzed as a single dimension psychological health test [CITATION Cor94 \l 1033]. But many researchers have suggested that it can be divided into two or three specific and meaningful factors, each factor composed of several items from the questionnaire. Gribbin and Worsley [CITATION Wor77 \l 1033] proposed three-factor

approach: Anxiety/Depression, Social Dysfunction, and Loss of Confidence. Andrich and van Schoubroeck [CITATION And89 \l 1033] suggested that positively worded items or questions constituted one factor and negatively worded ones constituted another. Politi et al. [CITATION Pol94 \l 1033] identified two factors: general dysphoria and social dysfunction. Martin [CITATION Mar99 \l 1033] proposed three factors: Self-esteem, Stress, and Successful Coping. When compared to other methods, and applied to different samples, the three-factor model proposed by Gribbin and Worsley [CITATION Wor77 \l 1033], anxiety and depression (4 items), social dysfunction (6 items), and loss of confidence (2 items), was found to give the best fit [CITATION Mäk06 \l 1033 \m Bun02]. It was therefore the approach followed in this study.
Table 1 presents the 12 items of the GHQ-12. Table 2 presents the association between GHQ-12 items and the three psychological factors. A study by Gao et al. [CITATION Gao04 \l 1033] has shown that the loadings of the items on their associated factors are very close as they range from 0.72 to 0.9. The correlation between the three factors was also found to be very high as it ranged from 0.83 to 0.9 [CITATION Gao04 \l 1033]. Based on these results and to simplify the assessment we will be assuming that all items have the same loading on their associated factor.

Table 1. GHQ-12 items, answers, and scores

Item ID	Question	Answers	Score
Item 1	Have you recently been able to concentrate on what you are doing?	Better than usual	0
		Same as usual	1
		Less than usual	2
		Much less than usual	3
Item 2	Have you recently lost much sleep over worry?	Not at all	0
		No more than usual	1
		Rather more than usual	2
		Much more than usual	3
Item 3	Have you recently felt you were playing a useful part in things?	More so than usual	0
		Same as usual	1
		Less than usual	2
		Much less than usual	3
Item 4	Have you recently felt capable of making decisions about things?	More so than usual	0
		Same as usual	1
		Less than usual	2
		Much less than usual	3
Item 5	Have you recently felt constantly under strain?	Not at all	0
		No more than usual	1
		Rather more than usual	2
		Much more than usual	3
Item 6	Have you recently felt you couldn't overcome your difficulties?	Not at all	0
		No more than usual	1
		Rather more than usual	2
		Much more than usual	3
Item 7	Have you recently been able to enjoy your normal day-to-day activities?	More so than usual	0
		Same as usual	1
		Less so than usual	2
		Much less than usual	3
Item 8	Have you recently been able to face up to your problems?	More so than usual	0
		Same as usual	1
		Less so than usual	2
		Much less than usual	3

Item 9	Have you recently been feeling unhappy and depressed?	Not at all	0
		No more than usual	1
		Rather more than usual	2
		Much more than usual	3
Item 10	Have you recently been losing confidence in yourself?	Not at all	0
		No more than usual	1
		Rather more than usual	2
		Much more than usual	3
Item 11	Have you recently been thinking of yourself as a worthless person?	Not at all	0
		No more than usual	1
		Rather more than usual	2
		Much more than usual	3
Item 12	Have you recently been feeling reasonably happy, all things considered?	More so than usual	0
		About same as usual	1
		Less so than usual	2
		Much less than usual	3

Table 2. Association between GHQ-12 items and psychological factors.

Psychological factor	**Item ID**
Anxiety and Depression	Item 2, Item 5, Item 9, Item 6
Social dysfunction	Item 1, Item 3, Item 4, Item 8, Item 7, Item 12
Loss of confidence	Item 10, Item 11

GHQ-12 scoring

The GHQ-12 items have answers that range from a 'better/healthier than normal' option, through a 'same as usual' and a 'worse/more than usual' to a 'much worse/more than usual' option. The answers reflected the difference of the psychological health state of participants when they responded to the questionnaire and their state which they considered normal before. Answers can be scored in four different ways: GHQ scoring (0-0-1-1), C-GHQ scoring (0-0-1-1), Likert scoring (0-1-2-3), and Modified Likert scoring (0-0-1-2).

This study investigates the severity of the identified psychological issues in addition to their prevalence. The Likert scoring method was therefore the method followed in the answers scoring, as it produces a wider and smoother score distribution which helps to assess severity [CITATION GLA20 \l 1033]. Each item of the GHQ-12 has 4 possible answers scored from 0 to 3. The higher scores indicate more severe conditions. Score for each answer of the 12 items are presented in Table 1.

The answers of participants were collected then scored. Based on the maximum score of each psychological factor and the total score, the answers were categorized to represent three severity categories: normal, high and severe.

For the total score of the GHQ-12, the normal state category score ranges from 0 to 12, the high-risk category score from 13 to 24 and the severe cases from 25 to 36. For the anxiety and depression factor, the normal state score ranges from 0 to 4, the high-risk category from 5 to 8 and the severe cases from 9 to 12. For the social dysfunction factor, the normal state score ranges from 0 to 6, the high-risk from 7 to 12 and the severe cases from 13 to 18. For the loss of confidence factor, the normal state ranges from 0 to 2, the high risk includes the scores 3 and 4, and the severe cases include the scores 5 and 6.

Part 2: Awareness of and attitudes towards mobile mental health apps

The second part of the questionnaire served to investigate the knowledge of university students of mental health apps, and their opinion about the use of these apps for mental care. The questions were formulated based on questions retrieved from related literature investigating similar matters [CITATION Sre191 \l 1033][CITATION Suk191 \l 1033] [CITATION Mil191 \l 1033][CITATION Ata18 \l 1033]. The questions, shown in Table 3, were formulated mainly to:

- Know if the students have any previous knowledge or experience with mental health apps.
- Understand their willingness to consider using a mental care app.
- Understand their preferences and what could encourage them to use apps for metal care.

Table 3. Questions related to mental care apps

ID	Question
Q1	Have you ever heard of mobile mental health apps?
Q2	Have you ever used a mobile app for your mental wellbeing?
Q3	Would you be open to use a mobile app for your mental wellbeing in the future?
Q4	Would you prefer using a mobile app over consulting with a mental health care specialist?
Q4.1	If yes. Why?
Q5	What would you like to see in an app for mental health care?

Part 2 Answers

The questions Q1 and Q2 are Yes/No questions. Questions Q3 and Q4 can be answered by “Yes”, “No” or “I don’t know”. If a participant answers “Yes” to Q4, he/she is asked to provide the reason for his/her choice in Q4.1, the participant can choose from a predefined list of reasons including: “Cost problems”, “Stigma related to mental problems”, “Distance from mental care professionals”, “Shortage in mental care professionals”, “I don’t have enough knowledge (information) on mental health”, or choose the “Other” option and express his/her own reasons. Q5 is an open question. For Q5 and the “Other” option in Q4.1, answers that have the same meaning were grouped and presented in a list.

