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# Validation of the Emotions&Care App: A MobileApplication for Supporting Mental Health of College Students

# Validación de Emotions&Care: una aplicación móvi para apoyar la salud mental de estudiantes universitarios

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**Abstract**

College students have experienced an increment in mental health issues due to the COVID-19 pandemic. When students start college, their mental health can be affected by emotional, social, or academic requirements. It is essential to provide tools for supporting the mental health of this population. In this paper, we present the validation of the Emotions&Care app, a mobile application for supporting the mental health of college students. Emotions&Care follows a user-centered design and provides mental health screening and monitoring. We used gamification techniques to motivate the sustained use of the app. Emotions&Care also allows mental health specialists to monitor college students' mental health by tracking daily notes and emotions and by controlling appointments. We validated Emotions&Care with eleven college students and four mental health specialists. Our results indicate that Emotions&Care has the potential to provide college students with mental health screening and monitoring; however, several design issues should be addressed to ensure its extended-term use.

***Keywords—*** College students, Mental health, Mobile app.

**Resumen**

Los estudiantes universitarios han experimentado un aumento de los problemas de salud mental debido a la pandemia de COVID-19. Cuando los estudiantes comienzan la universidad, su salud mental puede verse afectada por requisitos emocionales, sociales o académicos. Es importante proporcionar herramientas para apoyar la salud mental de esta población. En este artículo, se presenta la validación de Emotions&Care, una aplicación móvil para apoyar la salud mental de los estudiantes universitarios. Emotions&Care sigue una metodología de diseño centrado en el usuario y proporciona detección y seguimiento de la salud mental. Utiliza técnicas de gamificación para motivar el uso sostenido de la aplicación. Emotions&Care también permite a los especialistas en salud mental monitorear la salud mental de los estudiantes universitarios a través del seguimiento de notas, emociones diarias y el control de citas. Emotions&Care fue validada con once estudiantes universitarios y cuatro especialistas en salud mental. Los resultados indican que Emotions&Care tiene el potencial de proporcionar a los estudiantes universitarios detección y seguimiento de la salud mental; sin embargo, se deben abordar varios problemas de diseño para garantizar su uso a largo plazo.

***Palabras clave—*** Estudiantes universitarios, salud mental, aplicación móvil.

# 1 Introduction

The World Health Organization (WHO) defines mental health as *a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can make a contribution to his or her community"* (World Health Organization, 2004). Mental health is an integral part of an individual's general health and well-being and a basic human right. Good mental health means people are better able to connect, function, cope, and thrive. Mental health exists on a complex continuum, with experiences ranging from an optimal state of well-being to debilitating states ofgreat suffering and emotional pain (World Health Organization, 2022).

College students have experienced an increment in mental health issues due to the COVID-19 pandemic. When students start college, their mental health can be affected by emotional, social, or academic requirements. Several studies have documented the impact of the COVID-19 pandemic on the mental health of college students (Salimi, Gere, Talley, & Irioogbe, 2023; Wang et al., 2020), indicating an increased difficulty in concentration, sleeping, and eating patterns as well as an increase in social isolation, concerns about academic performance, and overall disruption in well-being (Salimi et al., 2023).

A sign of poor mental health is depression, which is not just about being sad or disinterested; it can lead to suicidal behavior. Suicide is related to most severe mental disorders, and in the case of people with depression, the risk is 21 times higher than in the general population. According to the WHO, suicide is the second cause of death in people between 15 and 29 years of age, ranging from high school to completion of college studies (Auerbachet al., 2019).

The mental health issues that college students might experience can lead them to seek help professionally or research themselves on the topics of interest. However, it is well known that much of the information on the internet today may come from an unreliable source or need better support (Ramón-Arbués et al., 2020).

