



# A pilot study on the feasibility and acceptability of a mobile e-health application about obsessive-compulsive disorder (OCD)

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## Abstract

**Aim:** Obsessive-compulsive disorder (OCD) is a mental health condition that significantly interferes with the school environment. The concealment of symptoms, lack of identification, and limited knowledge about the disorder often lead to delays in help-seeking, which are associated with greater chronicity, increased interference, and poorer treatment response. Programmes that educate teachers on early detection of OCD could help identify children at risk and promote help-seeking behavior. This study analyzed the feasibility, acceptability, and preliminary efficacy of the health app esTOCma from both quantitative and qualitative perspectives among teachers, as well as explored areas for improvement.

**Methods:** A total of 19 teachers (mean age = 47.74 years, SD = 11.2) completed the intervention along with pre- and post-intervention assessments through the app. In addition, they responded to open-ended questions to share their opinions about the app.

**Results:** Teachers took an average of 4.89 days (SD = 4.21) to complete the intervention. The app demonstrated excellent usability (M = 85.5, SD = 10.3) and was found useful by the majority of participants (89.5%), who reported satisfaction (84.2%) and stated they had learned considerably (73.7%) through its use. Upon completing the intervention, participants showed greater understanding of OCD and its treatments (MHLQ-R:  $z = -2.92$ ,  $p = 0.004$ ), lower levels of stigma (AQ-9:  $z = -3.67$ ,  $p < 0.001$ ), and a higher intention to seek professional help in case of experiencing obsessive-compulsive symptoms (GHSQ:  $z = -2.50$ ,  $p = 0.012$ ).

**Conclusions:** esTOCma appears to be a feasible app in an educational context, showing high acceptability among participating teachers. Moreover, the app increases knowledge and understanding of OCD, promotes the intention to seek professional help, and reduces stigma toward the disorder. Several improvements are suggested to further enhance the app's potential impact in educational settings.

## Keywords

obsessive-compulsive disorder/OCD, app, stigma, mental health literacy, feasibility, teachers, serious games



## Introduction

Obsessive-compulsive disorder (OCD) is a mental disorder characterized by the presence of obsessions (i.e., distressing, intrusive, and recurring thoughts) and compulsions (i.e., repetitive behaviors or mental acts), which are heterogeneous in their content and cause significant distress and impairment [1].

Individuals with OCD, both adults and minors, experience a reduced quality of life, as well as lower social, occupational, and academic performance [2–4]. Regarding academic settings, OCD negatively impacts learning, as symptoms may interfere with productivity and concentration [5, 6]. Students may struggle to pay attention in class because they are preoccupied with their obsessions or may fail to complete assignments due to performing mental rituals [7]. Furthermore, compulsive behaviors are often a reason for becoming victims of bullying. People with OCD struggle to hide these behaviors, which can increase social isolation. To this effort, one may add the mental exhaustion inherent in compulsions and obsessions, leaving students with little energy to socialize [5].

OCD has a lifetime prevalence of 2.3% [8]. It affects between 1–3% of the youth population [2], with many experiencing subclinical symptoms [8]. The first symptoms often occur between childhood and adolescence, a period of considerable vulnerability [9, 10]. A substantial delay often exists between symptom onset and formal diagnosis of OCD [11], as well as in seeking formal treatment [12], despite the availability of empirically validated interventions [13]. In this sense, Hezel et al. [11] reported an average 11.4-year delay between the onset of obsessive-compulsive symptoms and their diagnosis, a phenomenon observed across different demographic groups. Furthermore, the age at onset has been identified as a significant predictor of diagnostic delay [14]. Specifically, patients with an early onset (prior to age 17) were diagnosed after an average of 11.7 years, compared to a delay of 5.6 years for those with later onset [10]. This delay is associated with poorer clinical response, worse prognosis, chronicity of OCD, and symptom severity [10–12, 14, 15]. Therefore, early detection during the initial stages of the disorder is crucial for providing adequate treatment [10, 11].

Limited help-seeking among individuals with OCD may be due, among other factors, to stigma associated with mental disorders and poor mental health literacy, that is, a poor understanding of mental disorders and their treatment, stigma, help-seeking efficacy and how to optimize and maintain good mental health [16].

Stigma and mental health literacy are critical factors that can be addressed to reduce delays in help-seeking behaviors. Educational settings represent ideal contexts for addressing these variables. First, education occurs during a critical developmental period in these settings [16, 17]. Second, students spend most of their time in classrooms, engaging in social interaction with peers [18]. Therefore, teachers occupy a privileged position for primary prevention of OCD, as they are constantly in contact with vulnerable individuals and can serve as sources of support both inside and outside of the school environment [6, 19, 20]. However, previous studies have found that teachers possess limited mental health literacy [19]. Educational programmes aimed at improving teachers' ability to detect early symptoms of OCD could facilitate timely interventions for at-risk students [21]. Without proper training, teachers may misinterpret OCD symptoms as merely disruptive behavior [6] or disorders such as attention-deficit/hyperactivity disorder (ADHD) or oppositional defiant disorder [5]. Nonetheless, certain limitations hinder teachers' capacity to act effectively, including insufficient knowledge about symptom manifestation in the classroom, high student-to-teacher ratios, and limited time for individual interactions [22].

