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Developing A Mobile Application to Determine the Psychological Wellness of University Students

Üniversite Öğrencilerinin Psikolojik İyilik Halini Belirlemek İçin Bir Mobil Uygulama Geliştirilmesi

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ABSTRACT

Aim: This study aimed to develop a mobile application to assess the psychological well-being of university students.
Material and Methods: Using an innovative and interdisciplinary approach, this study follows a rigorous methodology from September 2022 to June 2023. The development of the mobile application followed a systematic and structured process to ensure functionality, usability, and reliability. Throughout all stages of development, professional support was sought from information technology to ensure the technical robustness, reliability, and effectiveness of the application. The study embraces four developmental stages including needs identification, technical development, intervention design, and promotion. These stages ensure a student-centered approach, while the application itself offers insights into depression, anxiety, stress, relationship violence attitudes, addiction, Internet addiction, sleep quality, and eating disorders.
Results: A unique and all-inclusive mobile application was created to assess and enhance the psychological well-being of university students. With the real-time emotion monitoring feature of the application, students may keep an eye on their present emotional states and develop self-awareness. If long-term negative emotions are detected, the early warning system is activated and implemented. It provides uninterrupted referrals to qualified professionals for immediate response and support in emergency situations and an enhanced feedback mechanism for user complaints and suggestions. It also provides sensitive evaluation and triage processes by creating an anonymous system record to provide instant support, when necessary. The application also includes stress management guidance for students.
Conclusion: This application provides real-time data that offers mental health professionals a comprehensive overview of students' psychological states.
Keywords: Mobile applications; student; health services; undergraduate.

ÖZ

Amaç: Bu çalışmada, üniversite öğrencilerinin psikolojik iyilik halini belirlemek için bir mobil uygulama geliştirilmesi amaçlanmıştır.
Gereç ve Yöntemler: Yenilikçi ve disiplinler arası bir yaklaşıma sahip olan bu çalışma, Eylül 2022'den Haziran 2023'e kadar uzanan titiz bir metodoloji izlemektedir. Mobil uygulamanın geliştirilmesi, işlevselliğini, kullanılabilirliğini ve güvenilirliğini sağlamak için sistematik ve yapılandırılmış bir süreç izlemiştir. Geliştirmenin tüm aşamalarında, uygulamanın teknik sağlamlığını, güvenilirliğini ve etkinliğini sağlamak için bilgi teknolojilerinden profesyonel destek alınmıştır. Çalışma, ihtiyaç belirleme, teknik geliştirme, müdahale tasarımı ve tanıtım aşamalarından oluşan dört gelişim aşamasını kapsamaktadır. Bu aşamalar öğrenci merkezli bir yaklaşım sağlarken, uygulama, depresyon, anksiyete, stres, ilişki şiddeti tutumları, bağımlılık, internet bağımlılığı, uyku kalitesi ve yeme bozukluklarına ilişkin içgörüler sunmaktadır.
Bulgular: Psikolojik iyilik hallerini değerlendirmek ve geliştirmek amacıyla üniversite öğrencilerine özel, kapsamlı bir mobil uygulama geliştirildi. Uygulamanın gerçek zamanlı duygu takibi özelliği ile öğrenciler anlık duygusal durumlarını izleyebilir ve öz farkındalık kazanabilirler. Uzun süreli olumsuz duyguların tespit edilmesi durumunda, erken uyarı sistemi etkinleştirilerek eyleme geçmektedir. Acil durumlarda anında müdahale ve destek için nitelikli profesyonellere kesintisiz yönlendirme ve kullanıcı şikayetleri ve önerileri için geliştirilmiş bir geri bildirim mekanizması sağlamaktadır. Ayrıca gerektiğinde, anında destek sağlamak için anonim sistem kaydı oluşturarak duyarlı bir değerlendirme ve triyaj süreçleri sağlamaktadır. Uygulama öğrencilerin stres yönetimi yönlendirmelerini de içermektedir.
Sonuç: Bu uygulama, ruh sağlığı profesyonelleri için öğrencilerin ruhsal durumuna ilişkin genel bakış sağlayan gerçek zamanlı veri sunmaktadır.
Anahtar kelimeler: Mobil uygulamalar; öğrenci; sağlık hizmetleri; üniversite.