Analytic strategy

This section presents a summary of the analytic strategy followed in this study>

For the GHQ-12 items:

- Participants answered each GHQ-12 item with one of these options: 'better/healthier than normal', 'same as usual', 'worse/more than usual', or 'much worse/more than usual'.
- The collected answers were converted to numerical scores based on the Likert scoring (0-1-2-3) method.
- Scores were regrouped to investigate the psychosocial factors presented in Table 2: anxiety and depression, social dysfunction, and loss of confidence.
- A total GHQ-12 score was calculated including scores of all items.
- Total score and scores of the psychological factors were categorized into three categories: a normal state, a high-risk state, and a severe state. The higher the score, the more severe the condition is.

For mental care apps questions:

- Participants answered the questions Q1-Q4 with predefined options. The answers of Q1-Q4 were then quantified and analyzed.
- For the open questions (Q5 and the "other "option in Q4.1), participants provided short answers. The answers of these open questions were then categorized based on their meaning and presented in a list.

Results

Sample Characteristics

A total of 154 university students participated in the survey, the majority of participants were female students (73.4% (113/154)). The majority of the respondents' academic majors fall under the category of science, mathematics, and technology (57.8% (89/154)). Table 4 summarizes the main characteristics of the participants.

Table 4. Participants' characteristics

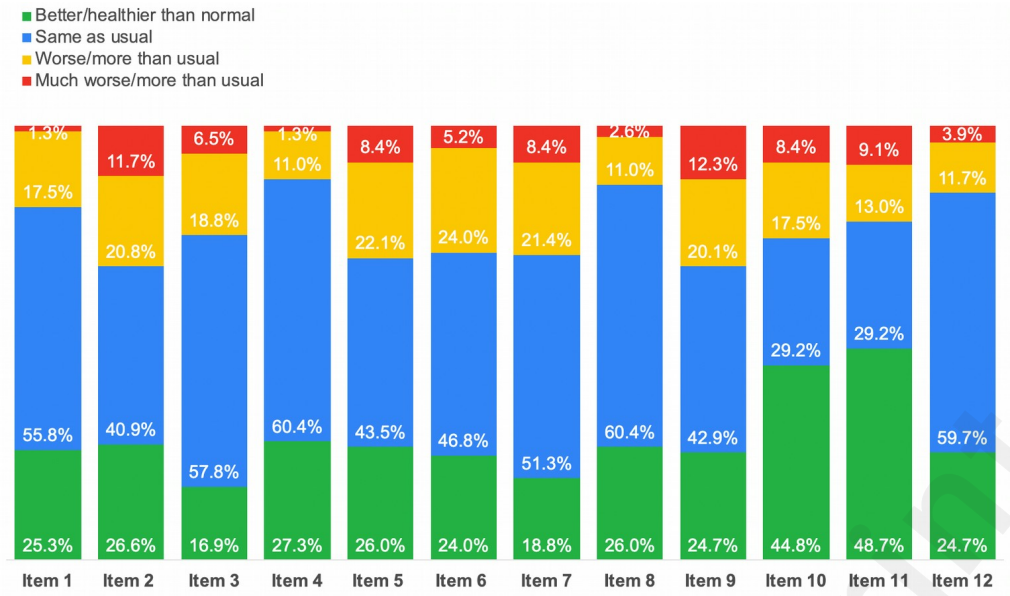
Variables	Total	%
Gender		
Female	113	73.4
Male	41	26.6
Age		
15-22	118	76.6
23+	36	23.4
Mean	22.45	
SD	5.87	
Academic majors' categories		
Science, Mathematics, and Technology	89	57.8
Business	24	15.6
Health and Medicine	10	6.5
Social Sciences	5	3.2
Public and Social Services	5	3.2
Other	21	13.6

Part 1 Results

Results by items

Results of items' analysis identified specific issues that the students suffered from more at the period of the survey. If an item is answered with answers indicating a better/healthier than normal or same as usual, then the issue investigated by the item is not present more than usual for the participant, but if it is answered with answers indicating worse/more than usual or much worse/more than usual, then it reflects an abnormal presence of the issue at that period. Figure 1 presents the answers to the GHQ-12 items.

