



# Developing a smartphone App based on the Unified Protocol for the transdiagnostic treatment of emotional disorders: A qualitative analysis of users and professionals' perspectives

Jorge Osma<sup>a,b,\*</sup>, Laura Martínez-García<sup>a,b</sup>, Javier Prado-Abril<sup>b,c</sup>, Óscar Peris-Baquero<sup>a,b</sup>, Alberto González-Pérez<sup>d</sup>

<sup>a</sup> University of Zaragoza, Department of Psychology and Sociology, Faculty of Social and Human Sciences, C/Atarazanas, 4, 44003 Teruel, Spain

<sup>b</sup> Health Research Institute of Aragon, Biomedical Research Center of Aragon (CIBA), Av. San Juan Bosco, 13, 50009 Zaragoza, Spain

<sup>c</sup> Miguel Servet University Hospital, Zaragoza, Spain

<sup>d</sup> Institute of New Imaging Technologies, Universitat Jaume I, Av. Vicente Sos Baynat s/n, 12071 Castellón, Spain

## ARTICLE INFO

### Keywords:

Unified protocol  
Emotional disorders  
Smartphone app  
Thematic content analysis  
Qualitative methods  
m-Health

## ABSTRACT

Emotional Disorders have become the most prevalent mental disorders in the world. In relation to their high prevalence, mental health care from public health services faces major challenges. Consequently, finding solutions to deliver cost-effective evidence-based treatments has become a main goal of today's clinical psychology. Smartphone apps for mental health have emerged as a potential tool to deal with it. However, despite their effectiveness and advantages, several studies suggest the need to involve patients and professionals in the design of these apps from the first stage of the development process. Thus, this study aimed to identify, from both a group of users and professionals, the needs, opinions, expectations and design aspects of a future smartphone app based in the Unified Protocol (UP), that will allow to develop the subsequent technical work of the app engineers. Two focus groups were conducted, one with 7 professionals and the other with 9 users, both groups familiar with the UP. A thematic content analysis based in grounded theory was performed in order to define emergent categories of analysis derived from the interview data. The results revealed 8 common topics in both focus groups and 5 specific key topics were identified in the professionals' focus group. Of the total proposals, 93 % of the professionals' and 78 % of the users' are implemented in the preliminary version of the app.

## 1. Introduction

Emotional Disorders (EDs), that include anxiety, depression and related disorders, are highly prevalent in the general population around the world (WHO, 2021). In Spain, the prevalence of anxiety disorders and depression reached 21.6 % and 18.7 % respectively in 2020 (OECD, 2021). EDs are highly disabling (Baxter et al., 2013) and are associated with poorer quality of life, functional impairment and significant personal, social and economic costs (Parés-Badell et al., 2014). In relation to this high prevalence and severity, psychological care from public health services faces major barriers such as, for example, lack of human

resources, with only 5.4 psychologists per 100,000 inhabitants in Europe (WHO, 2021) and 5.58 clinical psychologists per 100,000 in the Spanish National Health System (NHS) that compromises proper access to psychological treatment (Fernández-García, 2021; Prado-Abril et al., 2019). In turn, this data is accompanied in the NHS by long waiting lists, with more than a 45-day wait to receive mental health assistance for the first time from a clinical psychologist or psychiatrist (WHO, 2018) and a face-to-face psychological treatment session every 4 to 6 weeks (Osma et al., 2021).

Psychological interventions based on a transdiagnostic approach, as the Unified Protocol for the Transdiagnostic Treatment of Emotional

*Abbreviations:* EDs, Emotional Disorders; NHS, National Health System; PDAs, personal digital assistants; PMHC, Public Mental Health Center; UCD, User-Centered Design; UP, Unified Protocol.

\* Corresponding author at: Universidad de Zaragoza, Departamento de Psicología y Sociología, Facultad de Ciencias Sociales y Humanas, C/Atarazanas, 4, 44003 Teruel, Spain.

*E-mail addresses:* [osma@unizar.es](mailto:osma@unizar.es) (J. Osma), [715474@unizar.es](mailto:715474@unizar.es) (L. Martínez-García), [jprado@salud.aragon.es](mailto:jprado@salud.aragon.es) (J. Prado-Abril), [operis@unizar.es](mailto:operis@unizar.es) (Ó. Peris-Baquero), [algonzal@uji.es](mailto:algonzal@uji.es) (A. González-Pérez).

<https://doi.org/10.1016/j.invent.2022.100577>

Received 20 March 2022; Received in revised form 5 September 2022; Accepted 27 September 2022

Available online 29 September 2022

2214-7829/© 2022 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Disorders (UP; Barlow et al., 2018), are considered as an opportunity to address the barriers to psychological treatment in public health services mentioned above. This approach seeks the identification of etiological and maintenance mechanisms shared between different Eds or groups of disorders (Sauer-Zavala et al., 2017). Moreover, by focusing on common mechanisms in different EDs, the UP offers numerous advantages over protocols designed for the treatment of specific disorders, such as allowing treatment of people presenting comorbidity (Brown et al., 2001) and the reduction of costs associated with the training of mental health professionals in each of the specific treatments for each EDs Evidence-Based Psychological Treatments (Steele et al., 2018). In turn, different studies have demonstrated the versatility, flexibility and adaptability of the UP to different problems (Sauer-Zavala et al., 2021; Martínez-Borba et al., 2022) and formats (Reinholt et al., 2017; Sandín et al., 2020). Regarding its efficacy, several systematic reviews and meta-analysis have shown that UP is a highly effective treatment for EDs, with improvements in anxious and depressive symptoms with moderate to large effect sizes that appear to be maintained over time (Carlucci et al., 2021; Cassiello-Robbins et al., 2020; Sakiris and Berle, 2019). Finally, a recent study has shown that UP can be a cost-effectiveness solution for the Spanish public mental health system compared to treatment as usual (Peris-Baquero et al., 2022).

