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ORIGINAL ARTICLE

Effectiveness of AI App "Evolve" in Stress Management amongst Medical Students at Fazaia Medical College, Islamabad – A Quasi-Experimental Study

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ABSTRACT

Background: Mental health is one of the most common concerns amongst medical students. One in three medical college students struggle with mental health. This study highlights the critical need to address mental health issues and promote students' holistic well-being. Digital mental health interventions offer the possibility of treatment to college students with common mental health problems.

Aim: To determine the effectiveness of an AI mental health app, "Evolve," in assisting with stress management.

Results: A quasi-experimental (Pre and Posttest) study was conducted at Fazaia Medical College. Participants were assessed for stress using the PSS scale. They were separated into a control and an interventional group, with the interventional group using the "Evolve" App. Post-intervention analysis indicated a significant reduction in stress levels among regular app users, revealing a positive correlation between app usage frequency and reduced stress.

Conclusion: The research accentuated the efficacy of the AI app Evolve in alleviating stress amongst medical students. It not only validated previous theories about the potential of smartphone-based AI apps in stress management but also provided a significant scheme for future mental health management in colleges.

Keywords: Digital interventions, AI, Mental Health, Stress management, medical student

INTRODUCTION

"A healthy mind resides in a healthy body", and having a healthy mind can make tremendous differences in a person's professional and personal life. Mental health problems are a rising concern in the world, and it is well known that students are more susceptible to these problems compared to the general population.

Stress is typically described as a feeling of emotional discomfort and/ or strain. It is produced as a response to threatening, frustrating, and grieving situations. It can also result from internal struggles and loss of self-worth, esteem, and confidence. Stress affects the mind, body, and behavior, causing symptoms ranging from minor headaches to extreme fatigue. It also causes anxiety, restlessness, lack of motivation, and focus. In such helpless situations, students tend to find temporary relief by unhealthy means; from using un-prescribed medications to narcotics and alcohol[1].

Life of a medical student is hectic and restless, such an unhealthy lifestyle leaves the body overwhelmed, which leads to emotional and physical distress, and eventually the student reaches a point of complete burnout and is unable to reach his/her full potential and perform his/her best[2].

Chronic stress contributes not only to long-term problems for the cardiovascular system, but studies have shown its association with the development of AIDs and certain neoplasms[3-5].

In 2015, research was conducted to identify the prevalence of stress amongst medical students in Islamabad, Pakistan. Said research was done using the DASS scoring system and showed that there is a high frequency of stress, depression, and amongst medical students during the course of their training. Results revealed that 50% of the medical students were stressed[6].

Similarly, another study was conducted in Bangladesh, in which 990 medical students took part. The research concluded that the prevalence of stress was about 54% among the study population[7]

With the current advances in technology, there is an app available for everything. Considering how important it is to manage and deal with stress. AI Mental Health applications can be utilized for this purpose. Not only are these apps flexible, cost-effective, and easily accessible to all, but they also offer a less stigmatizing way to address mental health problems. These apps offer a wide variety of options to suit a person's preferences. This provides a person with a way to self-help and improve.

Mental health is the most neglected field in Pakistan and continues to remain as such without interventions on a more personal level. The reason being that mental health is viewed as a stigma. Along with all the negative perceptions surrounding psychological health and it being considered embarrassing to ask for and seek help are just a few of the reasons why a more personal and easily accessible source of help for students should be an utmost priority. This is why we feel that our research is of great value.

We were unable to find any previous studies in Pakistan that implemented an AI app intervention in this regard. This study tried to assist medical students by introducing the AI app "Evolve" to help them manage stress effectively. Then, on the basis of our results, recommendations can be made to authorities to invest in and introduce such easily accessible apps to combat and reduce the frequency of stress, mental health disorders, and all related physical, mental, and emotional disturbances.

The aim of this study was to assess the effectiveness of the AI App (Evolve) intervention on stress levels among medical students in Fazaia Medical College, Islamabad.

MATERIAL AND METHODS

It was a quasi-experimental study (pre- and posttest) conducted at Fazaia Medical College, Islamabad, from February to June 2023, following IRB approval. All medical students from the 1st to the final year of MBBS who scored 14 or above on the Perceived Stress Scale (PSS)were included in the study. While all those diagnosed with and taking medications to relieve stress, depression, and anxiety were excluded. A total of 257 students were selected using simple random sampling. Informed consent was taken from the participants, and confidentiality was assured. The grading criteria of the data collection tool (PSS) were as follows:

Intervention-AI application: "**Evolve":** The AI app that we used has features ranging from breathing exercises (20, 21) , meditations (22), sleep monitoring, positive affirmations (23, 26),

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journaling (24), wellness tips, and a plethora of calming sounds(25), motivational lectures to choose from. All these factors have been shown to have beneficial effects on a person's mental and physical health.