The development of new technologies can be used to develop innovative ways to support college students' mental health. More than 10,000 mobile applications (apps) are available for download on mental health for evaluation or treatment of mental disorders. For example, the WHO recommends *"promoting self-care through mobile and electronic health technologies"* (López-Santín & Álvaro Serón, 2018). However, many of these mobile applications are not designed according to the user's needs and without the support of mental health specialists.

In this paper, we present the validation of the Emotions&Care app, a mobile application for supporting the mental health of college students. A complete design iteration of Emotions&Care using the Design Thinking methodology (T. Brown, 2008) was previously reported in (anonymous for review). We used the first design validation results to improve the application and develop a high-fidelity prototype. We validated the new version with eleven college students and four mental health specialists. Our results indicate that Emotions&Care has the potential to provide college students with mental health screening and monitoring; however, several design issues should be addressed to ensure its long-term use.

## 2 Related work

Mobile apps for screening mental health are available in the literature. For example, the study of (BinDhim et al., 2015) presents a cross-sectional study of a depression screening mobile app containing a patient health questionnaire, a brief anxiety test, and personalized recommendations based on the user's results. Eight thousand two hundred forty-one participants from 66 countries downloaded the app, with a response rate of 73.9%. While one-quarter of the participants had a previous diagnosis of depression, the prevalence of participants with a higher risk of depression was 82.5%. The authors concluded that mobile apps could deliver a screening tool for depression across many countries.

Regarding the college student population, some studies have shown how app-based intervention can support depression (Lahtinen, Aaltonen, Kaakinen, Franklin, & Hyönä, 2023; Lattie et al., 2022). The study of (Lahtinen et al., 2023) presents a 4-week randomized controlled trial with 561 college students divided into a treatment group (publicly available mindfulness app) and an active control group (psychoeducational online content). Results showed that using the mindfulness app for four weeks resulted in small reductions in stress and depression. These results show that mindfulness apps offer modest but clear benefits to users in terms of improved mental health.

We systematically searched applications using Google Play and the App Store to investigate what commercial applications have been developed to support students' mental health. We use four keywords related to the research topic: Depression, anxiety, mental health, andstudents.

The search results show a great variety of commercial Apps. In particular, 25 apps were available on Google Play, and over 100 were in the App Store in April 2024. We analyze the search results to investigate commercial applications that are aimed at mental health, treating symptoms of depression and anxiety, and aimed at university students. We extract app information, including the app name, main characteristics, target users, scientific evidence, availability of the evidence, screenshots of the graphic user interfaces, and advantages anddisadvantages according to user reviews.

We also verified whether the apps had scientific evidence supporting their effectiveness and efficiency. We searched scientific papers on PubMed, the Journal of Medical Internet Research (JMIR), Scopus, ScienceDirect, EBSCO, ProQuest, Frontiers, and Google Scholar. In the following paragraphs, we describe the most relevant apps found.

The Wysa app (Chang, Sinha, Roy, & Wong, 2024) includes a Chatbot for anxiety using Artificial Intelligence. The advantages are that it provides audio and video sessions with a therapist and has a library of more than 150 self-care tools with scientific support. Some disadvantages are that it limits human interaction, is inappropriate for all cases, and is expensive.

The Sanvello app (Litvin et al., 2023) includes mindfulness techniques, meditation exercises, and personal attention. However, personalized attention is limited, complete access is expensive, and social support is limited. Similarly, the Calm app (May & Maurin, 2021) includes meditation, mindfulness, and breathing exercises. The disadvantage is that some content is only available through an optional paid subscription.

Finally, the Youper app (Potts et al., 2023) includes depression, anxiety, personality, panic, and social anxiety tests. The drawbacks are that paying to see the progress graphs isnecessary and does not offer behavioral therapy.

The overall findings in the analysis of the search results indicate that there are many applications for mental health to treat symptoms of depression and anxiety; however, they are not focused on university students—also, the majority lack scientific evidence. Additionally, many have negative comments specific to the special functions of mental health management.