At the same time, an intervention format that is increasingly attracting scientific interest, and which would also address the barriers to psychological care in public health services, is based on the use of mobile apps to provide psychological treatment (Miralles et al., 2020). These apps are considered part of a new field of medicine so-called m-health (WHO, 2011, p. 6) and could be useful to reduce the global burden associated with mental disorders (Torous et al., 2021). Research literature is starting to collect some effectiveness data of this type of mobile apps for the improvement of emotional symptomatology and EDs (Lecomte et al., 2020; Linardon et al., 2019). In addition to their effectiveness, psychological interventions via smartphone apps offer numerous advantages, such as, for example, acting as a complement to therapist-led face-to-face treatment, increasing its effectiveness and reducing the workload of the professional (Miralles et al., 2020).

Despite the effectiveness and advantages of this type of mobile apps, individual face-to-face intervention format is the most preferred by users of Spanish mental health units. Compared with 85.4 % of patients who prefer the individual intervention format, only 14.2 % prefer the group format and 0.4 % opt for the online format (Osma et al., 2019). The aforementioned makes blended format, which combines elements of both face-to-face and online interventions (Erbe et al., 2017), a suitable alternative to improve the current situation of psychological care in our NHS. Blended format allows integrating the advantages of face-to-face individual treatments with the advantages offered by online treatments. Thus, this intervention format confers advantages such as allowing therapists to use technology to motivate, supervise, support and continue treatment through this between sessions (Wentzel et al., 2016). In turn, this format decreases the number of face-to-face contacts, leading to a reduction in overall treatment costs. And, in addition, it saves therapists time without reducing the outcome of therapy, reduces treatment dropouts and helps to maintain the benefits obtained from treatment over time (Erbe et al., 2017). Regarding the efficacy of blended interventions, we found results indicating that these are equally effective as face-to-face treatments for anxiety symptoms (Leterme et al., 2020) and major depression (Ly et al., 2015).

Despite the advantages and effectiveness of blended interventions, an aspect to be taken into account in order to ensure optimal engagement with the mobile app, is to include users in the design of the app from the first stage of the process (Garrido et al., 2019; Torous et al., 2018). This approach is known as User-Centered Design (UCD) and entails involving users in all stages of the design process from design planning to implementation (Dekker and Williams, 2017) basing the process on information gathered from the people and contexts where the app will be used (Lyon and Koerner, 2016). Although this is a new

approach for the design of mental health apps (Torous et al., 2018), in the field of m-health, this approach involves end-users in order to get their feedback on desired features and functionalities, so that their input can be incorporated into the app development process to improve the usability and expected outcomes of interventions (Molina-Recio et al., 2020). Preliminary results regarding user-centered design in mental health apps are promising, such as the randomized controlled study testing the iBobbly app for suicide prevention, in which adherence was 97 % (Tighe et al., 2017). Finally, data suggest not only involving users in the process of designing mental health apps, but also health professionals, asserting that taking them into account increases confidence in the app (Alqahtani and Orji, 2020).

The aim of this study was to design an app based on the Unified Protocol for the Transdiagnostic Treatment of Emotional Disorders (UP; Barlow et al., 2018). In order to achieve this, as the first stage of the user-centered design process, we will find out the needs, opinions, expectations and design aspects of the users and professionals of the NHS regarding the app that will allow to develop the subsequent technical work of the app engineers. In this way, we seek to maximize the usefulness of the UP and the blended format, adapting the app to the specific needs of the Spanish NHS setting. Thus, both perspectives identified can serve as barriers or facilitators of treatment engagement, with the aim of ensuring and increasing effectiveness and adherence to treatment and improving the care offered by public mental health settings to users with EDs. The information collected will be used to develop a preliminary version of the app whose usability and acceptability will be evaluated in a future study by users and professionals as the second stage of the user-centered design process.

## 2. Method

### 2.1. Participants

The sample in the present study was selected by convenience and they were professionals and users who had collaborated previously in a multicenter randomized clinical trial developed across NHS (Osma et al., 2018). Sample size of the focus groups was determined by focus group guidelines, which mention an ideal size of 8–10 participants (Krueger and Casey, 2008). The professionals group ranged in age from 33 to 58 years old (Mean = 46, SD = 9.25) and 85.7 % (n = 6) of them were women. Regarding users, the group ranged in age from 26 to 49 years old (Mean = 38.11, SD = 8.94). Demographic and professional characteristics of the 7 professionals are depicted in Table 1 and demographic and clinical characteristics of the 9 users are depicted in Table 2.

### 2.2. Measures

The instrument used for this study was a semi-structured interview developed ad hoc (see Table 3), with the objective of collecting as much information as possible in order to subsequently transfer and include it in the development of the mobile app.

**Table 1**  
Demographic and professional characteristics of the 7 professionals.

P	Gender	Age	Clinical experience (years)	UP hours of training	How many users have you applied the UP to?
1	Woman	40	14	20	80
2	Woman	58	24	36	20
3	Woman	33	5	24	15
4	Woman	46	7	8	20
5	Man	50	25	25	25
6	Woman	56	30	24	30
7	Woman	39	5	36	25

**Table 2**  
Demographic and clinical characteristics of the 9 users.

P	Gender	Age ranges	ED diagnosis <sup>a</sup>
1	Woman	(40–50)	Anxiety disorder
2	Woman	(20–30)	Anxiety disorder
3	Woman	(40–50)	Adjustment disorder
4	Woman	(40–50)	Obsessive–compulsive disorder
5	Man	(40–50)	Depressive disorder
6	Man	(20–30)	Adjustment disorder
7	Woman	(40–50)	Anxiety disorder
8	Woman	(30–40)	Anxiety disorder
9	Woman	(30–40)	Obsessive–compulsive disorder

<sup>a</sup> At the time of the focus group, all of them had no longer met diagnostic criteria and had received a clinical discharge.

