A DIGITAL SOLUTION FOR MONITORING THE ANXIETY LEVEL OF UNIVERSITY STUDENTS

Monaza Saqlain[1], Junaid Anwar[2], Bilal Hameed[3]

[1]University of Sargodha, Sargodha.

[2]The University of Lahore, Sargodha Campus.

[3]The University of Lahore, Sargodha Campus.

The corresponding author email: **[1]monazasaqlain1905@gmail.com**

Abstract

The performance of a student is greatly influenced by their psychological and mental well-being. Institutions do not consider this factor when evaluating performance of the students' performance. Students' levels of depression and anxiety are increasing for a variety of reasons, including: achieving a low GPA, getting tired of studying, and having issues with the course material. We propose a technological approach that enables educational institutions to evaluate students' mental health and levels of anxiety in order to address this issue. We developed an Android application containing four different tests: the Patient Health Questionnaire-9, the Westside Test Anxiety Level-10, the Hamilton Anxiety Rating Scale-A, and the Major Depression Inventory. Calculating the students' anxiety levels is done through the questionnaire in this application. Numerous advice and treatments are also provided to assist students in lowering their levels of anxiety and depression, which will improve their academic performance. Students can get in touch with experts and receive advice via this application.

Keywords: Anxiety Level, University Students, Digital Solution, Patient Health questionnaires-9, Westside Test Anxiety Level-10, Hamilton Anxiety Rating Scale-A, The Major Depression Inventory,

Introduction

The American Psychiatric Association said that anxiety is predictable expectation of future danger, or negativity produced in human behavior which comes with Dysphoria feelings or tension with physical symptoms. The risk associated with anxiety can be related to internal and external world (Perrotta, 2019). There are two main categories of anxiety one is Trait anxiety and second is State anxiety. Trait anxiety is chronic and determined anxiety with respect to given situation and event based. In comparison the state anxiety can occur on different certain situation and environment. It has no specific starting point (Huberty, 2009).

In educational environment it is observed that students feel high level of anxiety when teacher are evaluating their performance. There are many reasons of anxiety like lack of interest, fear of getting low GPA, considering course content difficult. Due to which the ability of student to perform ideally is compromised (Hashempour & Mehrad, 2014).

There are many symptoms of anxiety which can be observed in students like breath shortening, pain in chest and random heartbeat (Boylan, 2011). Many researchers from all over the world are working on anxiety found in students at different level of education (Aurangzeb, Asif, & Amin, 2021; Shahid, Asif, & Pasha, 2022). The research by Stallman (2008) showed that in Australia 53% of university students were facing psychological distress. Similar research was done for Turkish students by (Bayram & Bilgel, 2008) and it was found that 47.1% students were facing anxiety. In second largest country by population India it was reported that 66.9% medical student faced anxiety during studies (Iqbal, Gupta, & Venkatarao, 2015).

In Pakistan a research was also done by (Asif, Mudassar, Shahzad, Raouf, & Pervaiz, 2020) in which total 500 students from GC Women University participated out of which 252 students were males and 248 were females students. The Depression, Anxiety and Stress Scale–21 also known as DASS-21 which was developed by (Norton, 2007) was used and result of this research is summarized in table 1.

Table-1: Mean and Standard deviation of anxiety from DASS-21 f (%) (N=500)

Source of DASS-21 Sub scale	Mean	Standard Deviation	f (%)
Anxiety	18.24	8.39	442 (88.4%)

Usually all researches related to anxiety, depression or stress are based on manual filling of questionnaire on paper which is quite time taking. Secondly these type of researches only give statistics about the anxiety level in students. These two were the main factors behind our research work. We are not only providing the digital solution for monitoring the anxiety level but also giving suggestions about tips and therapies. Instead of it student can also contact a psychologist directly from our solution.

Methods

In this proposed work there are two main parts, one is "Methods to measure the Anxiety Level" and second is "Android application implementation". The details of both parts are described in following subsections.

Methods to measure the Anxiety Level

Following are the four diagnostic tests which we used in our proposed work

1. Patient Health questionnaires-9
2. Westside Test Anxiety Level-10
3. Hamilton Anxiety Rating Scale -A
4. The Major Depression Inventory

Patient Health questionnaires-9 (PHQ-9)

It was introduced by Kroenke (2001) and tested by K, RL, and JB (2006) and widely known as diagnostic tool for patients to measure the severity of depression. This scale is consists of 9

questions and score of each is based upon frequency of symptoms over the time. Minimum score is 0 which means "Not at all" and maximum is 3 means patients feel specific problem mentioned on that particular question of PHQ-9 "Nearly every day". The fours possible answers of each question is "Not at all", "Several Days", "More than half the days" and "Nearly every day". The details of score for each possible answer is given in Table2.