Research has shown that these exercises aid in recovering from stress and anxiety, enhancing physical activity, memory, endurance, and mental agility/strength.

METHODOLOGY

Initially, 257 participants were recruited, and 229 consented to participate and were assessed for eligibility. Students scoring 14 and above on the scale were considered stressed and were included. The total number of stressed students was 206. The students were then divided into two groups: an experimental group comprising 101 students and a control group. The experimental group received the stress app intervention for 4 weeks. They were explained in detail how to use the app and were monitored daily. and a control group that comprised 105 students without any intervention. At the end, the PSS questionnaire was given again to both groups to reassess stress levels. Additional questions were added to the questionnaire sent to the experimental group to determine how regularly the app was used, how convenient it was to use, and how effective the test students thought the app was in helping them manage stress. Ethical approval was obtained from the IRB-FMC, and written informed consent was obtained from the participants.

RESULTS

The study initially assessed 229 medical students, out of which 75% were female. A total of 206 students were identified as stressed (scoring 14 or above on the PSS) and were subsequently divided into an interventional group (n=101) and a control group (n=105). Overall, the introduction of the "Evolve" AI app resulted in a significant improvement across the student body; the pre-interventional perceived stress prevalence was 90% with a mean score of 20.49, which notably decreased to 75.7% with a mean score of 16.4 post-intervention.

The independent T-test comparing the post-intervention mean PSS scores between the experimental and control groups yielded a highly significant p-value of 0.000.

As outlined in Table 2, the AI app demonstrated a profound effect on the interventional group compared to the control group. While both groups started with similar mean PSS scores (21.33 for the control and 21.88 for the interventional group), the interventional group experienced a much more dramatic reduction in stress. The magnitude of change was substantial, with the interventional group reporting a mean PSS score decline of 6.46, compared to a mere 1.76 decline in the control group. By the end of the 4-week study period, only 66.3% of the interventional group remained categorized as "stressed," whereas a staggering 85.7% of the control group still fell into the stressed category. Statistical tests, including paired T-tests, independent T-tests, and Pearson Chi-Square, all confirmed that these reductions were highly significant ($p < 0.001$).

Analysis of variance (ANOVA) demonstrated a highly significant positive correlation (p=0.000) between app usage frequency and decreased stress levels. Percentages for convenience are calculated based on the raw frequencies provided in the study

Table 3 highlights how the students interacted with the AI app and their subjective evaluations of it. Engagement was generally high, with over 80% of the interventional group using the app at least once a week or more. Crucially, the study found a strong positive correlation between the frequency of app use and the extent to which stress levels decreased (p=0.000). Furthermore, the app was well-received by the participants. When asked to rate its effectiveness, over 77% of students rated the app as effective, very effective, or extremely effective for managing their stress. Similarly, the app proved user-friendly, with roughly 74% of users rating its daily convenience as convenient, very convenient, or extremely convenient. These findings validate the efficacy of smartphone-based AI applications in providing flexible, accessible, and less stigmatizing mental health interventions for medical students.

Table 1: Grading criteria of PSS

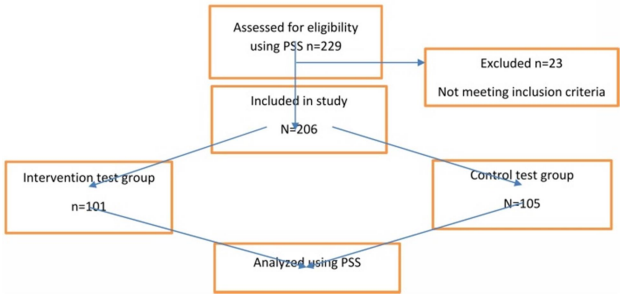
	Score Range	Inference
1	0-13	Low stress
2	14-26	Moderate stress
3	27-40	High perceived stress

Table 2: Comparison of Perceived Stress Scale (PSS) Scores and Stress Prevalence Between Control and Interventional Groups

Parameter	Control Group (n=105)	Interventional Group (n=101)
Pre-Intervention PSS Score		
Mean ± SD	21.33 ± 4.86	21.88 ± 4.97
Post-Intervention PSS Score		
Mean ± SD	19.66 ± 6.65	16.42 ± 6.21
Reported Mean Decline	1.76	6.46
Post-Intervention Stress Status		
Stressed, n (%)	90 (85.7%)	67 (66.3%)
Non-Stressed, n (%)	15 (14.3%)	34 (33.7%)

Table 3: Participant Engagement, Perceived Effectiveness, and Convenience of the "Evolve" App (n=101)