INTRODUCTION

University students face a range of academic, emotional, and economic stressors throughout their lives. Simultaneously, students are tasked with several developmental challenges such as self-discovery, forming close relationships with the opposite sex, making career choices, and gaining independence (1,2). When university students are unable to successfully manage developmental tasks and stress sources, their psychological well-being can be negatively impacted, potentially leading to depression, anxiety, eating disorders, substance abuse disorders, and other mental health issues (3-5).

In this period, the concept of 'psychological well-being,' which has gained importance in preventing mental issues, is defined as a state of wellness in which an individual can cope with the normal stresses of life, use their own abilities, contribute to their community, and work productively and fruitfully. Research shows that individuals with a high level of psychological well-being (flourishing) have better physical health, higher life satisfaction, and psychological resilience; are likely to have positive future expectations; experience more positive emotions; are happier and more optimistic; and suffer less from symptoms of psychological distress such as depression, anxiety, and stress (6-8).

Mental health is paramount in preventing and resolving stress, challenges, and other mental health issues, particularly those experienced by university students. In recent years, there has been increasing interest in employing technology to support the mental well-being of university students, particularly through the development and implementation of mobile applications. Mobile mental health applications enhance accessibility to mental health resources for students, enabling individual progress monitoring and timely interventions (9-11).

Recent years have witnessed a rapid increase in the use of mobile applications and smartphones among the 18-25 age group, as reported by Gökbulut B (12). While specific data on the rate of mobile device usage based on Internet technologies among the young population in Turkey are not available, it is estimated to be high. The interest of youth in mobile technologies has led the mobile application industry to focus on applications that have attracted their attention (13). Moreover, the use of mobile applications in the health sector has rapidly increased in recent years. Applications developed specifically to address mental health issues of individuals have been instrumental in managing stress and anxiety and enhancing psychological well-being (14). Mobile health applications reduce the cost of obtaining professional help and increase accessibility to mental health (15).

The COVID-19 pandemic has exacerbated the need for mental health support among university students by adversely affecting their academic and social lives. This scenario underscores the pivotal role that mobile mental health applications can play in extending support to students during challenging times (15-18).

Contemporary research has aimed to assess the efficacy and usability of mobile mental health applications among university students. These findings illustrate that well-designed applications can assist students in managing stress and bolstering mental health. Students exhibit positive attitudes towards using these applications and have emphasized their potential as a valuable resource (9,11,19).

Despite recognizing the potential of mobile mental health applications, further research is imperative to comprehend their impact on student's mental well-being and effectively integrate them into university support systems. Moreover, the exploration of students' attitudes and behaviors regarding seeking psychological help is crucial, as individual attributes, sociocultural factors, and prior experiences influence this process and the likelihood of accepting help (20-22). Universities must ensure the provision of viable and effective mental health resources to their students and cultivate a positive attitude toward utilizing these resources. This could potentially increase the likelihood of students seeking and accepting help from stressful situations. The mental well-being of university students is a priority, and universities must establish effective support systems to address this (21).

As psychiatric nurses, we endeavored to develop a mobile application that takes responsibility for identifying mental health issues in young individuals and evaluating appropriate treatment and support options. Mobile mental health applications are suitable for monitoring, supporting, and providing timely intervention for students' mental health. However, it is also crucial to assess the effectiveness of these applications and the attitudes of students towards receiving help and to conduct further research on this subject (22).

The aim of this study was to develop a mobile application to determine the psychological well-being of university students. This study explored the use of mobile applications to support university students' mental well-being, their attitudes toward seeking professional help, and the obstacles they encounter. The insights gained about students will aid in the refinement of university support systems and provide more effective solutions to support their mental health. This study aimed to develop a mobile application to assess the psychological well-being of university students and is anticipated to contribute significantly to understanding and supporting the mental health needs of university students on a broader scale.