Table-2: PHQ-9 possible answers with score

Possible Answer	Not at all	Several Days	More than half the days	Several Days
Score	0	1	2	3

On the basis of all 9 questions the severity of depression is calculated. The interpretation of total score is given in Table 3.

Table-3: PHQ-9 score interpretation

Total Score	Severity of Depression
1-4	Minimal
5-9	Mild
10-14	Moderate
15-19	Moderately Severe
20-27	Severe

Westside Test Anxiety Level-10 (WTA-10)

This is brief ten item instrument used to measure the anxiety level in students and it also covers self-assessed anxiety impairment and cognitions. In this scale there are 10 questions and score of each question is based upon the severity of anxiety which a student can feel in different situations (Driscoll, 2007). Minimum score is 1 which means which means "Not at all or never true" and maximum score is 5 which means "extremely or always true". The 5 possible answers related to anxiety are "Not at all or never true", "Slightly or seldom true", "Moderately or sometimes true", "highly or usually true" and "Extremely or always true". The details of score for each possible answer is given in Table 4.

Table-4: WTA-10 possible answers with score

Possible Answers	Not at all True	Slightly True	Moderately True	Highly True	Extremely True
Score	1	2	3	4	5

On the basis of all 10 questions the severity of anxiety is calculated. The interpretation of total score is given in Table 5.

Table-5: WTA-10 score interpretation

Total Score	Level of Anxiety
1.0-1.9	Low
2.0-2.5	Average
2.5-2.9	High Normal
3.0-3.4	Moderately High
3.5-3.9	High
4.0-5.0	Extremely High

Title: A Digital Solution for Monitoring the Anxiety Level of University Students

Hamilton Anxiety Rating Scale -A (HAM-A)

It is also well known diagnostic tool to measure the anxiety level based on 14 different feelings of human being (Hamilton, 1959). The type of feelings are listed below

1) Anxious mood
2) Tension
3) Fears
4) Insomnia
5) Intellectual
6) Depressed mood
7) Somatic (muscular)
8) Somatic (sensory)
9) Cardiovascular symptoms
10) Respiratory systems
11) Gastrointestinal symptoms
12) Genitourinary symptoms
13) Autonomic symptoms
14) Behavior at interview

In this test 14 questions related to above mentioned feelings are asked and the possible 5 answers are "Not present", "Mild", "Moderate", "Severe", "Very Sever". Not present means score is 0 and Very severe means score is 4. The details of score for each possible answer is given in Table 6

Table 6: HAM-A possible answers with score

Possible Answers	Not Present	Mild	Moderate	Severe	Very Severe
Score	0	1	2	3	4

On the basis of all 14 questions the severity of anxiety is calculated. The interpretation of total score is given in Table 7.

Table-7: HAM-A score interpretation

Total Score	Level of Anxiety
0-7	No or minimal
8-17	Mild
18-24	Moderate
25-30	Severe
30-56	Very severe

The Major Depression Inventory (MDI)

This diagnostic test is self-report mood questionnaire which was developed by World Health Organization (WHO) in 1980 and tested and verified by Bech, Rasmussen, Olsen, Noerholm, and Abildgaard (2001). It consists of 12 questions related different feeling of Human which they face over the time. The minimum score is 0 means "At No time" and maximum score 5 means "All the time". The possible 6 answers of these question are "At no time", "Some of the time", "Slightly Less than half the time, "Slightly more than half the time", "Most of the time", "All the time". The details of score for each possible answer is given in Table 8.

Table 8: MDI possible answers with score

Possible Answers	At no time	Some of time	Slightly less than half the time	Slightly more than half of the time	Most of the time	All the time
Score	0	1	2	3	4	5

On the basis of all 12 questions the severity of depression is calculated. The interpretation of total score is given in Table 9.

Table-9: MDI score interpretation

Total Score	Level of depression
0-20	No or doubtful
21-25	Mild
26-30	Moderate
31-50	Severe
30-56	Very severe

Android Application Development

All 4 diagnostic tests which are discussed in previous section were implemented in android application. For android application different tools and technologies were used which are listed below in table 10.