Figure 1: GHQ-12 Items' answers

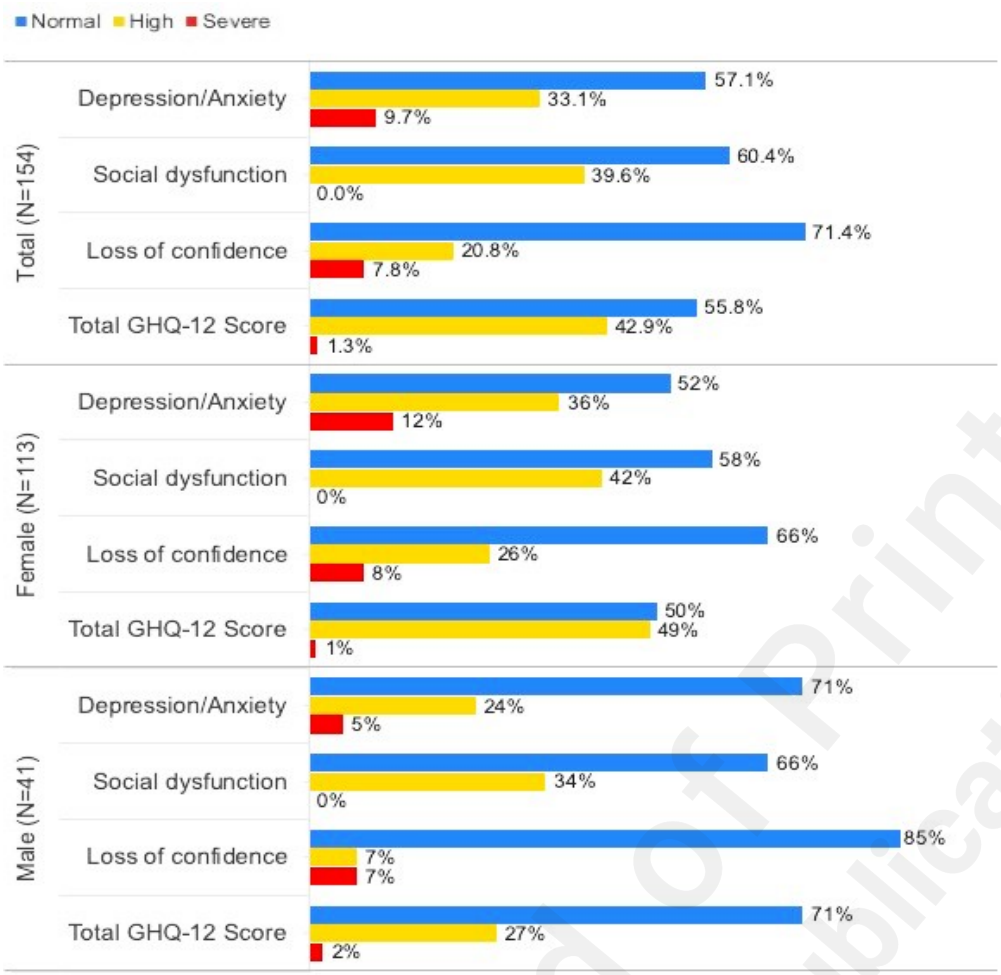


Third of participants (32.5% (50/154)) had sleep issues (Item2): 20.8% (32/154) worse than usual and 11.7% (18/154) much worse than usual. Same number of participants 32.5% (50/154) showed elevated states of feelings of unhappiness and depression (Item 9), with 20.1% (31/154) answering worse than usual and 12.3% (19/154) answering much worse than usual. Third of the participants (30.5% (47/154)) were feeling constantly under strain (Item 5), with 22.1% (34/154) answering worse than usual and 8.4% (13/154) answering much worse than usual. Capability of making decisions and facing problems (Items 4 and 8), were issues where participants showed the least elevated states: 12.3% (19/154) and 13.6% (21/154) respectively.

Total Score and psychological factors

Analysis by total score and scores of each psychological factor gives a general idea about the student's mental state, and mental issues that they are more susceptible to. Figure 2 presents severity categories of each psychological factor, as well as for the total score of the GHQ-12. It also presents a classification by gender for each category.

Figure 2: Classification of answers by severity category



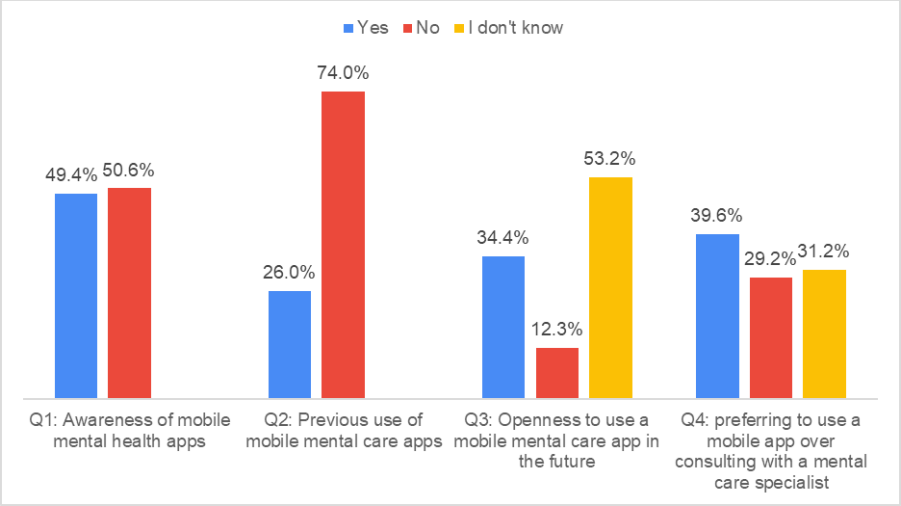
More than the third of participants (42.9% (66/154)) had high scores indicating a high risk of having mental issues and a few participants (1.3% (2/154)) had very high scores and were classified as severe cases. Participants seem to have mainly issues related to depression and anxiety.

Part 2 Results

Answers to the questions

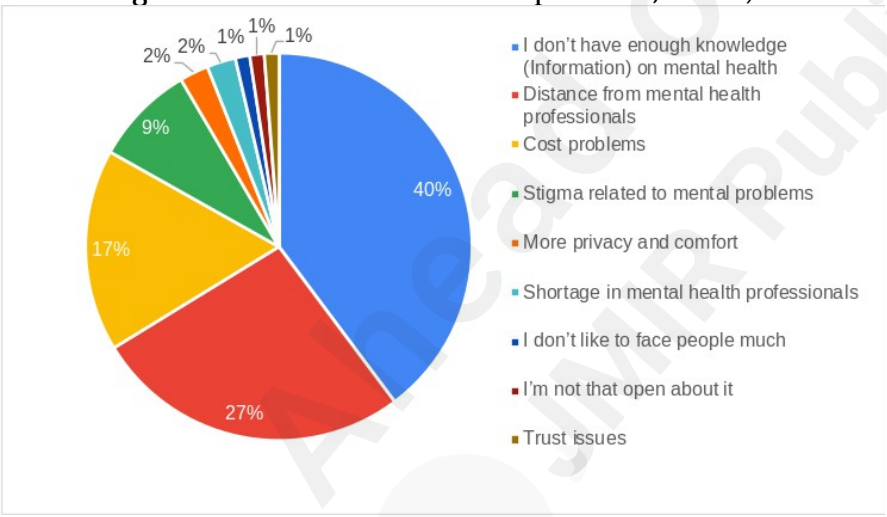
Figure 3 presents responses to the questions Q1-Q4 related to mental care apps.

Figure 3: Answers of questions Q1, Q2, Q3 and Q4



Half of participants (50.6% (78/154)) have never heard of mental care apps before (Q1). The majority of participants (74.0% (114/154)) have never used an app for mental care before (Q2). More than half of participants (53.2% (82/154)) showed uncertainty of willingness to use such apps in the future (Q3). 83 participants justified their answers "Yes" or "I don't know" to Q4 by reasons shown in Figure 4.

Figure 4: Answers to Q4.1(Participants' reasons to preferring the use of a mobile app over consulting with a mental health care specialist, N=83)



To identify what features would the students need or prefer in mental care apps, the participants were asked an open question (Q5) about what would they like to see in an app for mental care. Almost third of participants (28.6% (44/154)) answered the open question Q5 with functionality and characteristics they think mental care apps should have. Their answers were grouped and presented below.

- Functionality:
  - Online therapy
  - Communication with others experiencing same issues
  - Tracking mental status
  - Advice from specialists
  - Motivational statements
  - Educational content
  - Games
  - Recommendations of activities and tips

  - General health management
  - Emergency features
  - Tracking progress
  - Stories
- Characteristics:
  - Anonymity
  - Simple design and ease of use
  - Affordable price
  - Diversity of features

Association between the answers

Figure 5 shows the association between participants' previous use of apps for mental care (Q2), and their willingness to use them in the future (Q3).