**Table 3**  
Open questions from the interviews in the focus groups of professionals and users.

Professionals' interview	Users' interview
1) What experience do you have in the application of psychological treatments through the use of information and communication technology (ICTs)?	1) What kind of technologies do you usually use, how much time per day do you spend on your cell phone, do you have any apps downloaded on your mobile phone related to mental health?
2) What do you know about psychological treatments applied through apps?	2) What do you know about psychological treatments applied through apps, do you think they can work, have you had any experience with them?
3) What fundamental differences do you find between face-to-face therapy and therapy through apps?	3) What fundamental differences do you find between face-to-face therapy and therapy through apps?
4) What elements do you consider essential in an app that applies the UP to be effective?	4) What elements do you consider indispensable in an app that applies the UP to be effective?
5) What are, in your opinion, the main problems/barriers to carry out the UP through an app?	5) What are, in your opinion, the main problems/barriers to carry out the UP through an app?
6) What are, in your opinion, the main benefits of applying the UP through an app?	6) What are, in your opinion, the main benefits of applying the UP through an app?
7) Would you recommend the use of UP through an app for people suffering from an emotional problem?	7) Would you recommend the use of the UP through an app for people suffering from an emotional problem?
8) In general, how do you think patients perceive this type of treatment through the app?	8) Would you agree to download the app and carry out the intervention when you need it?
9) What would be your recommendations for developing a mobile app to apply the UP?	9) What would be your recommendations for developing a mobile app that applies the UP?
10) Can you think of any strategy to help patients not to drop the app once they have started using it?	10) Can you think of any strategy to help people who need it not to drop the use of the app once they have started it?

**2.3. Procedure**

Two focus groups were carried out, each with a duration of two hours, and both conducted online through the Cisco WebEx videoconferencing platform, commonly used in the NHS (complies with the Health Insurance Portability and Accountability Act [HIPAA] and has ISO/IEC 27001:2013 security certification). Both focus groups were recorded to facilitate their verbatim transcription later. The study was conducted under ethic's approval of (General University Hospital of Castellón) with number (05/05/2021) and all participants accepted and signed the informed consent. Professionals and users were invited to participate voluntarily in the focus groups because they collaborated in a previous multicenter clinical trial. All 9 users had finished the UP treatment in a face-to-face group format.

In both focus group, we followed an ad hoc semi-structured interview based on the main aspects highlighted in the literature, in order to identify the possible facilitators and barriers to implementing a

treatment through technology (Alqahtani and Orji, 2020) and, specifically, the aspects that users and professionals considered fundamental to take into account when applying the UP, module by module, through a mobile app. The focus groups were moderated by the principal investigator of the team, who is certified to train and research in the UP. He was responsible for asking the questions in an open manner, with the aim of encouraging spontaneous responses, the exchange of ideas and discussion among the different users and professionals about each aspect. Beyond asking the questions, the comments of the interviewer were limited in order to ensure that the fact that he was an UP trainer and researcher did not bias the information.

The information was analyzed using the MAXQDA program (Kuckartz and Rädiker, 2019). A thematic content analysis based in grounded theory (Schreier, 2012) was performed in order to define emergent categories of analysis derived from the interview data. This theoretical framework is developed from a phenomenological perspective, which becomes its intellectual root. It is based on the constant comparative method, a strategy that enables concepts to be systematically generated and analysis and explicit coding to be combined with theory building. This type of analysis sets out to construct conceptual categories, marking their properties or significant features and the hypotheses that establish relations between all of them.

After the main categories were extracted (as described in the Data analysis section), these were shared with the IT engineering team involved in the development of the app with the aim of incorporating the aspects highlighted during the focus groups into the development of the app. The qualitative analysis was carried out following the Consolidated Criteria for Reporting Qualitative Research Guidelines (COREQ; Tong et al., 2007) (see Appendix A).

**2.4. Data analysis**

The sociodemographic information was analyzed through descriptive statistical analysis using SPSS software (IBM Corp, 2013). Regarding the qualitative analyses, specifically content analysis, these were carried out through the MAXQDA software (Kuckartz and Rädiker, 2019). After the verbatim transcription of the focus groups, content analysis was carried out in two phases:

The first phase consisted of the generation of a coding system through a structural analysis, following a hierarchical classification that goes from the particular to the general (Krueger and Casey, 2000), in which two members of the research team, who were novices in the analysis of qualitative information, grouped the main verbalized ideas extracted from the focus group interviews into “Topics” (Eaton et al., 2019). These Topics gathered several textual examples that emerged during the focus groups and were based on the ideas that were repeated most often during the interview. Once these Topics were created, they were grouped into “Subthemes”, including those Topics that shared common characteristics and were at the same level, generating a higher order classification. Finally, these subcategories were grouped into main “Themes”, based on the main information we wanted to collect through the focus groups. The creation of this system of codes was done by consensus methodology (Cohen's Kappa = 1), and each of the themes, subthemes, and topics that emerged during the process were created with the objective of having the lowest possible number that would allow the collection of the greatest amount of information and were exhaustive and mutually exclusive. The realization of this first phase by two members inexperienced in qualitative analysis was done in order to avoid possible theoretical bias.

The second phase, in order to take care of the reflexivity of the qualitative approach, consisted of triangulation carried out by the two novice members and a supervisor with expertise in qualitative methods, who conducted the analysis independently. During this phase, the code system generated in the first phase was compared with the code system generated in the second phase by the expert supervisor.

Those codes that did not coincide between phases 1 and 2 were

confronted, debugged and reorganized until a consensus was reached, resulting in the final code system. Once this second phase was completed, the final number of themes, subthemes and topics was obtained.

A Cohen's Kappa inter-rater reliability analysis was carried out between phases 1 and 2, in order to see the degree of agreement when extracting results from the content analysis and the coding system created. Finally, a descriptive analysis was made of the percentage of aspects extracted from the focus groups that could be included in the pilot version of the app.

### 3. Results

#### 3.1. Extracted topics, subthemes and themes

During the first phase, a total of 58 “topics” were extracted from the focus group of professionals, grouped into 12 “Subthemes” and these into 2 “Themes”. During the second phase, which included triangulation, 43 Topics were extracted from the professionals' focus group, grouped into 7 “Subthemes” and these into 3 “Themes”. Table 4 shows the results of the content analysis of the professionals' focus group, the number of times each Topic was mentioned, as well as several textual examples of the content included in each Topic (an extended table can be found in Appendix B). The most repeated topics by professionals during the focus group were: Complementary use (n = 14), Supervision (n = 12), Examples (n = 9), Personalization (n = 9) and Interactive (n = 8).