MATERIAL AND METHODS

This descriptive study involved the development of mobile device applications. The mobile application program was developed at Düzce University, between September 2022 and June 2023. The development of the mobile device application followed a systematic and structured process involving various stages to ensure functionality, usability, and reliability. Throughout all stages of development, professional support was sought from information technology and computer engineering firms to ensure the technical robustness, reliability, and effectiveness of the application. Each stage of the development process was meticulously planned and executed with an emphasis on creating a user-friendly, reliable, and effective mobile application. The involvement of professional information technology and computer engineering support plays a crucial role in refining the technical aspects of the application, contributing to its overall success and efficacy.

The key steps followed during the development of the application are as follows:

Preparation of Mobile Application: At the foundational stage, the core elements, objectives, and scope of the

mobile application were established. In the development of mobile application modules, an extensive literature review was initially conducted focusing on the factors affecting the psychological well-being of university students and related mobile health applications. Subsequently, a roadmap was established to determine the needs of the university students. The project team integrated the data obtained from the literature review with students' needs to create modules through a dynamic process. The details of these stages are given below.

Identification of Student Needs: To identify student needs, a group of 14 community leaders from universities was gathered. Meetings with this team were intended to introduce the mobile application and determine the needs of students. Throughout the process, students' ideas were continuously solicited (via the WhatsApp group). Another method used to identify needs was the evaluation of applications made to the "Psychological Counseling and Guidance Unit" within the university. The reasons for applications by approximately 1000 students who sought assistance from this unit in the last five years were examined, and content analyses were conducted. Decisions regarding the assessment scale to be used in the application were made by considering the analysis results and information obtained from literature reviews related to the subject. At this stage, the application was also accepted for support by "Düzce University Scientific Research Projects" (project number: 2021.16.01.1163), and a special logo was designed for mobile applications. Following the decision of the university senate, the name of the application was determined to be "MODUM".

System Architecture and Software Preparation for Mobile Applications: The overall system architecture is designed to outline the structural framework and interactions within an application. The necessary software preparations were performed to establish a solid base for the functionality and features of the application.

The development of the MODUM Mobile Application Program consists of nine steps.

Step 1: Creation of systematic entry using student numbers
Step 2: Design of the login screen and informative areas, development of login functionalities and other connections
Step 3: Execution of front-end developments, creation of services for database and insert operations
Step 4: Testing of login and content screens
Step 5: Implementation of the notification infrastructure to be included in the application, design of reporting screens
Step 6: Creation of APIs for database connections
Step 7: Design of live monitoring screens, establishment of front-end and back-end API connections
Step 8: Conducting screen tests
Step 9: All tests were completed for mobile applications

Preparation of Mobile Application Infrastructure Components: The essential infrastructure components were prepared to ensure that the underlying elements supporting the application were robust and reliable.

Infrastructure Components: To examine the implemented application from an infrastructure-component perspective, Microsoft SQL was used as the database. NET Core is used for backend development, flutter for mobile devices, and angular for the web interface. The server infrastructure of the university was employed to handle multiple client requests and minimize security vulnerabilities. For media content such as images and videos, Amazon S3 services are preferred for their expertise in security and speed.

System Architecture: The system comprises four main components: API, mobile applications (Android and iOS), web panel, and database. Each domain operates in physically and software-isolated environments. The administrative panel of the software is web-based and written in an angular format. The database relationship (backend) was programmed using Net Core and the software database was written using Microsoft SQL. The software data tab was designed to comply with the relational database architecture. The software's mobile interface was written using Flutter, and the mobile application was operated on iOS version 10+ and Android version 7+ devices.

Development of the Mobile Application Flow Diagram: A comprehensive flow diagram was prepared to visually represent the workflow of the application and identify the interaction points within the application.

Login Screen: Users can enter the system on the login screen by typing the first six digits of their student number, age, and gender, followed by pressing the login button. In addition, the text for the Personal Data Protection Law (in Turkish KVKK) is in the middle of the page (Figure 1). The login screen does not collect any data in the category of 'personal data.' The data collected by the application only include whether the student is under or over 25 years old, their gender, and the faculty information they are registered with. These data are defined as tertiary data and are protected by the university's information technology network. Students not registered with the university or external participants can access the application using the codes of faculty departments associated with Düzce University. Random access is not permitted. After three random attempts, the system was locked.