For all these reasons, the development of educational programs for teachers is urgently needed. Thus far, some programs have been developed to address these variables in relation to mental health problems in general, such as *The Mental Health and High School Curriculum Guide* (the Guide) [16] or the *Youth Mental Health First Aid* course [22]. In the case of OCD, it is difficult to find specific interventions or educational programs in the literature [18]. White et al. [23] evaluated the knowledge of primary school teachers of Tourette syndrome, OCD, and ADHD before and after a training workshop. However, there was an unexpected decrease in OCD knowledge afterward. Jassi et al. [24] studied the effect of information packs and webinars on OCD knowledge among teachers and school staff. They concluded that reading the

material increased participants' general knowledge of symptoms and treatments; however, the effectiveness of the interventions was not assessed. Chaves et al. [19] published the first article evaluating the effectiveness of a brief educational intervention on teachers' knowledge and stigmatizing attitudes about OCD. The program was effective in improving knowledge of OCD symptoms and increasing response strategies for students with OCD, although it was less effective at reducing stigma.

To address this gap, esTOCma, an educational program on OCD aimed at the general population, which uses new technologies and serious games, was developed [25]. This app-based intervention has been proven effective in increasing knowledge about OCD and help-seeking intentions, as well as reducing stigmatizing attitudes and social distance in general [25, 26] and clinical [27] populations.

The aim of this study is to assess the feasibility, acceptability, and preliminary effectiveness of the mobile app esTOCma from a quantitative and qualitative perspective among teachers. Additionally, the study explores areas for improvement to optimize the app for the educational context. We hypothesize that participants will consider esTOCma a feasible and acceptable tool for educational settings. Regarding preliminary efficacy, we hypothesize that the intervention will: (1) increase OCD knowledge, (2) reduce stigmatizing attitudes and desire for social distance associated with OCD, (3) increase OCD help-seeking intention in case of experiencing OCD symptoms, and (4) decrease the disturbance of their own OCD symptoms. Even though the main objective of the app is not to reduce OCD symptomatology, psychoeducation on the disorder and normalizing intrusions could act as primary prevention [28].

## Materials and methods

### Study design

This study was a single-arm pilot intervention.

### Participant's characteristics

Nineteen teachers with a mean age of 47.74 years (range: 28–62 years) were mostly women (73.7%; 14/19). More than half of the participants worked in a public educational institution ( $n = 11$ ) and taught in secondary education and baccalaureate (5/19; 26.3%) or in other non-university studies (5/19; 26.3%).

The inclusion criteria were: (a) being teaching personnel and (b) having an Android or iOS mobile device with internet access.

### Procedure

Data were collected through convenience and snowball sampling. Teachers were invited face-to-face, by email, and via mobile messaging. An informative sheet describing the characteristics of their participation in the study was provided. Once their interest in participating was confirmed, they were given detailed information and the download links for the app. This study was approved by the Human Research Ethics Committee of the Universitat de València (2534203).

Once esTOCma was downloaded, participants signed the informed consent integrated within the app, which assigned them a personal code. The app randomly assigned participants by means of a sampling without replacement method to one of six vignettes, each describing a person with OCD symptoms from one of six content areas (i.e., moral; aggression; sexual; checking/doubts; superstition/order; or contamination). The symptoms described show a similar severity level and explicitly mention their interference with the quality of life of the person described. All vignette patients are named A., are middle-aged, and their gender is unspecified. All descriptions meet DSM-5 diagnostic criteria although the terms "obsession" or "compulsion" are not used. The vignettes are based on real clinical cases and have between 85 and 106 words. These vignettes are an abridged version of ones previously used for the general population [29].

After reading the assigned vignette, the app presents participants with pre-intervention measures, most of which refer to said vignette. Afterward, they can begin to play. Once the ten missions are completed, the app presents post-intervention measures. After finishing the game and completing the pre- and post-

intervention questionnaires, participants were contacted via email to complete an individual survey through the platform LimeSurvey.

### Intervention

The intervention program consists of completing the mobile app esTOCma v.2. It comprises 10 missions (Figure 1), each taking between 1–8 minutes [26]. One mission per day is recommended, but participants may proceed at their own pace. A more detailed description of the app can be found in Chaves et al. [30].