Figure 5: Association between answers of Q2 and Q3

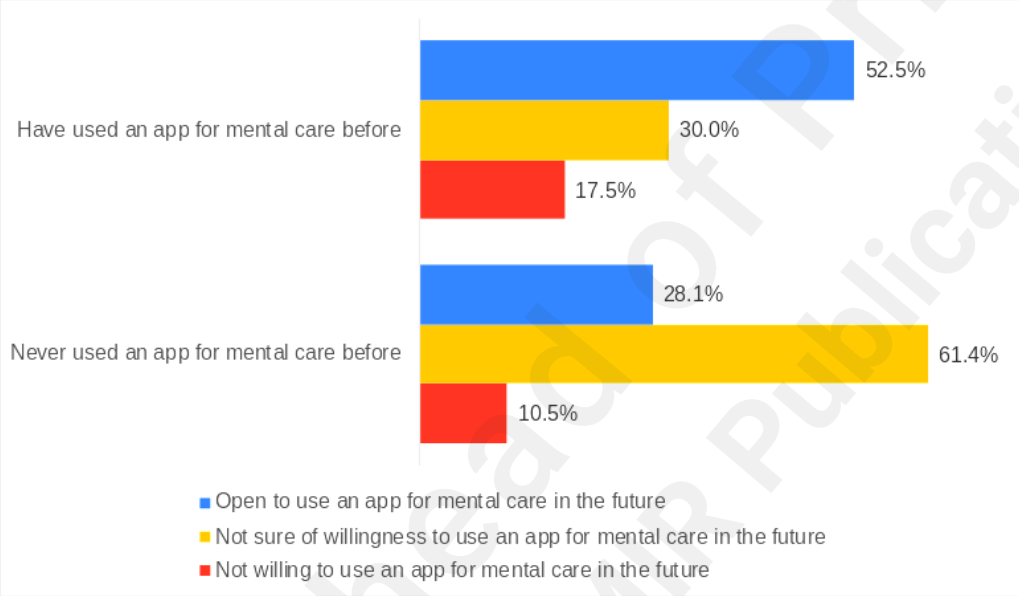
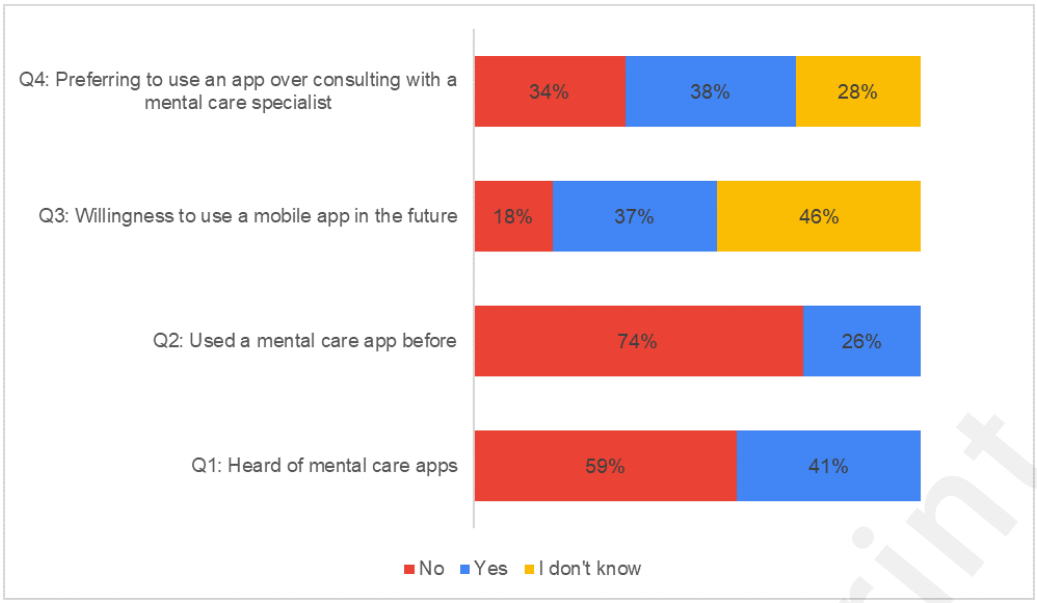


Figure 6 presents answers of participants that scored high in Part 1 of the questionnaire as regards questions Q1-Q4.

Figure 6: Answers of participants that showed high risk and severe cases in the GHQ-12 total scores (N=68)



Discussion

Main findings

Results of Part 1 of our questionnaire showed that more than the third of participants (42.9% (66/154)) are experiencing psychological health issues associated with anxiety and depression. The most reported issues related to anxiety and depression were: sleep problems, feelings of unhappiness, depression, and being constantly under strain. Given the period of the survey, those results can be linked to the measures taken by universities in UAE due to COVID-19 situation. The questionnaire was available online after universities were officially closed for students for two weeks and lectures were given online. Students had to adjust to new circumstances and lifestyles, and face the ambiguity of what will happen next concerning their education and future. Those findings are consistent with other studies conducted in other countries to analyze psychological impact of the COVID-19 pandemic. Several studies showed that anxiety, depression, sleep issues [CITATION Hua20 \l 1033], and stress [CITATION Wan20 \l 1033] are the most psychological issues caused by the outbreak.

Many students also showed high risk towards social dysfunction issues. Items 4 and 8 are related to the capability of making decisions and capability of facing problems, respectively. The nature of these issues implies that they are mainly linked to critical and problematic cases of social dysfunction, and might be indicators of pre-existing serious problems that might not necessarily be linked to the COVID-19 lockdown. Social dysfunction issues were mainly related to the lack of enjoyment of daily activities (item 7) and lack of a sense of playing a useful part in things (item 3). This can be linked to the hold of many activities and the limitations of what students could do at and from home, due to the safety measures taken during the outbreak.

Weak correlations were found between the age of participants and the total score of the GHQ-12 (–0.101) and between the gender of participants and the total score (-0.128). This indicates that university students at any age can be psychologically influenced by the lockdown due to COVID-19. The majority of participants that have high or very high psychological factors scores are females. This could be mainly because females are more susceptible to anxiety, fear, and stress [CITATION Bhu00 \l 1033][CITATION Keo04 \l 1033][CITATION Lew98 \l 1033].

The COVID-19 outbreak has caused many psychological issues, amongst different groups of people, and with the forced safety measures, it could be difficult to consult with mental care professionals even in emergency cases. Just like distant learning as an alternative to in-school

learning was required, distant alternative solutions to mental care are also needed. Apps are convenient solutions in the current pandemic, as they provide mental care via mobile devices, which are owned by the majority of people in UAE, particularly the young generation [CITATION Sta19 \l 1033]. Apps for mental care can help also overcome some of the pre-existing mental care barriers like stigma, cost, and distance from mental care professionals and institutions [CITATION Lin13 \l 1033][CITATION And14 \l 1033]. Apps have also been reported to be effective for anxiety, stress, and depression [CITATION Lip19 \l 1033] [CITATION Cou16 \l 1033]. The results showed that the majority of the university students in UAE (50.6% (78/154)) have never heard of mobile mental care apps, and 74.0% (114/154) have never used one before. This was also reflected in their attitudes towards such solutions, as 53.2% (82/154) were not sure about their willingness to use an app for mental care in the future. Third of participants (31.2% (48/154)) were not sure if they prefer using an app over consulting with a mental care professional. These results were also persistent when analyzing answers of participants who had high or very high scores in the general score of the GHQ-12 as shown in Figure 6. These participants could be in need for such apps. The lack of knowledge and use might be because apps for the young generation are mainly associated with games, communication or other activities not related to health or mental health in particular [CITATION Sta16 \l 1033]. Searching for a mental care app might not occur to someone who is not familiar with the concept.