Mood Diary Screen: This screen displays a total of nine emotions. In addition to the basic emotions found in the literature (23,24), the screen also includes emotions suggested by students based on the test results of the application. The user can select one of the nine emotional states displayed on the screen based on their mood. Upon making this choice, students can see the mood of other students in their department as a percentage below the emoji. The student then receives a motto as feedback related to the chosen emoji. Mottos were categorized according to their emotional expressions. Students can make emotional choices up to six times in 24 hours, once every four hours (Figure 1).

MOD Assessment Screen: Underneath the question "Do you want to feel better physically or mentally?", there is a section on mental and physical health, including the topic of reducing stress management.

Psychological Well-Being Screen: When an area is clicked, scale items related to that field are displayed. Points are accumulated as questions are answered and reverse items are processed. Assessment results can be viewed from the "my results" screen and are also reflected directly on the student's screen (Figure 2). Notifications appear on the screen regarding the scale scores and mean scores, guiding the student.

Stress Management Screen: Sleep aid and stress management sections contain "breathing exercise" and "body scan exercise," which are known to be effective tools for stress management, from Mindfulness applications (Figure 3).

Figure 1. Login screens

Figure 2. Assessment surveys

Figure 3. Stress management screens

MODUM Safety Screen: There is the "Women's Support Application" (in Turkish "KADES") application to share security issues related to the students themselves or others in emergencies. Emergency situations involving students or others were classified and organized into a flowchart.

Support for Friends in Need: Especially the section "if something is happening to a friend" is created to support students who are unreachable due to the inability to ask for help, stigmatization, and lack of awareness. A short survey will identify the emergencies of students, categorize them, and invite them for consultation.

MODUM Suggestions and Complaints Screen: This screen is categorized as on- or off-campus. Student issues are identified using data-mining techniques and conveyed to relevant departments. All the features of the application are shown on the map in Figure 4.

Preparation for Intervention within the Application: A triage system has been established within the application to cater to the support needs that may arise from university students. The system, arranged with yellow, orange, and red codes, plans to meet the student requests accordingly. A mental health professional (psychiatric nurse) plan was created to establish initial contact with the students and direct them toward triage. The details of the student triage are shown in Figure 5.