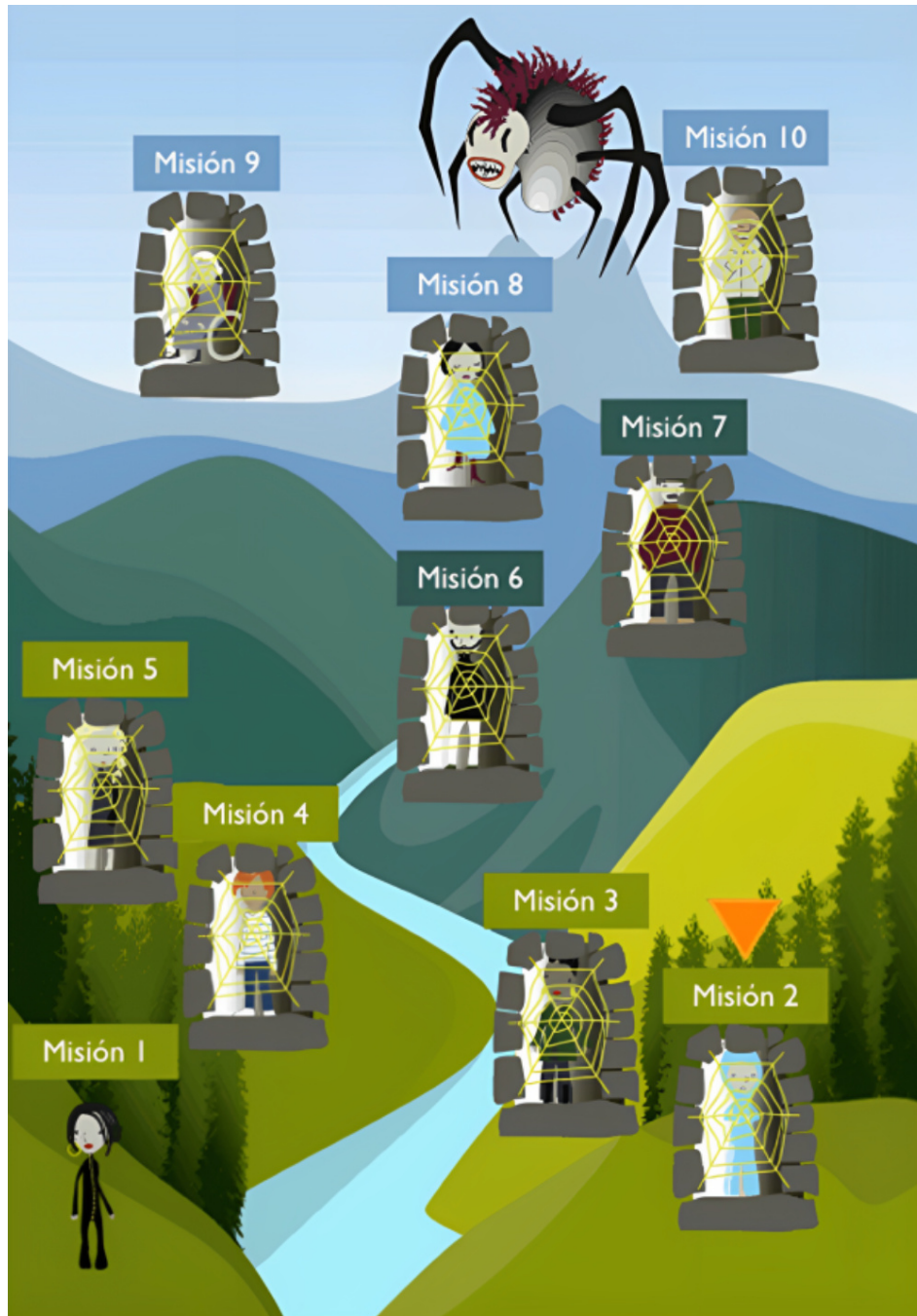


Figure 1. Image of esTOCma's home screen. The 10 missions along a mountain road.

Each mission follows a similar structure. An avatar instructs participants on what to do: (1) Introduces the mission, its objectives, and the character to be released; (2) Presents the activities (between six and eight), which consist of reading a text and answering multiple-choice questions; (3) At the end of the mission, it summarizes the key content points (there are two attempts to respond, otherwise the correct option is shown); (4) The character is released. In this final step, users receive a virtual reward (a key to

release the character), a reinforcement message, and a video of the character being released. Additionally, at the end of the game, more visual reinforcements appear: a video showing the ten released characters and a certificate that names the user as an “OCD expert”.