Concerning the users' focus group, 29 “Topics” emerged during the first phase, grouped into 5 “Subthemes” and 2 “Themes”. In the second phase, a total of 18 “Topics” were obtained, grouped into 6 “Subthemes” and 3 “Themes”, as can be seen in Table 5 (an extended table can be found in Appendix B). The most repeated Topics identified by users during the focus group were: Complementary use (n = 10), Lack of confidence (n = 8), Immediacy (n = 6), Gamification and motivation (n = 6) and Interaction (Forum and participatory chat) (n = 6).

#### 3.2. Inter-rater reliability results on the results of the content analysis

The inter-rater agreement index between phases 1 and 2 was moderate-high, with a mean Cohen's Kappa of 0.66 in the professionals focus group. Similar results were found for the focus group of users with a mean Cohen's Kappa of 0.70.

Considering the final results and, specifically, the rate of agreement in the Topics between professionals and users, the professionals agreed in 30.23 % (n = 13) of the Topics proposed by the users and the users agreed 55.55 % (n = 10) with the professionals.

#### 3.3. Common topics shared by users and professionals

During the realization of the focus groups, the following Topics emerged as shared by both professionals and uses:

**Immediacy.** This is an aspect that facilitates treatment and improves its efficiency. Specifically, the ability to be able to record information immediately or to have therapeutic resources available more quickly.

**Dropout prevention.** The professionals mentioned dropout prevention as a necessary aspect to be taken into account in order to guarantee treatment efficiency, which is why it appears as a Topic in the efficiency subcategory and also mentions “dropout” as a barrier to be taken into account. If we look at the users' focus group, it does not appear, but they do refer to aspects such as “less exposure” or “anonymity” that would favor “adherence” to treatment, or “lack of commitment” as a possible barrier. In all these cases, they are talking about the same construct, from the professionals' or users' point of view, reflecting the importance of taking the dropout into account in the development and implementation of the app.

**Privacy and data protection.** Another topic shared as a barrier to be

**Table 4**  
Results of the content analysis of the professionals' focus group.

	Themes	Subthemes	Description	Topics
Professionals	Facilitators	Efficiency	Factors that improve adherence, increase effectiveness, and reach more people.	Dropout prevention
				Flexibility
	Barriers	Digital divide	Difference in access to and knowledge of the use of new technologies.	Access
				Lack of resources and Technological organizational culture
	Design	Expectations	Cognitive expectations and negative beliefs regarding interventions through apps.	Lack of experience
				Dropout
	Design	User Experience/ Usability	Aspects and elements that facilitate and improve your experience as App users.	Loss of non-verbal information
				Loss of control
	Design	Monitoring	Review of the work done by the patient and resolution of doubts.	Privacy and Data Protection
				Personalization
Design	Type of application	This category includes reaching a larger number of people through different uses of technology.	Examples-Didactics	
			Accessibility	
Design	Treatment	Format	Interactive	
			Supervision	
Design	Emotional Awareness Module	Cognitive Flexibility Module	Feedback and self-evaluation	
			Complementary use	
Design	Emotionally Driven Behavior Module	Interoceptive Exposure Module	Self-application	
			Forum and group experience	
Design	Emotional Exposure Module	Relapse Prevention Module	Standardization	
			Videos	
Design	Emotionally Driven Behavior Module	Interoceptive Exposure Module	Manual Exercises	
			Short audios	
Design	Emotional Exposure Module	Relapse Prevention Module	Examples	
			Different interpretations	
Design	Emotionally Driven Behavior Module	Interoceptive Exposure Module	Drawings	
			Colors	
Design	Emotional Exposure Module	Relapse Prevention Module	Ambiguous image	
			Examples	
Design	Emotionally Driven Behavior Module	Interoceptive Exposure Module	Metaphors	
			Questions	
Design	Emotional Exposure Module	Relapse Prevention Module	Real examples	
			Simple	
Design	Emotional Exposure Module	Relapse Prevention Module	Vicarious learning	
			Examples	
Design	Emotional Exposure Module	Relapse Prevention Module	Flexibility	
			Questionnaires	
Design	Emotionally Driven Behavior Module	Interoceptive Exposure Module	Gamification	
			Control of the number of exposures	
Design	Emotional Exposure Module	Relapse Prevention Module	Feedback	
			Exposure ladder	
Design	Emotionally Driven Behavior Module	Interoceptive Exposure Module	Examples	
			Prolonged support	

**Table 5**  
Results of the content analysis of the users' focus group.

	Themes	Subthemes	Description	Topics
Users	Facilitators	Efficiency	Elements and characteristics of the efficiency of the use of this format	Immediacy Utility Economic cost
		Adherence	Facilitates the assistance and realization of the treatment	Lower exposure Anonymity
	Barriers	Expectations	Cognitive expectations and negative beliefs regarding interventions through Apps.	Lack of confidence Lack of commitment Dependency
		Design	Type of application	This category includes reaching a larger number of people through different uses of technology.
		Aesthetics	Visual appearance of the app	Colors Graphs
		Treatment	Contents	Gamification and motivation Interaction (Forum and participatory chat) Examples Reminders and notifications) Flexibility in the modules Formats for recording information Content review

considered when adapting the treatment to a mobile app is privacy and data protection (mentioned by the professionals) and lack of confidence (mentioned by the users), since both aspects, although mentioned differently, would allude to the same construct, the need for security and data protection as well as the guarantee and confidence in the app and the people responsible for it.

**Complementary use.** Both see the potential of this type of intervention as complementary, supporting and reinforcing face-to-face treatment.

**Flexibility:** The need for the treatment through the app to be flexible, adapting to the user's pace and progress.

**Gamification and motivation.** The app should contain a multitude of motivational messages that would maintain and increase the user's motivation, both as s/he achieved the proposed objectives, as well as when s/he did not achieve them, and that it should be dynamic and fun as a game.

**Interaction.** Users expressed the need for the app to allow some interaction with other users or with the professional. Similarly, professionals mention how interesting it would be if the app offered a "forum" that would allow users to interact with each other.

**Examples.** The app should contain a multitude of examples allowing users to see themselves reflected in them and clarifying the contents and exercises.

### 3.4. Specific topics mentioned by professionals

In addition to the topics mentioned and shared by users and professionals, previously commented, professionals add four specific topics:

**Lack of resources and technological organizational culture.** Professionals expressed the lack of resources and technological organizational culture as barriers to access and knowledge of the use of new technologies.