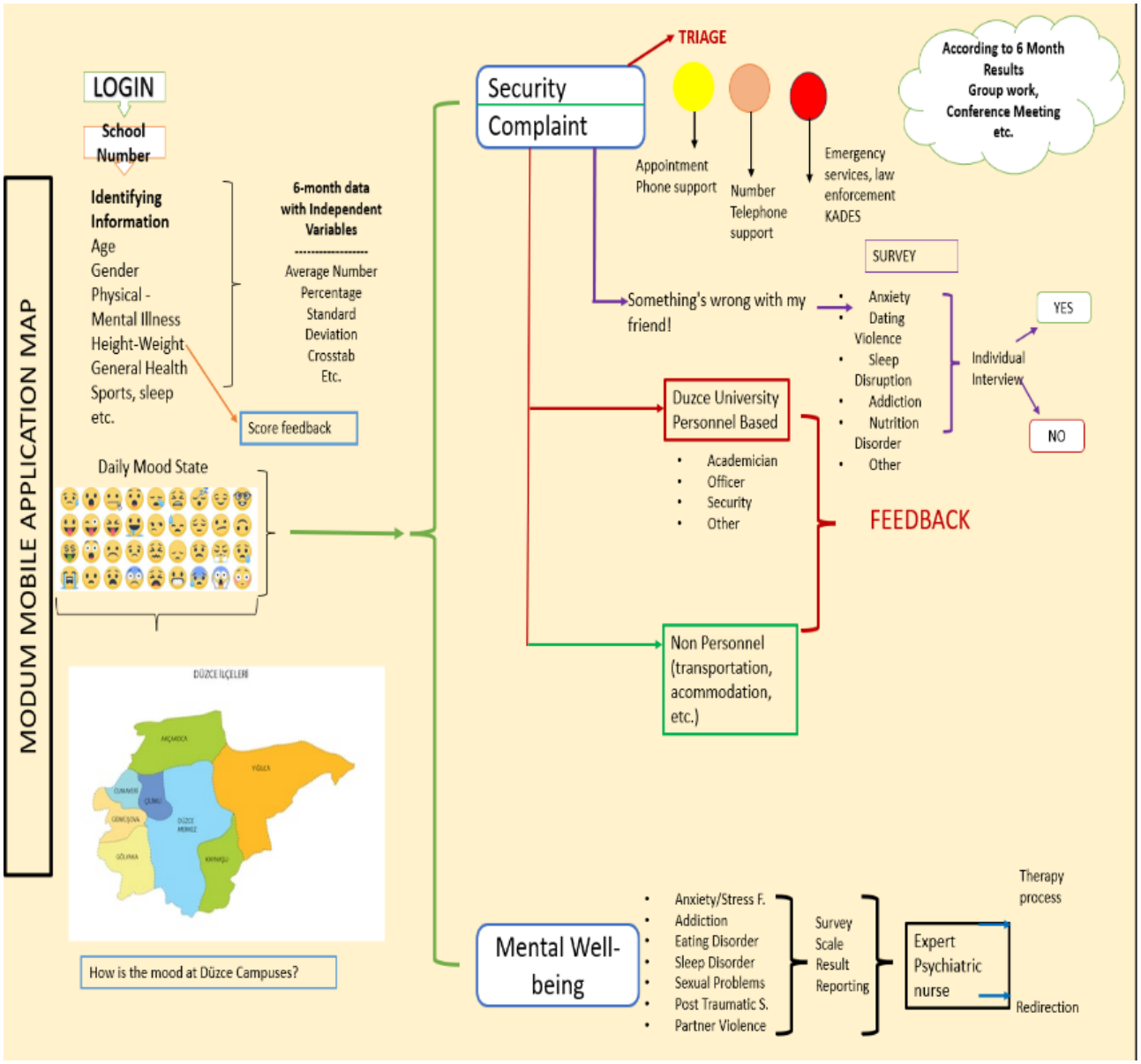

Figure 4. Application map

Testing the Mobile Application: The MODUM application was tested in two stages. In the first stage, the technical/structural features were tested, and in the second stage, the content, flow, and functionality of the algorithms were tested.

Technical/Structural Testing: To test the technical features and design of the application, feedback was sought from the students on various types of phones and usage habits. For this purpose, students from the university's associate degree in computer science programs were invited to participate in this research. A total of 200 students in the computer science department were informed about the MODUM application and research. Of these, 80 volunteers downloaded the MODUM application to their phones and tested it in terms of technical features. Simultaneously, the MODUM researchers used the application for three months, and student feedback was considered through an interactive process. At the end of three months, technical and structural errors and deficiencies were revised to finalize the application.

Testing of Content, Flow, and Algorithms: During this stage, the 'MODUM Application Assessment Form' created by researchers using literature resources was used. For this assessment, students from the university's Faculty of Health Sciences, Nursing Department were sampled. The reason for choosing this faculty was their experience in biopsychosocial health assessment and that they were receiving face-to-face education during the application process (due to online education triggered again by the earthquake in Turkey on February 6, 2023). A total of 120 nursing students in face-to-face education were informed of the study. Of these, 32 students who met the inclusion criteria (actively attending the university face-to-face, with at least six months of study duration, and without any physical/psychological disorders that could impair the use of the application or understanding of the questions) volunteered to participate in the sample.

Preparation of the Mobile Application Introduction: Three videos introducing the application were prepared and filmed in collaboration with the university's communication

and promotion coordination unit. These videos were published on university websites for all students.

Data Collection Instruments

Depression, Anxiety, and Stress Scale (DASS-42): The scale developed by Lovibond was adapted to Turkish by Akın and Çetin (25) with validity-reliability analyses conducted. It comprises 42 items graded on a 4-point Likert scale, covering depression, anxiety, and stress dimensions (26).

Dating Violence Attitude Scale: This scale was validated and tested for reliability by Terzioğlu et al. (27). It comprises 28 items on a 5-point Likert scale, measuring attitudes towards violence in dating relationships.

Addiction Profile Index (API): This scale was developed by Ögel et al. (28) to measure factors related to addiction, and consists of 37 questions on a 4-point Likert Scale.

Young Internet Addiction Test - Short Form: Adapted to Turkish by Kutlu et al. (29) and consisting of 12 items scored on a 5-point Likert scale measuring the level of Internet addiction.