The game is divided into three intervention mechanisms: (1) Psychoeducation (missions 1–5): general information about OCD and its heterogeneity, how to differentiate between non-clinical intrusive thoughts and obsessions, evidence-based treatments, and options to seek help; (2) Indirect contact (missions 6 and 7): includes six short videos where three patients diagnosed with OCD describe their experience (their symptoms, interference, when and to whom they sought help, treatment experience, etc.); (3) Cognitive restructuring (missions 8–10) of dysfunctional beliefs related to rejection, types of treatment and their efficacy, and variables related to the development of OCD. A more detailed explanation of the content of the missions can be found in the [Supplementary materials](#) (see [Table S1](#)).

## Instruments

Sociodemographic variables were collected only in the pre-intervention, whereas acceptability measures and the individual survey were administered exclusively at post-intervention. The remaining instruments were completed at both pre- and post-intervention.

Sociodemographic variables: gender, age, educational level, nationality, type of school, work position, and school cycle in which they teach.

Attribution Questionnaire-9 (AQ-9) [31, 32]: measures public stigma associated with the vignette about a case of OCD on a 1-to-9 Likert scale; higher scores indicate greater stigma. AQ-9 is a reduced version of AQ-27 [33], consisting of 9 items. In this study, 7 items were used: dangerousness, fear, blame, segregation, anger, help, and avoidance.

Social Distance Scale (SDS) [34]: assesses willingness to interact with a person with OCD described in the vignette. Only items 4 and 7 from the original questionnaire were used. They are answered on a scale from 0 (definitely willing) to 3 (definitely unwilling). Total score is calculated as the average, with higher scores indicating a greater preference for social distance.

General Help-Seeking Questionnaire (GHSQ) [35, 36]: measures intention to seek help from various formal and informal sources if experiencing symptoms like those in the vignette. Two items were used: seeking help from a mental health professional and a doctor. Items were answered on a Likert-type scale ranging from 1 (extremely unlikely) to 7 (extremely likely). The average score reflects greater help-seeking intention.

Mental Health Literacy Questionnaire-Reduced (MHLQ-R): reduced version of the original MHLQ [30]. Assesses OCD knowledge through four multiple-choice items: (1) definition of obsession; (2) definition of compulsion; (3) role of control strategies in maintaining obsessions; (4) evidence-based treatments. Score is the sum of correct answers (Range: 0–4).

Obsessive-Compulsive Inventory-4 (OCI-4) [37]: reduced four-item version of OCI-R [38, 39]. Evaluates distress caused by OCD symptoms on a scale from 0 (not at all) to 4 (extremely). Total score is an average, with higher scores indicating greater distress.

Usefulness, Satisfaction, and Ease of Use Questionnaire (USE) [40]: measures perceived usefulness, satisfaction, and ease of use of a product or service. Four items from the original questionnaire were used, two on perceived usefulness and two on satisfaction. The items were rated on a scale from 1 (strongly disagree) to 7 (strongly agree). Additionally, two multiple-choice items were developed ad hoc to assess the app’s acceptability. One item assessed perceived learning and another satisfaction with app duration.

System Usability Scale (SUS) [41, 42]: 10-item self-report scale that assesses usability. Items are rated on a scale from 1 (strongly disagree) to 5 (strongly agree). Scores are then converted into a single total SUS score that ranges from 0 to 100, with higher scores indicating better usability.

Individual survey: open-ended response items developed ad hoc to assess esTOCma’s acceptability. They are divided into three parts. In part 1, for each USE item, participants answered an open question

explaining their rating and suggestions. Part 2 includes open-ended questions that assessed: (1) acquired knowledge about OCD, (2) applicable resources for the classroom, and (3) usefulness of esTOCma for identifying OCD symptoms. In part 3, participants were asked which elements aimed at teachers should be included in the app.

### Data analysis

Descriptive statistics were calculated to analyze sociodemographic data, usage patterns, and quantitative usability data. Chi-square and Mann-Whitney *U* tests were used to explore differences in sociodemographic characteristics and baseline measures. The nonparametric Wilcoxon signed-rank test was used to analyze differences between pre- and post-intervention. Effect sizes were calculated using the rank-biserial correlation ( $r_{rb}$ ). The level of statistical significance was set at  $p = 0.05$ . Statistical analyses were conducted using IBM SPSS Statistics (version 25) and Jamovi (version 2.7.9).

For qualitative analyses, the narrative content of the open-ended questions was evaluated, drawing on exploratory methodologies. Based on the individual analysis of the answers, the most recurrent themes were identified and organized into thematic categories.

## Results

### Feasibility

#### Recruitment

Of the 48 participants who expressed interest in participating, 31.3% (15/48) were excluded for not downloading the app, while 68.8% (33/48) were enrolled in the intervention (Figure 2). Of those 33 participants, 63.6% (21/33) completed the app, whereas 36.4% (12/33) were excluded for not completing the missions or the post-intervention assessment. The individual survey was sent to those who completed the app (21/33), of whom 9.5% (2/21) did not respond. Therefore, the final sample consisted of 19 participants.