# 3 Research Methodology and Prior Work

We are following the Design Thinking methodology (T. Brown, 2008), a user-centered design approach that allows iteration and contributes to solving solutions for difficult and complex problems by understanding users' needs and developing appropriate solutions to support them (Pereira, Parizi, Prestes, Marczak, & Conte, 2021). Design Thinking consists of five phases: (1) Empathize, (2) Define, (3) Ideate, (4) Prototype, and (5) Test. The first iteration of the methodology was published in (Guevara Rodriguez et al., 2023). This paper presents the second iteration of the methodology, going forward, and backyards between the prototype and test phases. We used the first iteration results from the test phase to improve the app's design and build a high-fidelity prototype (a second iteration). We validated the high-fidelity prototype with eleven college students and four mental health specialists. Next, we describe the second iteration of the Emotions&Care App, following the results of the validation sessions with college students and mental health specialists.

# 4 The Emotions&Care App: Second Iteration

The Emotions&Care App is a mobile application designed to support college students' mental health. The app's main features include mental health screening, recommendations, daily notes, emotion tracking, specialists' appointment tracking, and community. Emotions&Care also includes a mental health specialist module, where specialists can monitor college students' mental health.

## 4.1 Mental health screening and recommendations

Emotions&Care uses the Beck Depression Inventory-Second Edition (BDI-II) (Figure 1(a, b)), a 21-item self-report rating inventory that measures characteristic attitudes and symptoms of depression. The BDI-II results range from absent or minimal depression to severe depression (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)(Figure 1(c)). Emotions&Care does not provide a mental health diagnosis; it informs the user about their possible mental health status and always recommends going to a mental health specialist.

Once the college student finishes the mental health screening through the standardized tests, the app invites her to continue using it, providing daily mental health recommendations (Figure 1(d)). We surveyed scientific studies that provide recommendations for improving and balancing mental health. We grouped the recommendations into five categories: diet, sleep, physical activity, social life, and relaxation techniques.

## 4.2 Mental health monitoring

College students can write daily notes using the app to monitor their mental health (Figure 2(a)). Additionally, college students can add emotion to each note (Figure 2(b)). In this way, college students can monitor their daily notes and emotions through different visualizations (Figure 2(c)). Mental health specialists can also use Emotions&Care to monitor the mental health of college students, observing their daily notes, emotions, and test results. Specialists and college students can manage therapy appointments. College students can also search for mental health specialists according to a therapeutic approach, proximity location, or otherrelated search filters.

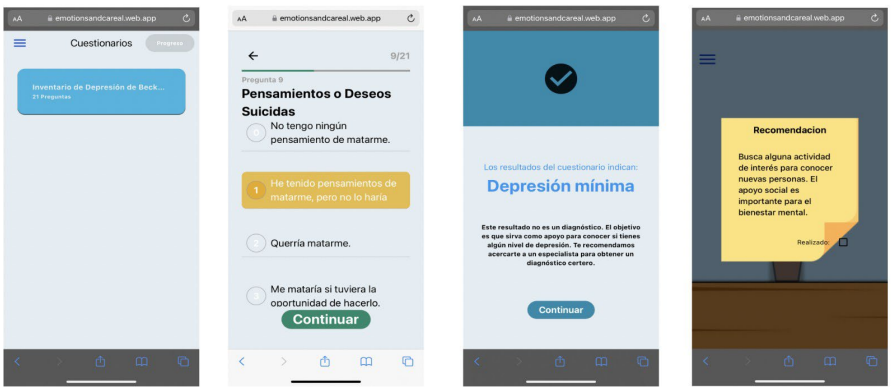



**Figure 1.** Mental health screening and recommendations features of the Emotions&Care app. (a) Screening test available; (b) BDI-II Questionnaire fragment; (c) Results of the BDI-II Questionnaire; (d) Example of social life recommendation.