Pittsburgh Sleep Quality Index (PSQI): The scale was developed by Buysse et al. (30), and adapted for Turkish by Agargun et al. (31). It is a self-report scale consisting of 24 questions to evaluate sleep quality and disturbances over a one-month time interval.

Eating Attitude Test: It is a 40-item, 6-point Likert-type scale developed by Garfinkel et al. (32,33) and adapted to Turkish by Savaşır and Erol (34), designed to measure symptoms of anorexia nervosa.

The MODUM Application Assessment Form: This form was prepared by the researchers with 10 questions based on a literature review. It is designed to evaluate users' physiological and psychological states using both open- and close-ended questions and application visuals.

Ethical and Legal Aspects of the Research

For the research, necessary permissions were obtained from the Scientific Research and Publication Ethics Committee of Düzce University (dated 30.09.2021, and numbered 219). All students involved in the research were informed in writing and verbally about the details of the research, and an "Informed Consent Form" was used. Institutional permission was obtained for retrospective evaluations of admissions made to the "Psychological Counseling and Guidance Unit." It was explicitly stated in writing and verbally that the information obtained from the research would not be used anywhere outside the research report, and that individuals could withdraw from the research whenever they wished. Legal advice regarding the protection of personal data for mobile applications was obtained from Düzce University.

The overall system architecture is designed to outline the structural framework and interactions within an application. The necessary software preparations were performed to establish a solid base for the functionality and features of the application.

Study Limitations

Conducting the study at a single center poses a limitation in terms of the generalizability of the research findings. The criterion for the study was that participants had to own and use a smartphone. Another limitation was the anonymity of the application. In this regard, text regarding the Personal Data Protection Law (in Turkish "KVKK") was placed on the application's login screen.

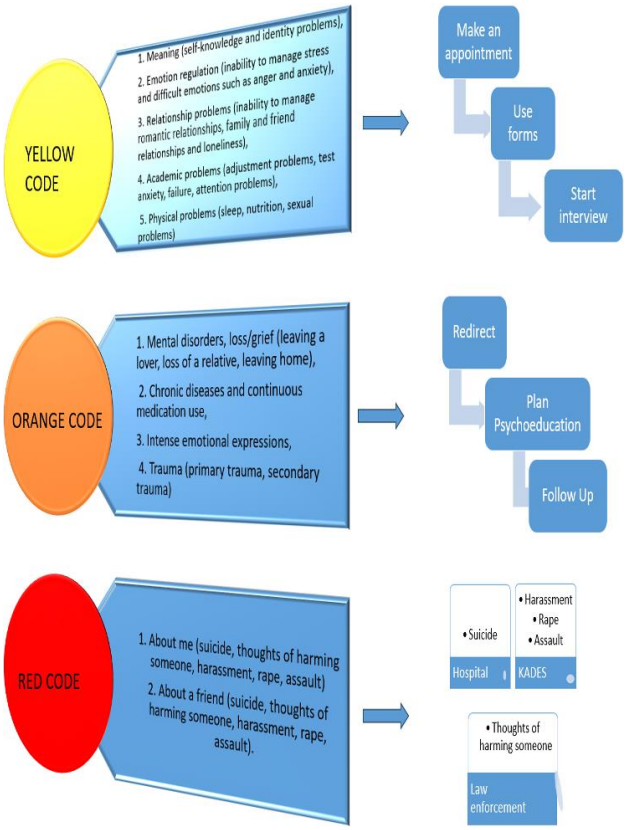

Figure 5. Students' triage

RESULTS

A preliminary assessment of the MODUM application was conducted to elicit users' real-world experiences, development suggestions, and overall evaluations. Development suggestions were presented to students for their opinions, anticipating that they would provide a comprehensive understanding of how the application could be optimized in terms of aesthetics, functionality, user information, and content.

A preliminary assessment of the MODUM application was conducted using the MODUM Application Assessment Form, which was designed to measure user perspectives on various critical aspects of the application. A total of 32 student responses from the university were received for this assessment. Of the students, 96.9% (n=31) liked the MODUM design, 96.9% (n=31) found the application user-friendly and easy to use, 93.8% (n=30) trusted the application's privacy measures, 90.6% (n=29) believed that the application would be beneficial to university students, 96.9% (n=31) were satisfied with the application's speed, 93.8% (n=30) recommended the application to other friends, and 87.5% (n=28) reported the content of the application to be adequate.