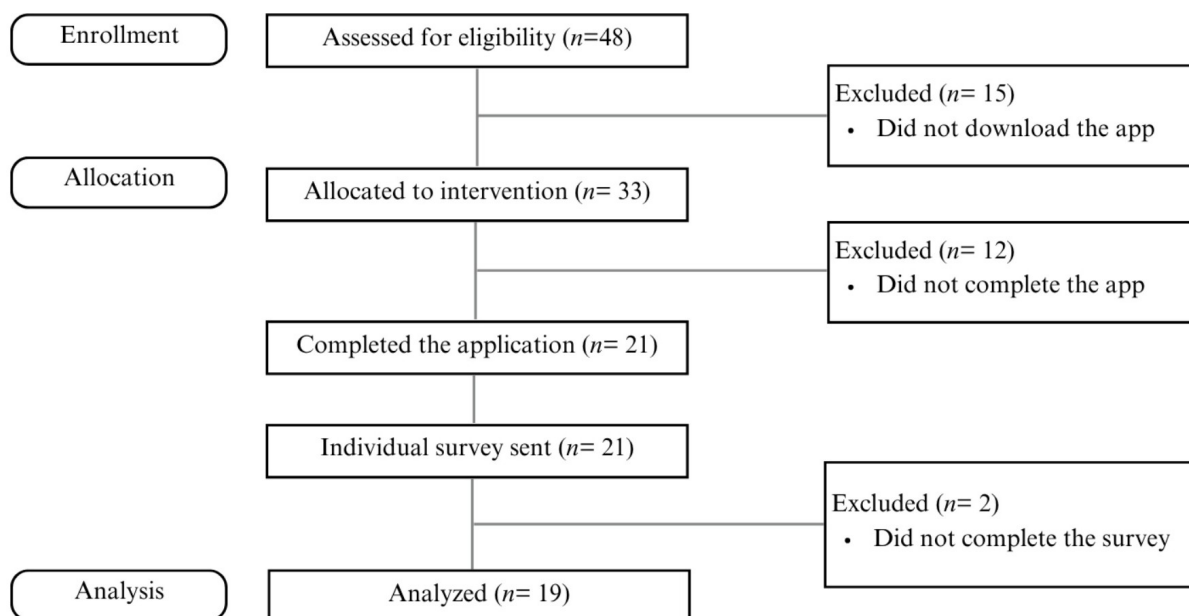


Figure 2. Participants flowchart.

Differences in sociodemographic characteristics and preintervention measures (baseline) between the completers' group and the non-completers' group were calculated (Table 1). Statistically significant differences were only observed in age, with the completer group being older, and SDS scores, which were higher in the non-completer group.

**Table 1. Differences between the completers and non-completers on demographic and baseline measures (N = 33).**

Variable or measure	Completers (n = 19) M ± SD	Non-completers (n = 14) M ± SD	Chi-square (df)	Mann-Whitney U test	p
Age (years)	47.74 ± 11.19	36.83 ± 9.04	N/A	53.00	0.003
Gender n (%)			1.954 (1)	N/A	0.162
Women	14 (73.70)	7 (50.00)			
Men	5 (26.30)	7 (50.00)			
MHLQ-R	3.00 ± 0.94	3.42 ± 0.65	N/A	100.00	0.198
AQ-9	25.79 ± 10.45	23.21 ± 6.50	N/A	119.50	0.621
SDS	1.08 ± 0.63	1.64 ± 0.77	N/A	69.50	0.018
GHSQ	5.29 ± 1.18	5.14 ± 1.29	N/A	127.00	0.825
OCI-4	0.95 ± 0.63	0.79 ± 0.67	N/A	111.00	0.416

M: mean; SD: standard deviation; MHLQ-R: Mental Health Literacy Questionnaire-Reduced; AQ-9: Attribution Questionnaire-9; SDS: Social Distance Scale; GHSQ: General Help-Seeking Questionnaire; OCI-4: Obsessive-Compulsive Inventory-4.

### App use pattern

An analysis of the app's usage pattern was conducted. First, the time elapsed from the pre-intervention to the completion of the post-intervention was explored (i.e., the pre-intervention assessment, the completion of the 10 missions, and the post-intervention assessment). On average, participants took 5.37 days (SD = 4.23, range: 0–17) to complete their participation in the study, with a mode of 7 days. The most frequent usage pattern was completing the study within one week. Secondly, the number of days participants dedicated to completing the missions was analyzed. They spent an average of 4.89 days (SD = 4.21, range: 0–17) from starting the first mission until finishing the tenth, with a mode of 1 day. A total of 26.3% (5/19) of participants completed the missions in one day or less, while 15.8% (3/19) took 9 or more days, completing approximately one mission per day. Lastly, the time spent on each mission was analyzed individually (Table 2). Participants who remained on a mission for more than 20 minutes were excluded, as it was assumed they left the app open without using it.