There is a need for digital health literacy, particularly for mental care in UAE. This can be done using social networks such as Instagram, and Twitter or via widely used websites like YouTube, as they reach a large number of people, and can help spread knowledge on available mental care apps.

Few participants (10.5% (12/114)) who have never used such apps before expressed their unwillingness to use one in the future, this might be due to the lack of knowledge or/and lack of trust in these apps. Involving mental health professionals in the design of apps for mental health could give the apps more credibility and encourage university students to be more open towards using such apps. It is noteworthy that a group of participants (17.5% (7/40)) who have used apps for their mental care before, expressed their unwillingness to use them again in the future, which might be due to poor usability and/or lack of functionality of the used apps. End-user should be involved in the co-creation of m-health apps [CITATION Ouh19 \l 1033] to improve the adoption of such solutions. Integrating gamification features in these apps can also be a solution to make the apps more enjoyable and engaging to encourage users to keep using them.

The majority of participants (70.8% (109/154)) answered “Yes” or “I don’t know” to preferring using an app over consulting with a mental care professional, they have justified their choice mainly to their lack of knowledge on mental health. Apps could be a useful mean for people to educate themselves about mental issues and to have easy access to information. Participants have also suggested providing educational content in mental care apps. It must be noted that mental care apps are not a substitution to professional care. Such apps can help in the management of certain mental issues, and deliver certain treatment methods, but reaching for professional help is imperative for treating serious mental health issues.

Stigma was amongst the expressed reasons of preferring mental care apps. Apps can provide anonymity and confidentiality when only the user can access its content, which helps overcome stigma barriers. The aforementioned listed reasons were consistent with the students’ preferred functionality and characteristics, like online therapy, advice from specialists, anonymity that help overcome stigma, and affordable price to overcome cost issues. This study’s results are consistent with results of previous studies reporting that stigma, cost and distance from mental care professionals are the main barriers to mental care delivery

[CITATION And14 \l 1033][CITATION Lin13 \l 1033]. Simple design and ease of use were amongst the suggested characteristics expressed by participants. Usable apps should be easy to use, easy to learn and provide enjoyable user experience. The aforementioned functionality and characteristics suggested by the students could be used for requirements of mental health apps for university students in UAE.

Even though mental care apps are convenient means to overcome many mental care barriers, it must be noted that for an app to be beneficial, it must ensures safety, privacy, security, and confidentiality of users' data. Available apps for mental care differ in their quality, effectiveness, and security measures. Psychological health is a sensitive subject, the user should therefore check the permissions required by these kind of apps and the treatment approaches they provide before using them.

Limitations

This study might have some limitations, such as: (i) the survey was conducted during the early stages of lockdown in the UAE, the psychological state of the students might have been changed since then, most likely to show more psychological issues; (ii) the difference in the number of participants by gender, might have affected the psychological investigation results, as the majority of participants were females, which are more susceptible to certain psychological issues. It should be noted that female students represent 81% of the entire UAEU student population [CITATION UAE19 \l 1033], which might also have impacted the results; (iii) comparing the results with a pre-lockdown investigation on the psychological state of the university students in UAE using the GHQ-12 would have improved the discussion of the results. However, to the best of our knowledge, no such investigation exists; (iv) a broader number of participants might have been included if not under the pandemic circumstances; (v) conducting semi-structured interviews could have improved the discussion of the results. However as the study was conducted at the beginning of the lockdown due to the pandemic, delivering the questions trough an online form was our best and only choice; and (vi) given that more than half of respondents were unfamiliar with mental health apps, the conclusions regarding the benefits of the use of these apps were not based on the results of the questionnaire but on previous studies investigating the effectiveness and advantages of mental care apps.

Conclusions and future work

The COVID-19 outbreak and the applied safety measures to limit its spread, have caused many global psychological issues. The psychological assessment test based on GHQ-12, conducted on university students, has shown that more than the third of participants were experiencing issues related to depression and anxiety, as well as social dysfunction, which confirms our first hypothesis. On the contrary, our second hypothesis has been found to be wrong, as the majority of students showed a lack of awareness of mental care apps. The students also showed mixed attitudes and uncertainty of willingness to use such apps, which does not support of our third hypothesis. Participants proposed characteristics and functionalities for mental care apps that could encourage them to use such apps. We encourage developers of mental health apps to consider these suggestions especially when targeting university students or the young generation. We do believe that the findings of this study might assist researchers and practitioners investigating the impact of the COVID-19 outbreak on psychological health of university students.

For future work, we intend to build on the results of this study and develop a mobile app to assist university students coping with their mental health.

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Conflicts of Interest

The authors have no conflict of interest.

Abbreviations

JMIR: Journal of Medical Internet Research
UAE: United Arab Emirates
UAEU: United Arab Emirates University

References

CITATION Wor20 \l 1033 : , [1],
CITATION Wor201 \l 1033 : , [2],
CITATION Wor202 \l 1033 : , [3],
CITATION Wor203 \l 1033 : , [4],
CITATION Wor204 \l 1033 : , [5],
CITATION Bro20 \l 1033 : , [6],
CITATION Lin20 \l 1033 : , [7],
CITATION The20 \l 1033 : , [8],
CITATION Zul10 \l 1033 : , [9],
CITATION Bak11 \l 1033 : , [10],
CITATION Yag12 \l 1033 : , [11],
CITATION Mar09 \l 1033 : , [12],
CITATION APi01 \l 1033 : , [13],
CITATION Gol97 \l 1033 : , [14],
CITATION Lip19 \l 1033 : , [15],
CITATION Cou16 \l 1033 : , [16],
CITATION Gau19 \l 1033 : , [17],
CITATION Eys04 \l 1033 : , [18],
CITATION Gol72 \l 1033 : , [19],
CITATION Cor94 \l 1033 : , [20],
CITATION Wor77 \l 1033 : , [21],
CITATION And89 \l 1033 : , [22],
CITATION Pol94 \l 1033 : , [23],
CITATION Mar99 \l 1033 : , [24],
CITATION Mäk06 \l 1033 \m Bun02: , [25, 26],
CITATION Gao04 \l 1033 : , [27],
CITATION GLA20 \l 1033 : , [28],
CITATION Sre191 \l 1033 : , [29],