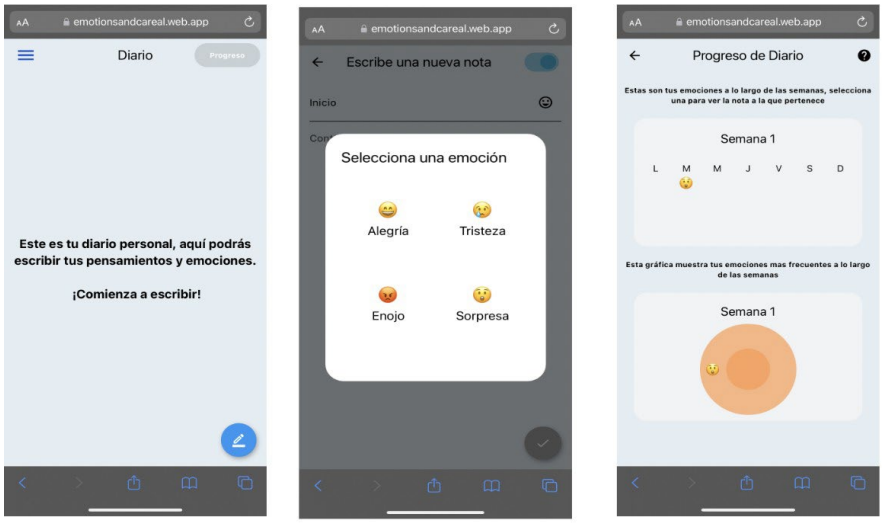
## 4.3 Gamification techniques

Gamification involves applying game design elements in non-game contexts. It has demonstrated its potential to foster user motivation, engagement, and enjoyment in computer-mediated environments (Seaborn & Fels, 2015). In web-based mental health interventions, several studies have suggested that incorporating game mechanics could improve treatment adherence and program engagement (M. Brown et al., 2016; Hopia & Raitio, 2016).

Emotions&Care adopted a gamification approach based on fundamental psychological principles, such as self-determination theory and intrinsic and extrinsic motivation (Seaborn & Fels, 2015). Multiple gamification elements have been incorporated to encourage user engagement and adherence. First, a visual feedback and progression system was implemented using a flower growth metaphor (Figure 3(a, b)). The flower grows and advances to new levels as the user completes tasks and achieves goals, providing a tangible representation of individual progress. This approach is based on the experience systems commonly used in video games, which reward positive actions and progress toward goals (Zichermann,2011).

Additionally, the application awards a badge upon meeting certain milestones, taking advantage of the extrinsic motivation and sense of achievement these digital rewards can generate (Figure 3(d)). On the other hand, social engagement loops have been incorporated to allow users to send anonymous notes of encouragement to other community members (Figure 3(c)). This mechanic encourages positive interactions and a sense of belonging while encouraging re-entry into the application to continue interacting and receive feedback (Zichermann, 2011).

The gamification design of Emotions&Care is based on a combination of intrinsic motivations (such as personal growth represented by the flower) and extrinsic motivations (such asbadges and social recognition), following the recommendations of the literature on effective gamification techniques (Seaborn & Fels, 2015; Zichermann, 2011).




(a) (b) (c)

**Figure 2.** Daily notes and emotion tracking features of the Emotions&Care app. (a) Daily note's introduction; (b) Emotions available for adding to each daily note; (c) Visualizations for tracking emotions.

# 5 Emotions&Care Validation Sessions

## 5.1 Methods

We conducted two validation sessions, one with eleven college students (five females; average age = 21 years; SD = 2.5 years; seven participants had attended therapy sessions) and one with four mental health specialists (three females; average age = 42.5 years; SD = 3.7 years, all psychologists). In each session, we explained the project's goals. Then, with the guidance of the research team, each participant interacted with the high-fidelity prototype of the app. We asked them to carry out tasks with the application related to its functions. Finally, each participant answered a short survey consisting of demographic information and the System Usability Scale (SUS) Questionnaire to measure usability. The short survey also included open-ended questions to investigate participants' qualitative perceptions of the prototype. At the end of the session, we thanked our participants for helping us validate the app. For mental health specialists, we also used the Technology Acceptance Model (TAM) (Silva,2015) to measure perceived usefulness and ease of use.