**Table 2. The time that participants dedicated to completing the 10 missions.**

Mission	Excluded participants (n)	Time (min)	Mode (min)
Mission 1	3	3.88 (1.36; 2–8)	3
Mission 2	1	4.06 (1.16; 3–6)	3
Mission 3	1	3.78 (1.44; 2–7)	3
Mission 4	1	1.50 (0.51; 1–2)	1
Mission 5	0	1.63 (0.83; 1–4)	1
Mission 6	3	8.50 (0.63; 8–10)	8
Mission 7	2	7.47 (0.8; 7–10)	7
Mission 8	1	4.44 (1.50; 3–8)	3
Mission 9	0	2.74 (0.73; 1–4)	3
Mission 10	0	3.47 (1.71; 2–9)	3

The column "excluded participants" includes participants who spent more than 20 minutes completing a mission. Time invested is described in minutes as mean (SD; range).

Time invested in the first module (missions 1–5) ranged from 1 to 3 minutes, in the second module (missions 6 and 7) between 7 and 8 minutes, and in the third module (missions 8, 9, and 10) around 3 minutes. The most common pattern was completing more than one mission per day. Usually, several days of inactivity passed; some participants spent more than 20 minutes on a mission before returning to complete several missions consecutively.

## Acceptability

### Quantitative data

Acceptability, understood from the perspective of the Technology Acceptance Model [43], was evaluated by assessing perceived usability and ease of use. The perceived ease of use of the app was very high. SUS obtained an average score of 85.5 (SD = 10.3), which is interpreted as an excellent perception of the app's design [41].

Regarding usability and satisfaction with the app, measured with the USE (see Table 3), the majority of participants strongly or completely agreed that the app was useful (89.5%; 17/19) and that they were satisfied with it (84.2%; 16/19). Moreover, esTOCma met participants' expectations, and the vast majority would recommend it to someone else, with 73.7% (14/19) and 89.5% (17/19), respectively, agreeing or strongly agreeing with these statements.

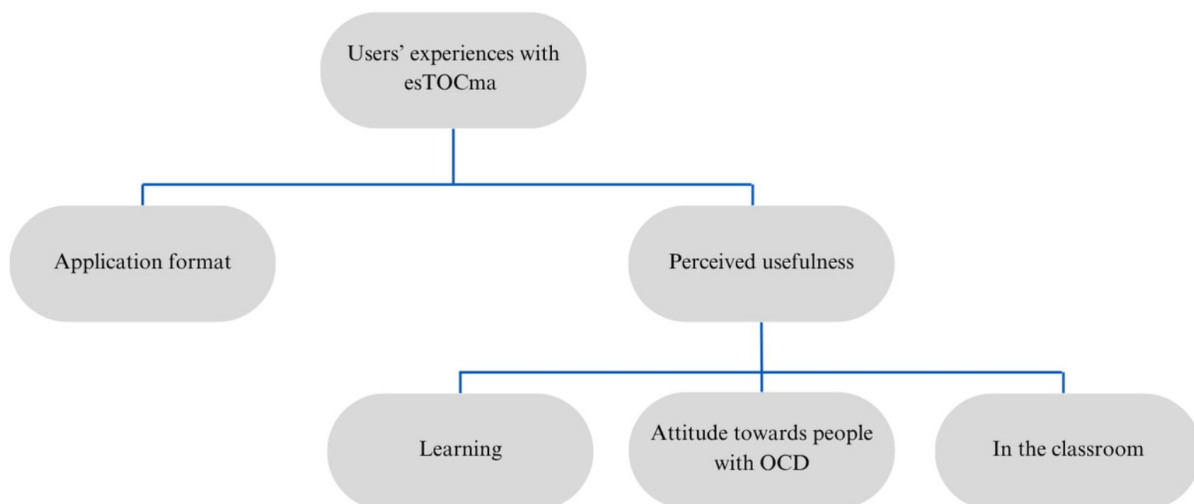
**Table 3. USE scores.**

USE dimension	Disagree % (n)	Neither agree nor disagree % (n)	Agree % (n)
Utility	5.3 (1)	5.3 (1)	89.5 (17)
Expectations	5.3 (1)	21.1 (4)	73.7 (14)
Satisfaction	5.3 (1)	10.5 (2)	84.2 (16)
Recommendation	5.3 (1)	5.3 (1)	89.5 (17)

Category "disagree" includes answer options 1, 2, and 3 of the Likert-type Scale, category "neither agree nor disagree" includes answer option 4, and category "agree" includes answer options 5, 6, and 7. USE: Usefulness, Satisfaction, and Ease of Use Questionnaire.