**Lack of experience.** Professionals mentioned that it has only been

since the pandemic that they have begun to incorporate technology into their work, so lack of experience emerged as a topic.

**Personalization.** Personalization of the app according to each user was mentioned by professionals as an aspect that will facilitate and improve users' experience.

**Supervision.** A key element mentioned by professionals was that the app provides a review of the work done by the user and resolution of doubts.

### 3.5. Integration in app development

From the two conducted focus groups, a total of 61 proposals were collected. Forty three were proposed by professionals and 18 by users. From the professionals, 40 proposals are present in the app (93 %). Of the three proposals not present, lack of resources and lack of technological culture and experience by the clinicians were not related to the app and emotions represented by colors was discarded in favor of greater flexibility when configuring the weekly emotional assessment. From the users, 14 proposals have been accommodated in the app (78 %). Of the four non-integrated proposals, forums for patient interaction and novel exercise submission methods were annotated for future versions, the economic cost of the treatment was unrelated, and the use of colors that convey calm has yet to be evaluated in a separate study. In total, 89 % of the proposals have been incorporated in the current version of the mobile app. The functionalities can be seen in Fig. 1.

## 4. Discussion

The aim of this study was to determine the needs, opinions, expectations and design aspects that users and professionals of the Spanish NHS demanded with regard to the subsequent development of a Smartphone app that includes the contents of the UP. In this way, we sought to involve them in its design, from the first stage of the process, following the UCD approach (Dekker and Williams, 2017).

To our knowledge, this is the first study to analyse the perspectives of both users and mental health professionals for the design of an UP-based smartphone app. This is important, as data suggest that, in addition to users, involving health professionals in the mental health app design process increases confidence in the app (Alqahtani and Orji, 2020).

It is also worth noting that previous research indicates that only 5 % of mobile app development teams for mood and anxiety disorders include a health professional (Van Ameringen et al., 2017). In this regard, it is known that improving the attitude as well as the perceived control of professionals toward mental health apps has a positive effect on their intention to use and recommend these apps (Sprenger et al., 2017).

With regard to the findings obtained, overall, the results of the thematic content analysis point to important key themes that can contribute to research and practice in this field and 89 % have been considered in the design of the Smartphone app.

First of all, within the theme of "Facilitators", immediacy and dropout prevention and adherence have been identified as important aspects to consider in the development and implementation of the app, findings that are supported by previous literature (Garrido et al., 2019; Hetrick et al., 2018; Oyeboode et al., 2020). Secondly, consistent with previous studies (Farao et al., 2020; Mayer et al., 2019; Robillard et al., 2019; Sprenger et al., 2017), privacy and data protection, lack of resources and technological organizational culture and lack of experience were highlighted as "Barriers" to be considered for the development of the app. Finally, within the "Design" theme, complementary use, flexibility, personalization, gamification and motivation, interaction, accessibility, supervision and examples were identified as key topics, consistent with findings in previous literature (Alqahtani et al., 2021; Donker et al., 2013; Garrido et al., 2019; Montero-Marín et al., 2015).

A strength of the study is that we have included professionals to analyse their perspectives for the design of the app, pointing out four

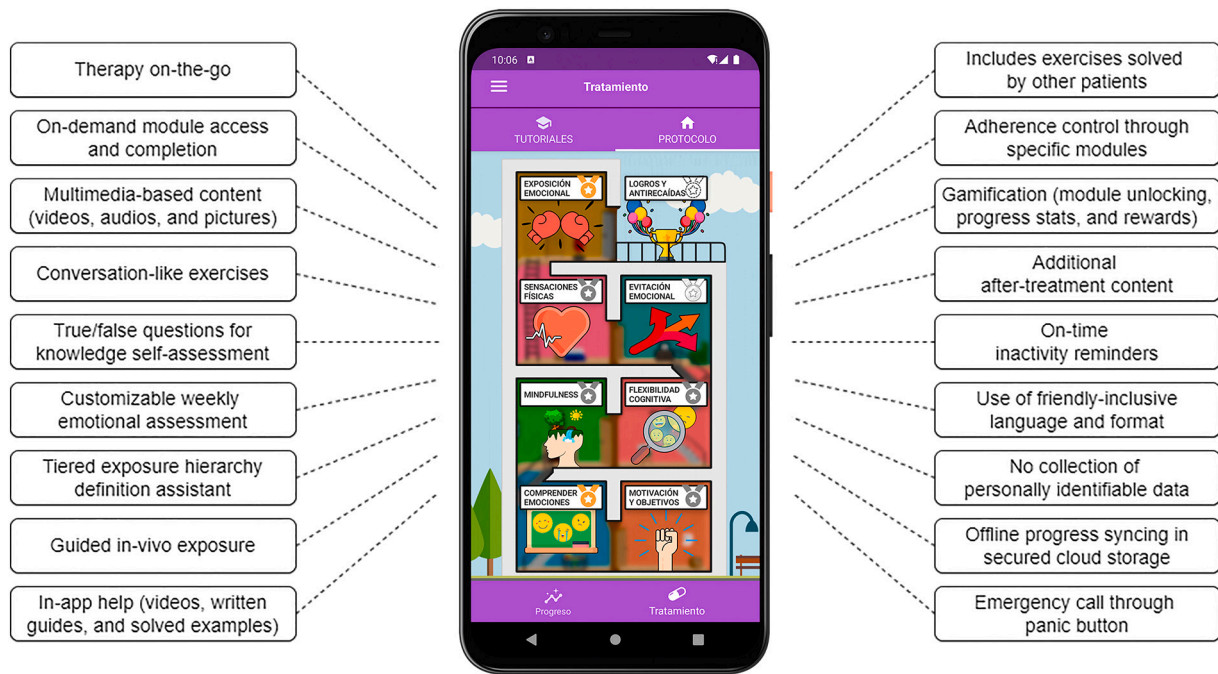


Fig. 1. Functionalities integrated in the app extracted from focus group.

unique points that were mentioned in the previous paragraph. Half of them within the theme of “barriers”: lack of resources and technological organizational culture and lack of experience; and the other half within “design”: personalization and supervision. Regarding “barriers”, topics lack of resources and technological culture and lack of experience provide valuable information about the current state of technology incorporation in the NHS. This information is consistent with previous studies in which professionals report very little experience with the use of mental health apps (Mayer et al., 2019) and state the low maturity level of existing technology infrastructure in the NHS for incorporating mental health applications into real practice (Osma et al., 2017). Finally, topics personalization and supervision refer to the adaptation of the app to the user’s experience and the app’s provision of a review of the work done by the user and the resolution of doubts. These topics have already been pointed out in previous literature, in which they appear as recommendations for the design of mental health apps that would help to improve users’ adherence to, engagement with, and ability to benefit from them (Alqahtani et al., 2021).