CITATION Suk191 \l 1033 : , [30],
CITATION Mil191 \l 1033 : , [31],
CITATION Ata18 \l 1033 : , [32],
CITATION Hua20 \l 1033 : , [33],
CITATION Wan20 \l 1033 : , [34],
CITATION Bhu00 \l 1033 : , [35],
CITATION Keo04 \l 1033 : , [36],
CITATION Lew98 \l 1033 : , [37],
CITATION Sta19 \l 1033 : , [38],
CITATION Lin13 \l 1033 : , [39],
CITATION And14 \l 1033 : , [40],
CITATION Sta16 \l 1033 : , [41],
CITATION Ouh19 \l 1033 : , [42],
CITATION And14 \l 1033 : , [40],
CITATION Lin13 \l 1033 : , [39],
CITATION UAE19 \l 1033 : , [43],

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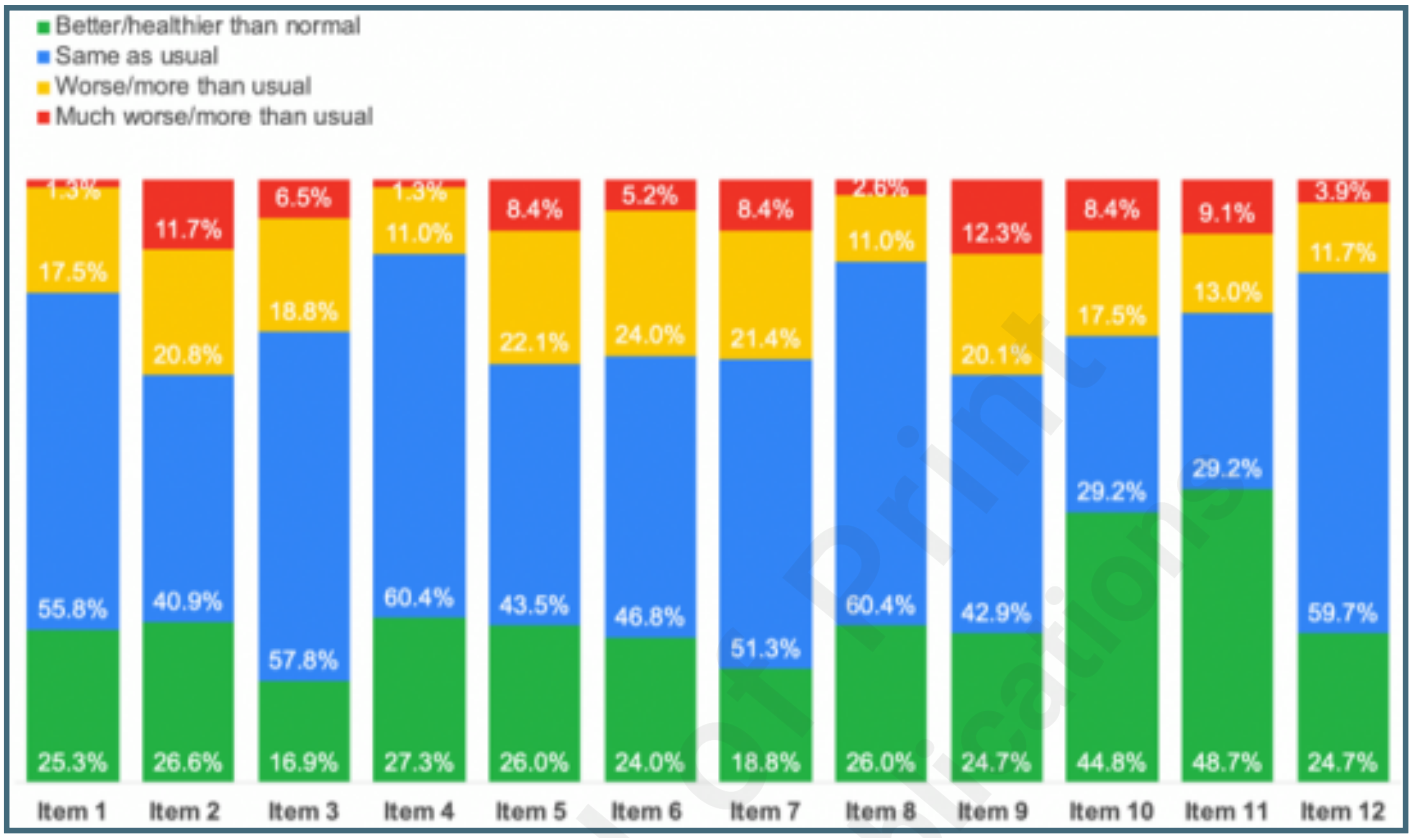
87.