### Qualitative data

Common contents from the responses to parts 1 and 2 of the surveys were extracted and categorized into the following themes: (1) application format and (2) perceived usefulness. A summary of the themes and subthemes can be found in Figure 3.



**Figure 3. A tree diagram that shows the codified themes and subthemes.** OCD: obsessive-compulsive disorder.

Application format comprises comments related to esTOCma as an app. Participants generally expressed satisfaction with the format; one noted: "An ingenious way to do scientific divulgation. Very original." (P1).

Participants highlighted its simplicity and ease of completion. Another praised aspect was the testimonial videos from patients sharing their experiences with OCD, described as "very good" (P1). The videos, together with the missions, "clearly convey the objective of reducing stigma" (P17) and "help empathize with them [people with OCD]" (P1).

esTOCma is a serious game; however, opinions about its entertainment value were mixed. Two individuals pointed out its dynamic nature, whereas two others expected it to be more playful: “The app’s idea seemed very good to me, and I thought it could be useful in the classroom, but the content or its layout did not seem appealing to me.” (P10).

The length of the app was seen as an obstacle to completion or dedicating enough attention by 36.8% (7/19) of participants, although they considered the content well-structured. For example:

“In my opinion, 10 days is excessive. The modules are short, and I think they could be completed in much less time.” (P11).

“It seemed a bit long. I think it would be better if it were slightly shorter because by the end, you complete it just to get it done.” (P2).

Additionally, some participants (4/19; 21.1%) reported difficulties in module 3 when asked to identify the incorrect belief. One participant suggested simplifying the wording of the items, and another would have preferred clearer feedback on the response alternatives.

About the perceived usefulness category, three sub-themes were identified: (1) learning; (2) attitudes towards individuals with OCD; and (3) classroom utility.

Except for one participant, the others (18/19; 94.7%) reported having learned about OCD through the app. For 21.1% (4/19), the app helped remember previously known concepts. Most participants (73.7%; 14/19) acquired new information about OCD through the app. The main areas of learning included: the disorder in general, symptomatology, and treatment. Some participants (5/19; 26.3%) gained an overall understanding of OCD, while others (6/19; 31.6%) noted having obtained new information.

Regarding symptoms, one participant commented he learnt about aggressive obsessions through the app, two understood the intrusive nature of compulsions, and three learnt to differentiate between normal and pathological behaviors. An illustrative example follows: “I’ve learnt a lot, I think it’s important. It’s now very clear to me when a quirk stops being just a quirk: when it affects your daily life.” (P15).

Regarding treatment, some (4/19; 21.1%) were previously unaware that OCD had effective treatments and learned for the first time about cognitive-behavioral therapy. One of them would have liked “extended information about the therapy” (P11). They also learnt about support mechanisms and agents, such as general practitioners in the public health system and the importance of a personal support network: “I’ve learnt a bit more about the role and involvement of family and friends.” (P14).

Another factor contributing to satisfaction with the app was attitudinal changes towards people with OCD. Using the app has helped the majority (68.4%; 13/19) of participants to “understand them [people with OCD]” (P7). It allowed them to reflect and empathize with patients. One participant also mentioned it “helped [her] feel more at ease knowing that it happens to many people” (P5), because she saw herself slightly reflected in some of the personal experiences of the videos. Participants also felt motivated to normalize the disorder. They advocated for open conversations about patients’ struggles, thoughts, and feelings, as this facilitates the possibility of receiving help and recovery: “Now I know it’s not something comical, those who suffer from it are regular people and can overcome it.” (P13).

Nearly half of the participants (47.4%; 9/19) corrected misconceptions or stereotypical ideas they had about people with OCD. Learning more about the disorder contributed to reducing the associated stigma: “It’s not the same to be OCD than to have OCD. I thought OCD was part of someone’s identity, not that it referred to behaviors or thoughts that we can all sometimes have.” (P4), “Now I see them more naturally and with less prejudice.” (P9).

In the school context, teachers valued the app positively. Although more than half (10/19; 52.6%) reported not learning any directly applicable classroom resource, the same proportion (10/19; 52.6%) indicated gaining indirect resources. The most commonly cited areas were: improved observation (2/19; 10.5%), willingness to help (3/19; 15.8%), and acceptance of students with OCD (4/19; 21.1%). The app offers the perspective that emotional problems may underlie certain behaviors: “Were that to happen, I

would use observation, I would be more attentive to assess if there's a problem, trying to see what's behind those behaviors because I would no longer see that student as 'that quirky kid'." (P15), "Knowing the disorder gives you examples so you don't look at someone who has it in a strange way." (P5).

The majority (10/19; 52.6%) believed the app would help them identify students with OCD, while only two disagreed. One participant expressed a need for more information about symptomatology. According to the participants, esTOCma provides a useful professional resource so that teachers "can identify and know how to act in such cases in general terms" (P6). Participants who would recommend the app, when asked to whom they would recommend it, suggested education professionals, students, families, the general population, and OCD patients.