- Android Studio (Arctic fox//2020.3.1)
- XML (eXtensible Markup Language)
- JAVA (back-end)
- Firebase (database)

Android studio is an application software widely used for android application development. XML is Markup language and file format which is used to store, transmit and reconstruct the arbitrary data. JAVA is programming language based on object oriented programming and it was

created at Sun Microsystems and its first version was released in 1995. Firebase is the product of Google used for storing data online and can be accessible at any time.

Functional Procedure

In our application there are two types of user one is for student or patient and second one is for Psychologist. First of all user has to fill up the form for sign up and get the verification email. Now user can sign in with given credentials if user is student or patient then 4 options will be available.

1) Questionnaire
2) Posts
3) Workouts
4) Consultation

In Questionnaire option user can choose any of 4 diagnostic tests which are already discussed previously. If user wants to communicate with other users then Post can be created under the Post option. For getting relaxed, user can select Workout option in which different therapies are listed. In case of user needs of consultation then user can also contact with registered psychologist under consultation option. In comparison if user is Psychologist then list of all appointment from student or patient will be given. Instead of it the detail of different upcoming seminars will also be available.

3. Results

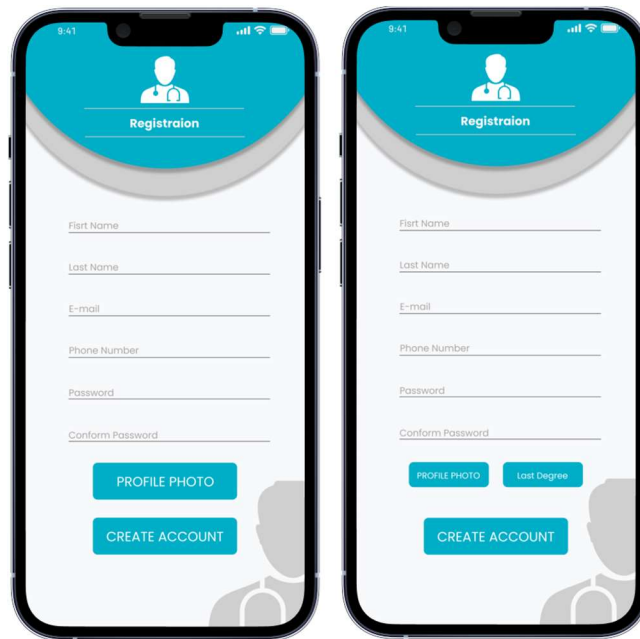Following are the screenshots of our proposed android application.

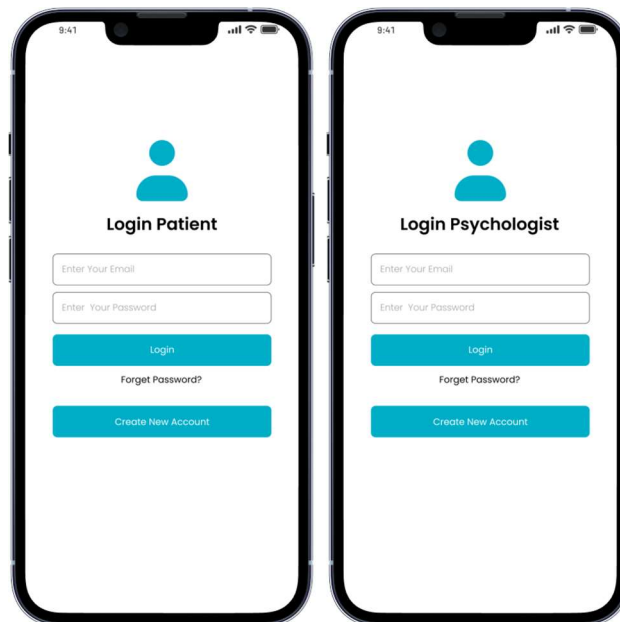**Figure 1: Registration Form of student and Psychologist**
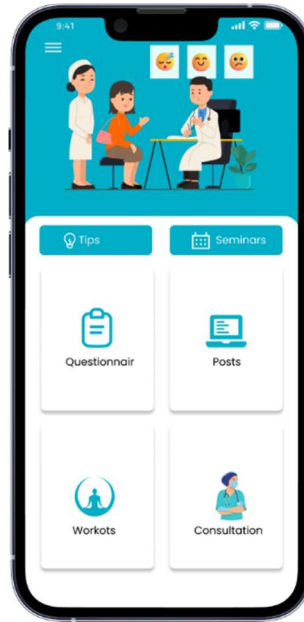