Findings of the present study should be read in light of a variety of limitations. Firstly, those inherent to qualitative methodology. Although focus group are useful for obtaining information on multiple perspectives (Krueger and Casey, 2000), there is a possibility that the group dynamics influenced the perspectives expressed by the participants in some way. At the same time, a limitation to note is that the sample size is small, as only two focus groups were conducted, one with 7 professionals and the other with 9 users. In this regard, it would have been interesting to carry out more than one focus group with both types of participants. Another limitation to consider is that convenience sampling was used and that including people who dropped out of therapy would have given us valuable information to prevent dropouts. Therefore, as this is a convenience sample, participants in the study may not fully represent the population from which the sample has been drawn (Cochran, 1977) and other participants might have expressed different ideas on the development of an UP-based application. In turn, the present study was carried out with users and professionals from Spanish NHS. Therefore, the answers given by the participants in the focus groups must be interpreted within this context and may not be similar to those provided by both population groups in other healthcare contexts.

However, our research interest with this study was specifically to determine the opinions and needs of users and professionals in the context of Spanish public mental health units, in order to transfer them into the design and development of the app and implemented it in the Spanish NHS. Finally, with regard to the smartphone app resulting from the information gathered in the focus groups, one limitation to note is that there are aspects mentioned in the focus groups (i.e., forums for patient interaction and novel exercise submission methods, like camera-based methods) that could not be considered in the design of the app due to insufficient budget. However, this is a preliminary version of the app and these suggestions that could not be included in the design of the app will be considered for future versions of the app, as well as for future research.

Despite the above-discussed limitations, the results of this study have important implications as they provide valuable information about the needs, opinions, expectations and design aspects of users and professionals about an UP-based smartphone app. The opinions of users and professionals should be taken into account throughout the design process, following the UCD approach (Dekker and Williams, 2017). In this regard, future research in this area could include, in addition to focus groups, other quantitative (e.g. satisfaction surveys) and qualitative methodologies (e.g. SWOT [strengths, weaknesses, opportunities, threats]) for the analysis of information. In turn, it could also be interesting to evaluate the opinions of people who drop out or use the app to a lesser extent and to integrate engineers from the beginning of the process so that they can observe the focus groups first-hand, as this could facilitate their work in developing the app and increase their motivation by seeing the needs requested by the end users.

Finally, it should be pointed out that the results reported in this article correspond to the first phase of the UCD process and they have been used to develop a preliminary version of the UP-APP. Usability and acceptability of the UP-APP will be analyzed in the second phase of the UCD process by the target audience in order to continue improving and adapting the app to their needs and opinions.

### 5. Conclusion

In conclusion, this study has explored in depth the needs, opinions,

expectations and design aspects of users and professionals about an UP-based smartphone app. The key themes identified by participants in both focus groups were immediacy, prevention of dropout, lack of resources and technological organizational culture, lack of experience, privacy and data protection, complementary use, flexibility, personalization, gamification and motivation, accessibility, supervision, interaction, and examples. The preliminary version of the app resulting from this work incorporates most of the proposals from users and professionals (89 %), adjusting to the needs of both groups with the aim of ensuring greater engagement and satisfaction with the app. As this is a preliminary version of the app, future research work will be aimed at analysing its usability and acceptability by the target audience, prior to a pilot study and a later a RCT that will analyse the effectiveness, implementation and cost-effectiveness of UP in this format in the Spanish NHS. Finally, future research in this area could include other quantitative and qualitative methodologies, evaluate the opinions of people who drop out or use the app to a lesser extent and to integrate engineers from the beginning of the process.

## Funding

Funding for this study was provided by the Ministerio de Industria, Economía y competitividad ISCIII (PI20/00697) and co-funded by the “ISCIII-Subdirección General de Evaluación y Fomento de la Investigación del Fondo Europeo de Desarrollo Regional (FEDER). Otra manera de hacer Europa”. The research was co-funded by Gobierno de Aragón and FEDER 2014–2020 “Construyendo Europa desde Aragón” (S31\_20D). The funders had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgements

We would like to thank all the clinical psychologists and patients who participated in the focus groups for making this study possible.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.invent.2022.100577>.