Suggestions for application development were presented under the following headings:

Content Enhancement: Suggestions were made to improve the clarity of the content, explicitly stating the purpose of the application and increasing the use of symbols that express emotions.

User Experience: Some students provided feedback on aesthetic and interactive features, such as color harmony, increasing the number of emoji, and interactive notifications.

Information and Transparency: Recommendations were made to provide user information at the initial login, elaborate on privacy details more thoroughly, and offer insights about the application content in the Play Store.
Emotional and Cognitive Feedback: The feelings and thoughts of the participants offer insights into the general acceptance of the application.
Overall Evaluation: Most participants expressed positive sentiments about the application's engaging design, its potential to create emotional awareness, and their perception of professionalism.
Considering these findings, the following steps are recommended for the further development of MODUM applications.

- Conducting detailed user research to understand user needs and expectations better,
- Focusing on the suggestions brought up by participants regarding privacy, content, and user experience,
- Maintaining and enhancing the positive aspects identified by users while making necessary adjustments in areas perceived negatively,
- Supporting the application's continuous improvement by establishing regular feedback collection and evaluation processes.

Our mobile application, designed to assess and support the psychological well-being of university students, was integrated with a series of functionalities to ensure a comprehensive user experience. The results obtained for these functionalities are described in detail below:

DISCUSSION

In recent years, the increased use of mobile health applications among university students has emerged as one of the most exciting developments in the health sector. Analyses in this realm reveal the substantial role of these applications in assessing and improving the mental health of students. These students often face psychological health problems exacerbated by various factors, including academic stress, social pressure, and lack of sleep (35-37). In this context, instant access and intervention provided by mobile health applications are recognized as significant steps in addressing these problems (18,38,39).
Particularly during the COVID-19 pandemic, the isolation and uncertainty experienced have heightened the importance of such applications (40). The economic accessibility of mobile health applications, proven to have similar effectiveness as traditional therapies, is also advantageous for students (11,19,21). Customized applications for students are reportedly more effective than general health applications as they accurately assess and address the specific needs of students. This emphasizes the necessity of designing applications tailored to the target audience rather than generalized ones (22,37). A study by Lee and Jung (14) suggested that mindfulness-based applications such as DeStressify can offer effective alternative support for the mental health of university students. Universities and other institutions could benefit from promoting the use of DeStressify or other Mindfulness-based mobile health applications for students interested in anxiety management or self-guided health support based on mindfulness. In addition to these programs, this study introduced a new application to evaluate the mental and physical health of students, particularly focusing on the context of Turkey.
However, despite these positive prospects, potential problems exist, such as concerns about the protection of personal data and security (39). Developers and healthcare providers must implement necessary security measures to ensure the safe widespread use of such applications. Significant issues and inconsistencies related to privacy in mobile health applications have been observed, and clinicians must be aware of the benefits and risks of mobile health applications and communicate them clearly to patients (41). The integration of artificial intelligence and new technologies can enhance the effectiveness and user-friendliness of mobile health applications (42).
The current study, aimed at developing a mobile application (MODUM) for monitoring and improving the psychological well-being of university students, presents significant findings that align with the global trends observed in mobile health application usage among university students, as well as some unique insights pertinent to the Turkish context.
Studies indicate a general acceptance of mobile application-based interventions among college students for managing stress, anxiety, and depression, emphasizing the effectiveness and proactive role these tools can play in mental health management (1).
The MODUM application's high user satisfaction rates echo findings from studies that found that pharmacy students using mobile health applications reported higher e-health literacy (2). This indicates not only readiness but also a positive perception of mobile health solutions among Turkish students. In a broader study examining Turkish college students' attitudes towards mental health applications, it was observed that while many students were aware of such applications, their usage remained relatively low. Students expressed an interest in applications that provide stress management tools and mood tracking, which aligns with the features offered by the MODUM application (3).
MODUM's feature of real-time emotional tracking is relevant to Lee and Jung's (14) analysis of the DeStressify application, where mindfulness-based applications were effective in reducing anxiety. The capability of MODUM to enable users to monitor their emotional states provides a direct tool for self-awareness and stress management, a critical aspect during challenging times such as the COVID-19 pandemic, as seen in Spain’s increased reliance on mental health applications (4).
The MODUM application focuses on providing content that is not only adequate but also educational, aligning with the need for increased education in the usage of mobile health applications, as highlighted in the study on Istanbul pharmacy students. The feedback on content adequacy (87.5% positive) suggests a well-received approach, yet also points towards an area for continuous improvement.
Concerns regarding the security and privacy of mobile health applications are a common barrier to wider adoption, as noted in studies from Morocco, and broader privacy concerns have been discussed in Turkish studies (5). The MODUM's development process includes stringent measures to protect user data, mirroring the global need for secure mobile health solutions.
The acceptance and integration of mobile health applications such as MODUM into university health