Figure 2: Login Screen

Title: A Digital Solution for Monitoring the Anxiety Level of University Students

Figure 3: Dashboard with all options
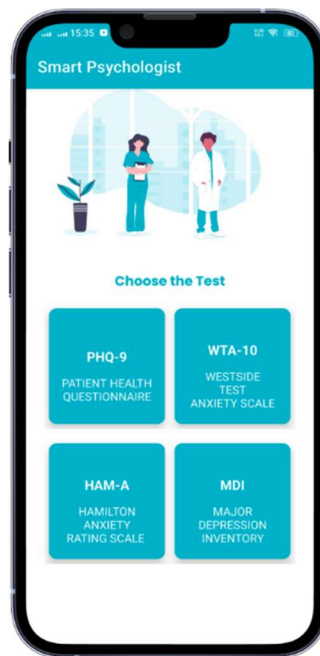
Figure 4: Listed four diagnostic tests

Title: A Digital Solution for Monitoring the Anxiety Level of University Students
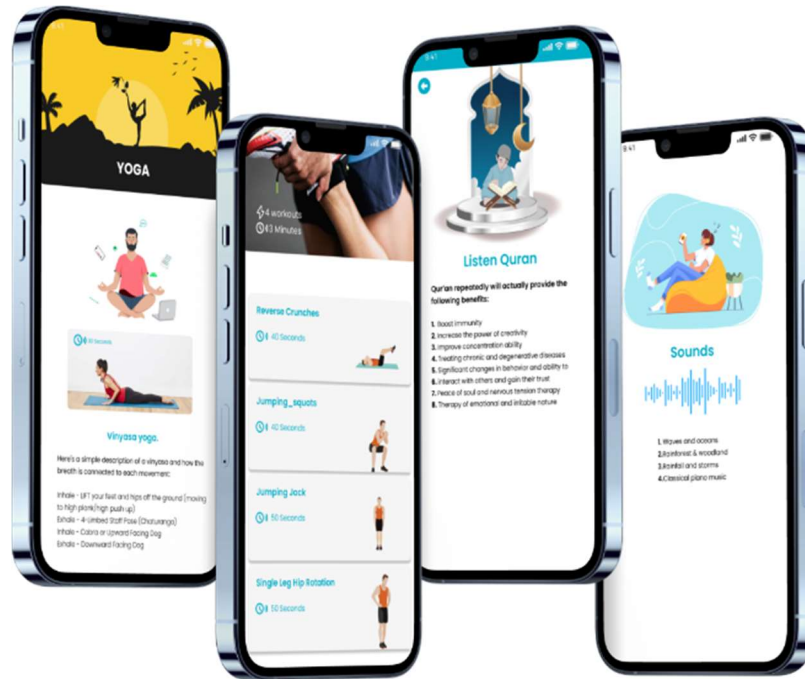
Figure 5: Work and Therapies Listed

Figure 6: PHQ-9 result of a random student

Title: A Digital Solution for Monitoring the Anxiety Level of University Students
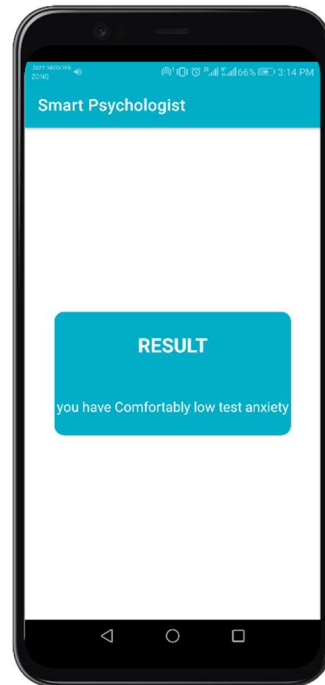
Figure 7: WTA-10 result of a random student