Parameter	Frequency (n)	Percentage (%)
Frequency of App Usage		
Never	8	7.9%
Once in 4 weeks	9	8.9%
Once a week	39	38.6%
2 to 4 times a week	38	37.6%
Daily	7	6.9%
Perceived Effectiveness in Managing Stress		
Not effective	8	7.9%
Slightly effective	15	14.9%
Effective	33	32.7%
Very effective	32	31.7%
Extremely effective	13	12.9%
Perceived Convenience of Daily Use		
Not convenient	9	8.9%
Slightly convenient	17	16.8%
Convenient	25	24.8%
Very convenient	34	33.7%
Extremely convenient	16	15.8%



DISCUSSION

The purpose of this research was to determine the effectiveness of the AI stress app intervention (Evolve) in managing stress among medical students. To our knowledge, this study was one of the first to demonstrate the stress-reducing effects of a smartphone-based AI app intervention among medical students in Pakistan. Our study demonstrated that the Evolve app effectively managed stress. The

data revealed a decline in stress levels after the intervention, with the experimental group showing a significantly greater reduction than the control group. Additionally, we found a strong positive association between app usage and decreased stress levels.

Stress levels of 229 students were assessed at the start of this research; 206 were found to be stressed. An initial comparison was made between pre- and post-intervention stress levels. The descriptive analysis conducted in SPSS showed that the pre-intervention group (229 students) had a mean PSS score of 20.49, with 89.96% (206) of students stressed and the remaining 10.4% (23) non-stressed. In contrast, the post-intervention group had a mean PSS score of 18.06, with 75.7% of students (156) being stressed and the remaining 24.3% (50) non-stressed.

Secondly, stress levels in the post-intervention experimental group (101 students) and the control group (105 students) were compared. The control group had a mean PSS score of 19.66 after the intervention, compared with an original mean of 21.33. Conversely, the experimental group had a mean PSS score of 21.88; their post-intervention mean PSS score was 16.42. 85.7% (90 students) in the control group were stressed, compared with only 66.3% (67 students) in the test group.

Subsequently, inferential analysis was carried out. The significance value for the paired t-test comparing pre- and post-intervention mean PSS scores was 0.00, indicating statistical significance. Furthermore, the P-value from an independent t-test comparing the mean PSS scores of the experimental and control groups was 0.000. Similarly, the significance values for Pearson's chi-square and Fisher's exact tests were 0.001, indicating that both were highly significant.

In addition to these, an association was observed between the regularity of app use and changes in stress levels. Analysis of variance was used. The analysis had a significance value of 0.000, indicating a strong positive correlation between the degree of app usage and reduced stress levels.

Finally, other factors related to app usage were explored among the Experimental group to provide a greater understanding of previous research hypothesizing about the potential to increase the use of such mental health apps. The users were asked to give feedback on how effective the app was in helping them. 8 students reported it was not effective, 15 reported it was slightly effective, 33 reported it was effective, 32 reported it was very effective, and 13 reported it was extremely effective. Another facet assessed was the convenience of using the app. The students using the app were asked to report from a self-made 5-point Likert scale. 9 reported it to be not convenient, 17 found it slightly convenient, 25 commented it was convenient, 34 chose very convenient, and 16 found the app extremely convenient.

To sum up the notable findings, the magnitude of change in perceived stress was greater in our post-interventional test group, which had a mean PSS score decline of 6.46, than in the post-interventional control group, which had a mean PSS score decline of 1.76. Additionally, regular users of the app showed a greater decrease in stress levels than non-regular users. Our research demonstrated that the app Evolve was extremely significant in managing stress.

CONCLUSION

AI App Evolve was found to be an effective modality to reduce stress among medical college students. This research not only supports previous studies that theorized the potential of smartphone-based AI stress apps for managing stress but also provides important information that can serve as an effective model for designing future mental health resources in medical settings and across multiple educational institutions.

RECOMMENDATIONS: With more time, it should be possible to further expand this research. We would like to give the intervention for a greater period of time. There should be greater population involvement by including multiple universities, rather than confining the study population to medical students. Specific aspects of the app that contributed more to stress relief than others should be further assessed in detail.