systems is crucial. This study's emphasis on a structured and rigorous development process ensures the reliability and functionality of the applications, which could facilitate their integration into university support systems, thereby enhancing their utility and acceptance among students.

The findings from the MODUM application development and evaluation study not only reinforce the global recognition of mobile applications as viable tools for enhancing mental health among university students but also highlight specific aspects such as real-time monitoring and educational content that are critical for their success. Future research should focus on overcoming barriers related to privacy and security and enhancing the educational components of these applications to ensure they meet the diverse needs of the student population. In addition, continual feedback mechanisms and iterative improvements are crucial for maintaining the relevance and efficacy of these applications in a rapidly evolving digital landscape.

In Turkey, we observed the absence of a mobile application designed to assess and monitor the physical and mental health of university students. Our examinations have revealed that existing mobile applications mainly introduce universities and focus on logistics subjects, but they lack a section to identify the individual needs of students. This study was the first of its kind in Turkey and was designed to address the gap in health development among university students.

CONCLUSION

The results of this study can be grouped as follows:

Innovative Application Development: This research successfully developed a comprehensive and innovative mobile application specifically designed to assess and enhance the psychological well-being of university students, addressing an essential unmet need in higher education institutions.

Real-Time Emotional Tracking: The application uniquely incorporates real-time emotional tracking, allowing students to monitor and gain awareness of their immediate emotional states, activating an early warning system for prolonged negative emotions to prompt acknowledgment and action.

Comprehensive Health Monitoring and Professional Referral: The application facilitated holistic health monitoring, provided students with a detailed review of their mental and physical health statuses, and enabled seamless referrals to qualified professionals for immediate intervention and support in urgent situations.

Data-Driven Approach: A standout feature of the application is its ability to utilize real-time data reporting, offering insights into the mental state of students across multiple campuses and enabling the development of programs specifically tailored to address the diverse needs of the student population proactively.

Enhanced Security and Privacy: While illustrating the transformative potential of mobile health applications in mental healthcare for university students, the study also highlighted the crucial need for advancements in security and privacy to foster the wider adoption and efficacy of such technologies in the context of higher education.

University years are pivotal for both the personal and academic development of young individuals, as preserving their mental and physical health directly affects their academic achievements. However, current technological tools and mobile applications usually focus on logistics needs and overlook students' psychological well-being. A serious deficiency in this domain has been observed in Turkey, and the application developed is expected to fill this gap and contribute to students.

The findings of this study demonstrate that mobile health applications developed to evaluate and support the mental conditions of university students offer unique benefits, but also encounter certain challenges. For future advancements in this field, more extensive research on the efficiency, safety, and user-friendliness of these applications is crucial. One of the most important steps in this field is directing attention to understanding students' specific needs and designing applications to meet these needs. Efforts to overcome security and privacy concerns can facilitate the adoption of this technology by a broader audience. Continuous research and development efforts are crucial to ensure the efficacy and safety of such applications, with real-world data and user experience playing a significant role in making these applications more effective and user-friendly.

Ethics Committee Approval: The study was approved by the Scientific Research and Publication Ethics Committee of Düzce University (30.09.2021, 219).

Conflict of Interest: This manuscript was produced based on the doctoral thesis of Dilek Demirezen, the first author, and all authors declare that there is no conflict of interest.

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