Figure 8: HAM-A result of a random student

Title: A Digital Solution for Monitoring the Anxiety Level of University Students
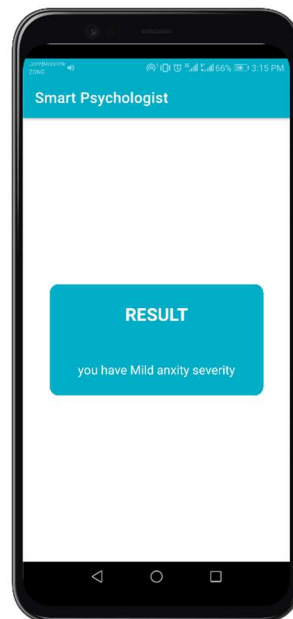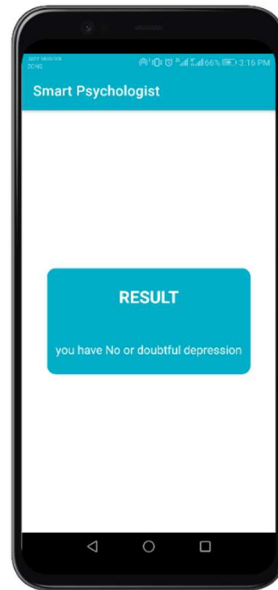
Figure 9: MDI result of a random student

Conclusion

In this research we propose that a digital solution for monitoring the anxiety level of students at any level of education is important. We used 4 diagnostic tests PHQ-9, WTA-10, HAM-A and MDI to measure the mental condition of students under study. For relaxing the students, different therapies and workout have also listed in our application, which can be used when needed. If any student is in severe condition then student can contact with registered and authorized psychologist with just one click through this application. This application work quite efficiently for both students and psychologists. The registered psychologist can check the appointments of the students and can communicate easily and effectively. Students can also get updates of upcoming seminars and healthy activities.

By using this application, management of educational institution can easily monitor the mental health and psychological condition of their students and can help them by inclusion or engaging the registered and authorized psychologists to give their excellent performance while getting education.

References

Asif, S., Mudassar, A., Shahzad, T. Z., Raouf, M., & Pervaiz, T. (2020). Frequency of depression, anxiety and stress among university students. *Pakistan journal of medical sciences, 36*(5), 971.

Aurangzeb, Asif, M., & Amin, M. K. (2021). RESOURCES MANAGEMENT AND SME'S PERFORMANCE. *Humanities & Social Sciences Reviews, 9*(3), 679-689. doi:10.18510/hssr.2021.9367

Bayram, N., & Bilgel, N. (2008). The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Social psychiatry psychiatric epidemiology, 43*, 667-672.

Bech, P., Rasmussen, N.-A., Olsen, L. R., Noerholm, V., & Abildgaard, W. (2001). The sensitivity and specificity of the Major Depression Inventory, using the Present State Examination as the index of diagnostic validity. *Journal of affective disorders, 66*(2-3), 159-164.

Boylan, H. R. (2011). Improving Success in Developmental Mathematics: An Interview with Paul Nolting. *Journal of Developmental Education, 34*(3), 20.

Driscoll, R. (2007). Westside Test Anxiety Scale validation. *Online submission*.

Hamilton, M. (1959). Hamilton anxiety scale. *Group, 1*(4), 10-1037.

Hashempour, S., & Mehrad, A. (2014). The effect of anxiety and emotional intelligence on students' learning process. *Journal of Education Social Policy, 1*(2), 115-122.

Huberty, T. J. (2009). Test and performance anxiety. *Principal leadership, 10*(1), 12-16.

Iqbal, S., Gupta, S., & Venkatarao, E. (2015). Stress, anxiety & depression among medical undergraduate students & their socio-demographic correlates. *The Indian journal of medical research, 141*(3), 354.

K, K., RL, S., & JB, W. (2006). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606-613.

Kroenke, K. S. (2001). RL, & Williams, JB (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606.

Norton, P. (2007). Depression Anxiety and Stress Scales (DASS-21): Psychometric analysis across four racial groups. *Anxiety, stress, coping, 20*(3), 253-265.

Perrotta, G. (2019). Anxiety disorders: definitions, contexts, neural correlates and strategic therapy. *J Neur Neurosci, 6*(1), 042.

Shahid, N., Asif, M., & Pasha, A. (2022). Effect of Internet Addiction on School Going Children. *Inverge Journal of Social Sciences, 1*(1), 12-47.

Stallman, H. M. (2008). Prevalence of psychological distress in university students: Implications for service delivery. *Australian Journal of General Practice, 37*(8), 673.