## References

- Alqahtani, F., Orji, R., 2020. Insights from user reviews to improve mental health apps. *Health Informatics J.* 26, 2042–2066.
- Alqahtani, F., Winn, A., Orji, R., 2021. Co-designing a Mobile app to improve mental health and well-being: focus group study. *JMIR Formative Res.* 5, e18172.
- Barlow, D.H., Farchione, T.J., Sauer-Zavala, S., Latin, H.M., Ellard, K.K., Bullis, J.R., Bentley, K.H., Boettcher, H.T., Cassiello-Robbins, C., 2018. *Unified Protocol for Transdiagnostic Treatment of Emotional Disorders: Therapist Guide*, 2nd ed. Oxford University Press.
- Baxter, A.J., Scott, K.M., Vos, T., Whiteford, H.A., 2013. Global prevalence of anxiety disorders: a systematic review and meta-regression. *Psychol. Med.* 43, 897–910.
- Brown, T.A., Campbell, L.A., Lehman, C.L., Grisham, J.R., Mancill, R.B., 2001. Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *J. Abnorm. Psychol.* 110 (4), 585.
- Carlucci, L., Saggino, A., Balsamo, M., 2021. On the efficacy of the unified protocol for transdiagnostic treatment of emotional disorders: a systematic review and meta-analysis. *Clin. Psychol. Rev.* 87, 101999.
- Cassiello-Robbins, C., Southward, M.W., Tirpak, J.W., Sauer-Zavala, S., 2020. A systematic review of unified protocol applications with adult populations: facilitating widespread dissemination via adaptability. *Clin. Psychol. Rev.* 78, 101852.
- Cochran, W.G., 1977. *Sampling Techniques*. John Wiley & Sons.
- Dekker, M.R., Williams, A.D., 2017. The use of user-centered participatory design in serious games for anxiety and depression. *Games Health J.* 6, 327–333.
- Donker, T., Petrie, K., Proudfoot, J., Clarke, J., Birch, M.-R., Christensen, H., 2013. Smartphones for smarter delivery of mental health programs: a systematic review. *J. Med. Internet Res.* 15, e247.
- Eaton, K., Stritzke, W.G., Ohan, J.L., 2019. Using scribes in qualitative research as an alternative to transcription. *Qual. Rep.* 24 (3), 586–605.
- Erbe, D., Eichert, H.C., Riper, H., Ebert, D.D., 2017. Blending face-to-face and internet-based interventions for the treatment of mental disorders in adults: systematic review. *J. Med. Internet Res.* 19 (9), e306.
- Faraó, J., Malila, B., Conrad, N., Mutsvangwa, T., Rangaka, M.X., Douglas, T.S., 2020. A user-centred design framework for mHealth. *PLOS ONE* 15, e0237910.
- Fernández-García, X., 2021. In: *Situación de la psicología clínica en el Sistema Nacional de Salud (SNS) y perspectivas de crecimiento. Ansiedad y Estrés*, p. 27.
- Garrido, S., Cheers, D., Boydell, K., Nguyen, Q.V., Schubert, E., Dunne, L., Meade, T., 2019. Young people's response to six smartphone apps for anxiety and depression: focus group study. *JMIR Ment. Health* 6.
- Hetrick, S.E., Robinson, J., Burge, E., Blandon, R., Mobilio, B., Rice, S.M., Simmons, M.B., Alvarez-Jimenez, M., Goodrich, S., Davey, C.G., 2018. Youth codesign of a Mobile phone app to facilitate self-monitoring and management of mood symptoms in young people with major depression, suicidal ideation, and self-harm. *JMIR Ment. Health* 5, e9.
- IBM Corp., 2013. *IBM SPSS Statistics for Windows, Version 22.0*. IBM Corp., Armonk, NY.
- Krueger, R.A., Casey, M.A., 2000. *Focus Groups: A Practical Guide for Applied Research*, 3rd ed. SAGE Publications, Thousand Oaks, CA/ London, UK/New Delhi, India.
- Krueger, R.A., Casey, M.A., 2008. *Focus Groups: A Practical Guide for Applied Research*, 4th ed. SAGE, New York.
- Kuckartz, U., Rädiker, S., 2019. *Analyzing qualitative data with MAXQDA*. Text, audio, and video. Springer Nature Switzerland, Schweiz, Cham.
- Lecomte, T., Potvin, S., Corbière, M., Guay, S., Samson, C., Cloutier, B., Francoeur, A., Pennou, A., Khazaal, Y., 2020. Mobile apps for mental health issues: meta-review of meta-analyses. *JMIR mHealth uHealth* 8, e17458.
- Leterme, A.C., Behal, H., Demarty, A.L., Barasino, O., Rougeguez, L., Labreuche, J., Duhamel, A., Vaiva, G., Servant, D., 2020. A blended cognitive behavioral intervention for patients with adjustment disorder with anxiety: a randomized controlled trial. *Internet Interv.* 21, 100329.
- Linardon, J., Cuijpers, P., Carlbring, P., Messer, M., Fuller-Tyszkiewicz, M., 2019. The efficacy of app-supported smartphone interventions for mental health problems: a meta-analysis of randomized controlled trials. *World Psychiatry* 18, 325–336.
- Ly, K.H., Topoco, N., Cederlund, H., Wallin, A., Bergström, J., Molander, O., Carlbring, P., Andersson, G., 2015. Smartphone-supported versus full behavioural activation for depression: a randomised controlled trial. *PLoS one* 10 (5), e0126559.
- Lyon, A.R., Koerner, K., 2016. User-centered design for psychosocial intervention development and implementation. *Clin. Psychol. Sci. Pract.* 23, 180–200.
- Martínez-Borba, V., Osma, J., Crespo-Delgado, E., Andreu-Pejó, L., Monferrer-Serrano, A., 2022. Prevention of emotional disorders and symptoms under health conditions: a pilot study using the unified protocol in a fertility unit. *Ann. Psychol.* 38 (1), 25–35.
- Mayer, G., Gronewold, N., Alvarez, S., Bruns, B., Hilbel, T., Schultz, J.H., 2019. Acceptance and expectations of medical experts, students, and patients toward electronic mental health apps: cross-sectional quantitative and qualitative survey study. *JMIR Ment. Health* 6.
- Miralles, I., Granell, C., Díaz-Sanahuja, L., van Woensel, W., Bretón-López, J., Mira, A., Castilla, D., Casteleyn, S., 2020. Smartphone apps for the treatment of mental disorders: systematic review. *JMIR mHealth uHealth* 8 (4), e14897.
- Molina-Recio, G., Molina-Luque, R., Jiménez-García, A.M., Ventura-Puertos, P.E., Hernández-Reyes, A., Romero-Saldaña, M., 2020. Proposal for the user-centered design approach for health apps based on successful experiences: integrative review. *JMIR mHealth uHealth* 8 (4), e14376.
- Montero-Marín, J., Prado-Abril, J., Botella, C., Mayoral-Cleries, F., Baños, R., Herrera-Mercadal, P., Romero-Sanchiz, P., Gili, M., Castro, A., Nogueira, R., García-Campayo, J., 2015. Expectations among patients and health professionals regarding web-based interventions for depression in primary care: a qualitative study. *J. Med. Internet Res.* 17, e67.
- OECD, 2021. *Tackling the Mental Health Impact of the COVID-19 Crisis: An Integrated, Whole-of-Society Response*, Health at a Glance. OECD.
- Osma, J., Peris-Baquero, O., Suso-Ribera, C., Farchione, T.J., Barlow, D.H., 2021. Effectiveness of the unified protocol for transdiagnostic treatment of emotional disorders in group format in Spain: results from a randomized controlled trial with 6-months follow-up. *Psychother. Res.* 1–14.
- Osma, J., Sprenger, M., Mettler, T., 2017. Introduction of e-mental health in national health systems- a health professionals' perspective. *Health Policy Technol.* 6, 436–445.
- Osma, J., Suso-Ribera, C., García-Palacios, A., Crespo-Delgado, E., Robert-Flor, C., Sánchez-Guerrero, A., Ferreres-Galan, V., Pérez-Ayerra, L., Malea-Fernández, A., Torres-Alfosea, M.A., 2018. Efficacy of the unified protocol for the treatment of emotional disorders in the Spanish public mental health system using a group format: study protocol for a multicenter, randomized, non-inferiority controlled trial. *Health Qual. Life Outcomes* 16, 46.
- Osma, J., Suso-Ribera, C., Peris-Baquero, Ó., Gil-Lacruz, M., Pérez-Ayerra, L., Ferreres-Galan, V., Domínguez, O., 2019. What format of treatment do patients with emotional disorders prefer and why? Implications for public mental health settings and policies. *PLoS one* 14 (6), e0218117.
- Oyebode, O., Alqahtani, F., Orji, R., 2020. Using machine learning and thematic analysis methods to evaluate mental health apps based on user reviews. *IEEE Access* 8, 111141–111158.
- Parés-Badell, O., Barbaglia, G., Jerinic, P., Gustavsson, A., Salvador-Carulla, L., Alonso, J., 2014. Cost of disorders of the brain in Spain. *PLoS ONE* 9, e105471.