REFERENCES

1. Ball S, Bax A. Self-care in medical education: effectiveness of health-habits interventions for first-year medical students. Academic Medicine. 2002;77(9):911-7.
2. Lemma S, Gelaye B, Berhane Y, Worku A, Williams MA. Sleep quality and its psychological correlates among university students in Ethiopia: a cross-sectional study. BMC psychiatry. 2012;12:1-7.
3. Leserman J, Petitto JM, Gu H, Gaynes BN, Barroso J, Golden R, et al. Progression to AIDS, a clinical AIDS condition and mortality: psychosocial and physiological predictors. Psychological medicine. 2002;32(6):1059-73.
4. Hamer M, Chida Y, Molloy GJ. Psychological distress and cancer mortality. Journal of psychosomatic research. 2009;66(3):255-8.
5. Hamer M, Molloy GJ, Stamatakis E. Psychological distress as a risk factor for cardiovascular events: pathophysiological and behavioral mechanisms. Journal of the American College of Cardiology. 2008;52(25):2156-62.
6. Rizvi F, Qureshi A, Rajput AM, Afzal M. Prevalence of depression, anxiety and stress (by DASS scoring system) among medical students in Islamabad, Pakistan. Br J Med Med Res. 2015;8(1):69-75.
7. Eva EO, Islam MZ, Mosaddek ASM, Rahman MF, Rozario RJ, Iftekhar A, et al. Prevalence of stress among medical students: a comparative study between public and private medical schools in Bangladesh. BMC research notes. 2015;8(1):1-7.
8. Radez J, Reardon T, Creswell C, Lawrence PJ, Evdoka-Burton G, Waite P. Why do children and adolescents (not) seek and access professional help for their mental health problems? A systematic review of quantitative and qualitative studies. European child & adolescent psychiatry. 2021;30:183-211.
9. Repetto C, Gaggioli A, Pallavicini F, Cipresso P, Raspelli S, Riva G. Virtual reality and mobile phones in the treatment of generalized anxiety disorders: a phase-2 clinical trial. Personal and Ubiquitous Computing. 2013;17:253-60.
10. Farrer L, Gulliver A, Chan JK, Batterham PJ, Reynolds J, Calear A, et al. Technology-based interventions for mental health in tertiary students: systematic review. Journal of medical Internet research. 2013;15(5):e2639.
11. Wasil AR, Palermo EH, Lorenzo-Luaces L, DeRubeis RJ. Is there an app for that? A review of popular apps for depression, anxiety, and well-being. Cognitive and Behavioral Practice. 2022;29(4):883-901.
12. Josephine K, Josefine L, Philipp D, David E, Harald B. Internet-and mobile-based depression interventions for people with diagnosed depression: a systematic review and meta-analysis. Journal of affective disorders. 2017;223:28-40.
13. Kazdin AE. Addressing the treatment gap: A key challenge for extending evidence-based psychosocial interventions. Behaviour research and therapy. 2017;88:7-18.
14. Loo Gee B, Griffiths KM, Gulliver A. Effectiveness of mobile technologies delivering Ecological Momentary Interventions for stress and anxiety: a systematic review. Journal of the American Medical Informatics Association. 2016;23(1):221-9.
15. Russ TC, Stamatakis E, Hamer M, Starr JM, Kivimäki M, Batty GD. Association between psychological distress and mortality: individual participant pooled analysis of 10 prospective cohort studies. Bmj. 2012;345.
16. Huppert FA, Whittington JE. Symptoms of psychological distress predict 7-year mortality. Psychological medicine. 1995;25(5):1073-86.
17. Backé E-M, Seidler A, Latza U, Rossnagel K, Schumann B. The role of psychosocial stress at work for the development of cardiovascular diseases: a systematic review. International archives of occupational and environmental health. 2012;85:67-79.
18. Chida Y, Hamer M, Wardle J, Steptoe A. Do stress-related psychosocial factors contribute to cancer incidence and survival? Nature clinical practice Oncology. 2008;5(8):466-75.
19. Tsutsumi A, Kayaba K, Kario K, Ishikawa S. Prospective study on occupational stress and risk of stroke. Archives of Internal Medicine. 2009;169(1):56-61.
20. Hopper SI, Murray SL, Ferrara LR, Singleton JK. Effectiveness of diaphragmatic breathing for reducing physiological and psychological stress in adults: a quantitative systematic review. JBI Evidence Synthesis. 2019;17(9):1855-76.
21. Naik GS, Gaur G, Pal G. Effect of modified slow breathing exercise on perceived stress and basal cardiovascular parameters. International journal of yoga. 2018;11(1):53.
22. Zollars I, Poirier TI, Pailden J. Effects of mindfulness meditation on mindfulness, mental well-being, and perceived stress. Currents in Pharmacy Teaching and Learning. 2019;11(10):1022-8.
23. Creswell JD, Dutcher JM, Klein WM, Harris PR, Levine JM. Self-affirmation improves problem-solving under stress. PloS one. 2013;8(5):e62593.
24. Sohal M, Singh P, Dhillon BS, Gill HS. Efficacy of journaling in the management of mental illness: a systematic review and meta-analysis. Family medicine and community health. 2022;10(1).
25. Lin S-T, Yang P, Lai C-Y, Su Y-Y, Yeh Y-C, Huang M-F, et al. Mental health implications of music: Insight from neuroscientific and clinical studies. Harvard review of psychiatry. 2011;19(1):34-46.
26. Cohen GL, Sherman DK. The psychology of change: Self-affirmation and social psychological intervention. Annual review of psychology. 2014;65:333-71.

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