## 5.2 Results

Table 1 shows college students' and mental health specialists' average scores from the SUS Questionnaire. A SUS score above 68 would be considered above average, and anything below 68 is below average. According to Table 1, college students and mental health specialists obtained a score below the average, which may indicate usability problems

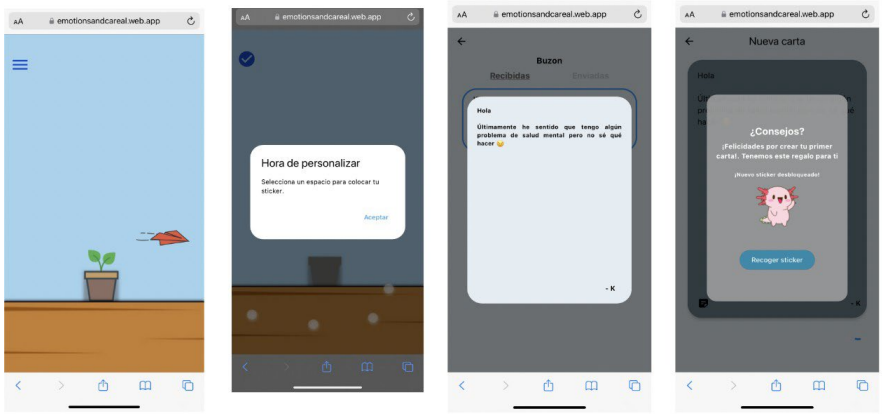



**Figure 3.** Gamification techniques. (a) The flower growth metaphor; (b) Personalization options for placing badges; (c) Community feature; (d) Example of a badge(digital rewards).

encountered with the interface. During the validation session with college students, several issues regarding functionality emerged, which could have caused an impact on perceived usability. On the other hand, mental health specialists expressed that they were confused with some functions and icons when looking for options to solve the assigned tasks.

Regarding the TAM results, we obtained an average score of 5.20 for usefulness and 5.18 for the ease-of-use dimension, which is above average. This indicates that Emotions &Care was perceived as useful and easy to use.

From the qualitative results, most college students mentioned that their favorite part of Emotions&Care was the daily notes and emotion tracking. They also enjoyed the flower growth metaphor and the community module. Their most minor favorite aspect was consulting the appointment schedule with their mental health specialist. One reason for this is that this module had many functionality problems since it did not save the appointments made in the agenda, and the application had to be restarted several times.

Mental health specialists mentioned that their favorite app feature was monitoring the mental health of college students through daily notes, test results, and emotion tracking. Some suggestions for improving the app were changing the icons, adding more tests for mental health screening, and allowing mental health specialists to add specific recommendations according to the college student's needs. The four specialists agreed that Emotions&Care can optimize the specialist's work and facilitate access to mental health services; however, they mentioned that correcting icons and errors in functionalities and reviewing thelegal aspect of data use is essential.

Table 1: SUS Scores by participants' group.

| Participants' group | SUS Score |
|---|---|
| College Students | 62.27 |
| Mental Health Specialists | 62.50 |

# 6 Conclusions and future work

This paper presents the Emotions&Care validation with eleven college students and four mental health specialists. Emotions&Care is designed to support mental health screening and monitoring using several gamification techniques. The validation results show that there are still some design issues to address before deploying Emotions&Care with college students and mental health specialists. However, participants perceived Emotions&Care as a useful tool for supporting mental health. In the future, we plan to integrate more standardized tests to screen for depression, anxiety, and other mental health disorders. We also plan to integrate the validation results into a new app iteration and deploy it to study its long-term use. Finally, considering their specific needs, we plan to offer different types of licenses or memberships to offer Emotions&Care services to different universities.

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