- Peris-Baquero, Ó., Moreno, J.D., Osma, J., 2022. Long-term cost-effectiveness of group unified protocol in the Spanish public mental health system. *Curr. Psychol.* 1–16.
- Prado-Abril, J., Sánchez-Reales, S., Gimeno-Peón, A., Aldaz-Armendáriz, J.A., 2019. Clinical psychology in Spain: history, regulation and future challenges. *Clin. Psychol. Europe* 1.
- Reinholt, N., Aharoni, R., Winding, C., Rosenberg, N., Rosenbaum, B., Arnfred, S., 2017. Transdiagnostic group CBT for anxiety disorders: the unified protocol in mental health services. *Cogn. Behav. Ther.* 46 (1), 29–43.
- Robillard, J.M., Feng, T.L., Sporn, A.B., Lai, J.-A., Lo, C., Ta, M., Nadler, R., 2019. Availability, readability, and content of privacy policies and terms of agreements of mental health apps. *Internet Interv.* 17, 100243.
- Sakiris, N., Berle, D., 2019. A systematic review and meta-analysis of the unified protocol as a transdiagnostic emotion regulation based intervention. *Clin. Psychol. Rev.* 72, 101751.
- Sandín, B., García-Escalera, J., Valiente, R.M., Espinosa, V., Chorot, P., 2020. Clinical utility of an internet-delivered version of the unified protocol for transdiagnostic treatment of emotional disorders in adolescents (IUP-A): A pilot open trial. *Int. J. Environ. Res. Public Health* 17 (22), 8306.
- Sauer-Zavala, S., Gutner, C.A., Farchione, T.J., Boettcher, H.T., Bullis, J.R., Barlow, D.H., 2017. Current definitions of “transdiagnostic” in treatment development: a search for consensus. *Behav. Ther.* 48 (1), 128–138.
- Sauer-Zavala, S., Tirpak, J.W., Eustis, E.H., Woods, B.K., Russell, K., 2021. Unified protocol for the transdiagnostic prevention of emotional disorders: evaluation of a brief, online course for college freshmen. *Behav. Ther.* 52 (1), 64–76.
- Schreier, M., 2012. *Qualitative Content Analysis in Practice*. Sage publications.
- Steele, S.J., Farchione, T.J., Cassiello-Robbins, C., Ametaj, A., Sbi, S., Sauer-Zavala, S., Barlow, D.H., 2018. Efficacy of the unified protocol for transdiagnostic treatment of comorbid current psychology 1 3 psychopathology accompanying emotional disorders compared to treatments targeting single disorders. *J. Psychiatr. Res.* 104, 211–216.
- Sprenger, M., Mettler, T., Osma, J., 2017. Health professionals' perspective on the promotion of e-mental health apps in the context of maternal depression. *PLoS one* 12, e0180867.
- Tighe, J., Shand, F., Ridani, R., Mackinnon, A., de La Mata, N., Christensen, H., 2017. Ibbly mobile health intervention for suicide prevention in Australian indigenous youth: a pilot randomised controlled trial. *BMJ Open* 7, e013518.
- Tong, A., Sainsbury, P., Craig, J., 2007. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int. J. Qual. Health Care* 19, 349–357.
- Torous, J., Bucci, S., Bell, I.H., Kessing, L.V., Faurholt-Jepsen, M., Whelan, P., Carvalho, A.F., Keshavan, M., Linardon, J., Firth, J., 2021. The growing field of digital psychiatry: current evidence and the future of apps, social media, chatbots, and virtual reality. *World Psychiatry* 20, 318–335.
- Torous, J., Nicholas, J., Larsen, M.E., Firth, J., Christensen, H., 2018. Clinical review of user engagement with mental health smartphone apps: evidence, theory and improvements. *Evid. Based Ment. Health* 21, 116–119.
- Van Ameringen, M., Turna, J., Khalesi, Z., Pullia, K., Patterson, B., 2017. There is an app for that! The current state of mobile applications (apps) for DSM-5 obsessive-compulsive disorder, posttraumatic stress disorder, anxiety and mood disorders. *Depress. Anxiety* 34, 526–539.
- Wentzel, J., van der Vaart, R., Bohlmeijer, E.T., van Gemert-Pijnen, J.E., 2016. Mixing online and face-to-face therapy: how to benefit from blended Care in Mental Health Care. *JMIR Ment. Health* 3 (1), e9.
- World Health Organization, 2011. *mHealth: New Horizons for Health Through Mobile Technologies: Second Global Survey on eHealth*.
- World Health Organization, 2018. *Mental Health Atlas 2017*. Geneva.
- World Health Organization, 2021. *Mental Health Atlas 2020*. Geneva.