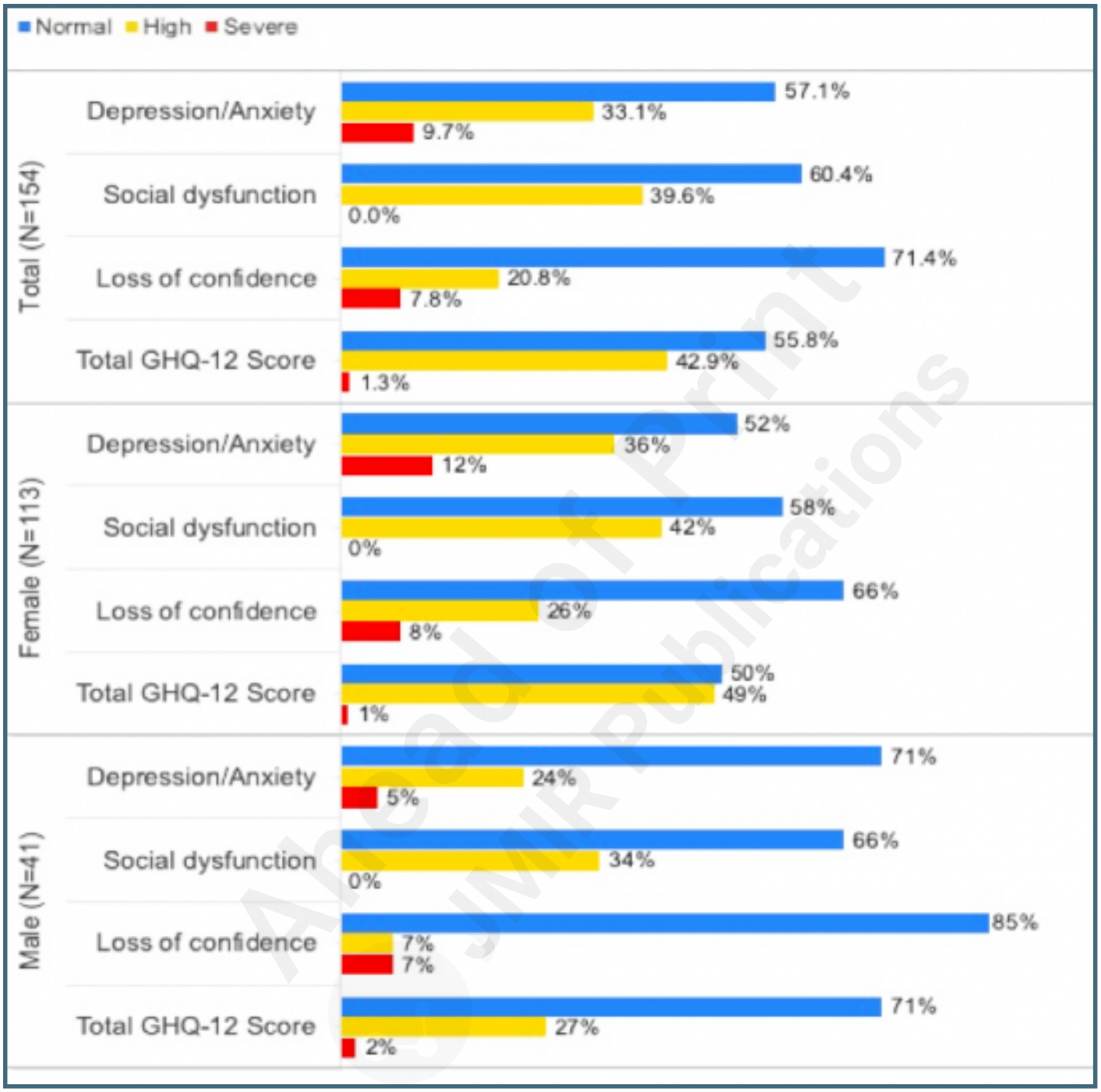
Supplementary Files

Figures

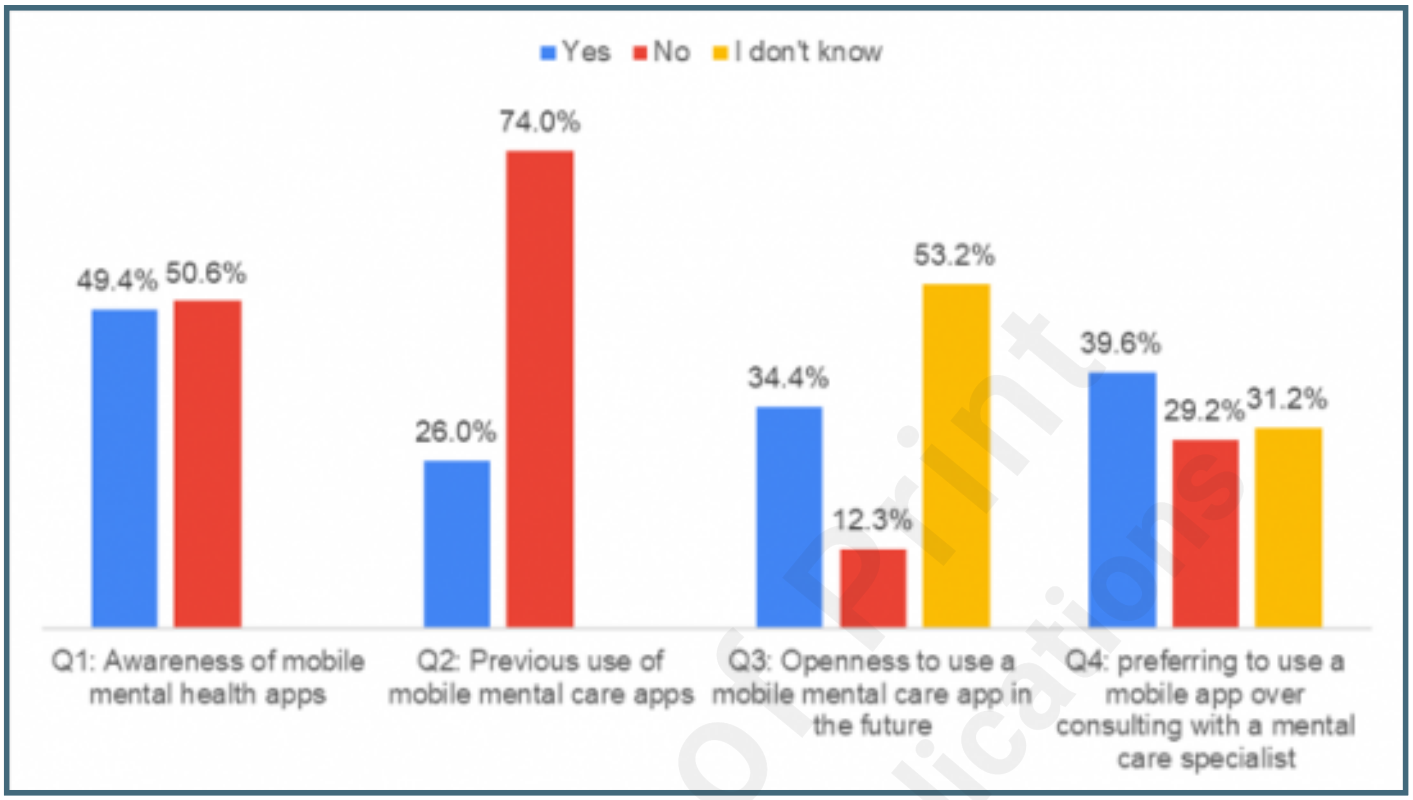
GHQ-12 Items' answers.



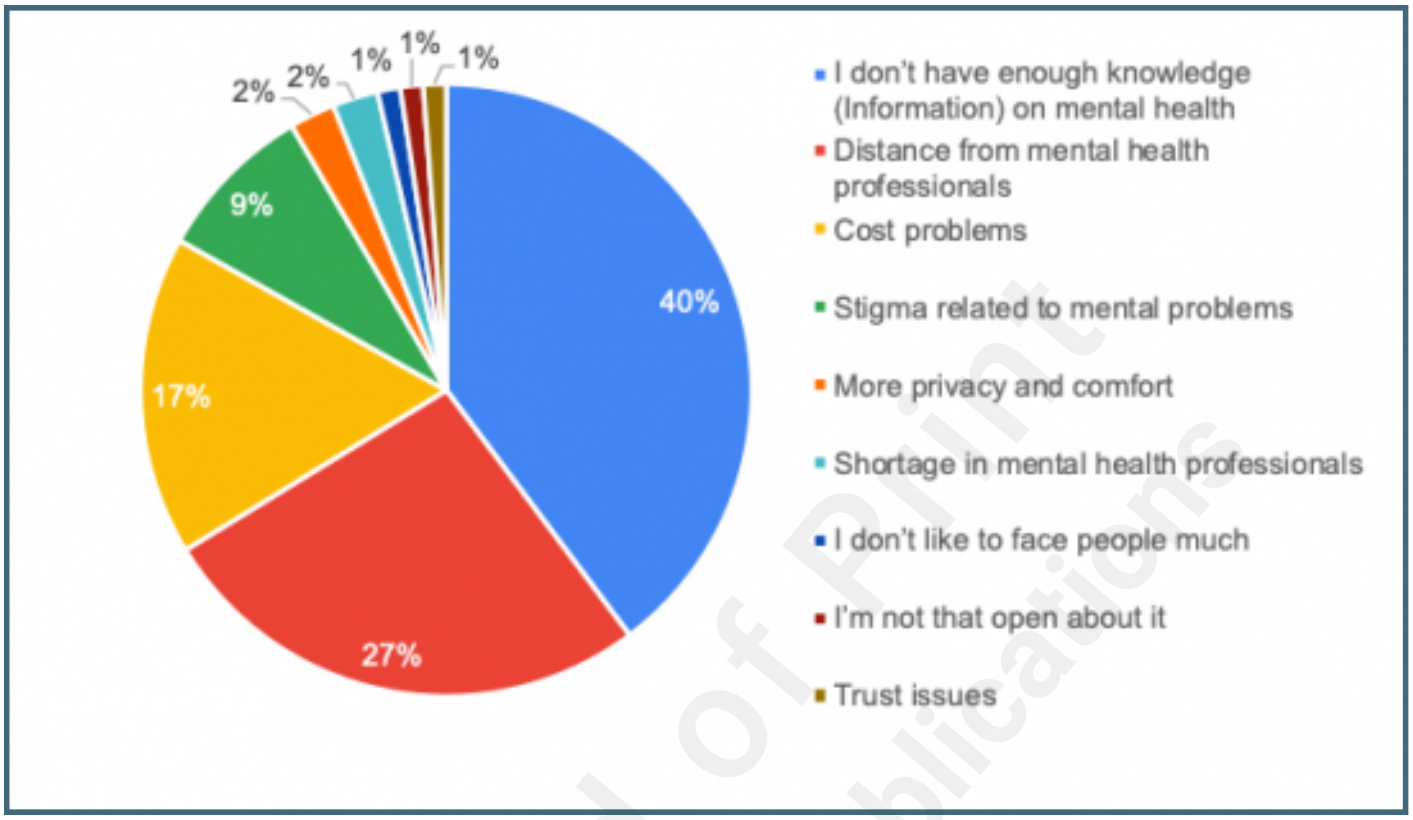
Classification of answers by severity category.



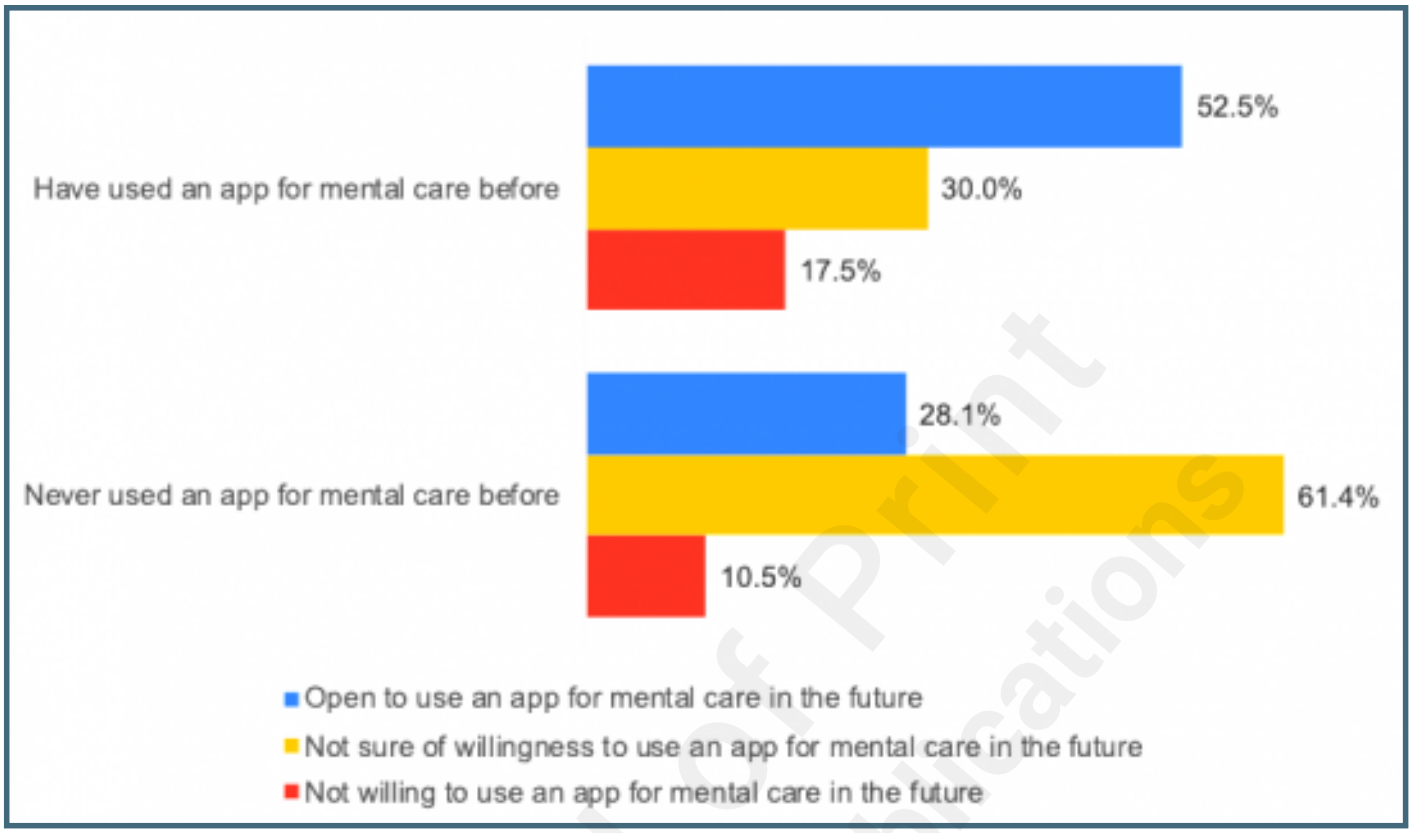
Answers of questions Q1, Q2, Q3 and Q4.



Answers to Q4.1(Participants' reasons to preferring the use of a mobile app over consulting with a mental health care specialist, N=83).



Association between answers of Q2 and Q3.



Answers of participants that showed high risk and severe cases in the GHQ-12 total scores (N=68).