Two participants specified that esTOCma is "more adapted to students and not so much to adults" (P1, P3). Participant 15 shared an interesting implication of the app in classrooms: It fosters personal contact with students and helps prevent conflicts and school failure. Often, the causes of school failure are unknown, and the distress caused by OCD could be at the root of some of these cases.

### Preliminary efficacy

Nonparametric Wilcoxon tests for repeated measures were conducted to examine the differences between pre- and post-intervention assessments in the following variables (Table 4): stigma (AQ-9), social distance (SDS), help-seeking intentions (GHSQ), distress caused by OCD symptoms (OCI-4), and mental health literacy (MHLQ-R).

**Table 4. Differences in scores between pre- and post-intervention.**

Item	Experimental group (n = 19)				
	Pre (M ± SD)	Post (M ± SD)	z	p	r <sub>rb</sub>
Stigma (AQ-9)					
Total score	25.8 ± 10.5	18.2 ± 8.08	-3.67	< 0.001	0.96
Dangerousness	4.42 ± 2.91	2.16 ± 1.89	-3.47	0.001	1.00
Fear	3.89 ± 2.73	2.42 ± 1.74	-2.53	0.011	0.76
Blame	2.58 ± 2.09	1.47 ± 1.12	-2.54	0.011	0.89
Segregation	2.05 ± 1.81	1.42 ± 1.12	-2.06	0.039	1.00
Anger	2.16 ± 2.09	1.47 ± 1.22	-2.10	0.036	0.78
Help	7.42 ± 1.43	7.53 ± 2.09	-0.82	0.415	-0.27
Avoidance	3.26 ± 3.03	1.74 ± 1.73	-2.53	0.011	0.89
Social distance desire (SDS)	1.08 ± 0.63	0.92 ± 0.82	-0.99	0.318	0.33
Help-seeking intentions (GHSQ)	5.29 ± 1.18	6.00 ± 1.59	-2.50	0.012	-0.74
Distress due to OCD symptoms (OCI-4)	0.95 ± 0.63	0.88 ± 0.70	-0.63	0.532	0.18
Mental health literacy (MHLQ-R)	3.00 ± 0.94	3.68 ± 0.58	-2.92	0.004	-1.00

M: mean; SD: standard deviation; z: Wilcoxon signed-rank test; r<sub>rb</sub>: rank-biserial correlation; AQ-9: Attribution Questionnaire-9; SDS: Social Distance Scale; GHSQ: General Help-Seeking Questionnaire; OCI-4: Obsessive-Compulsive Inventory-4; MHLQ-R: Mental Health Literacy Questionnaire-Reduced.

The results show statistically significant differences in three of the five variables explored between the pre- and post-intervention. Overall, results indicate that after completing esTOCma, there was a significant reduction in stigma (AQ-9) associated with OCD, across all dimensions with effect sizes ranging from moderate to large, except for the help subscale, where a slight non-significant increase was found. Regarding mental health literacy (MHLQ-R), knowledge about OCD increased significantly, with a large effect size. Lastly, the use of the app led to a significant increase, with a moderate effect size, in help-seeking intentions (GHSQ) in the event of experiencing symptoms similar to those described in the vignette.

In contrast, although a decrease was observed in the distress associated with OCD symptoms (OCI-4), the differences did not reach statistical significance. Similarly, a decreasing tendency in the desire for social distance (SDS) from someone with OCD was observed after using the app, though the differences were not statistically significant.

## Possible improvements in esTOCma for its adaptation in educational settings

Participants proposed different areas for improvement of the app in part 3 of the open-ended questions. The most frequent suggestion (63.2%, 12/19) was to include classroom guidelines for dealing with a student with OCD, such as how to assist students if they are engaging in a compulsion. To improve detection, many participants (42.1%; 8/19) wished to receive specific information on how OCD symptoms manifest in classrooms. One participant noted that understanding the symptoms in detail “would help give teachers more confidence in their ability to identify these symptoms or refer the student to the counselor” (P15). Another recurring recommendation (36.8%; 7/19) was to make the application lighter and more concise. Suggestions included reducing the length of the introductory video and directly introducing the missions.

## Discussion

The aim of the present study was to assess whether esTOCma, a serious game designed to improve understanding of OCD, is feasible and acceptable, as well as to offer preliminary data about its effectiveness within the teaching field. Results indicate that esTOCma demonstrates feasibility and acceptability, and that completion of the game seems to be associated with positive changes in the variables of interest.

Of the total participants assigned to the intervention, 63.6% (21/33) completed the application, and of these, 90.5% (19/21) responded to the subsequent individual survey. Therefore, 36.4% (12/33) discontinued the application before completion. Even though this dropout rate is higher than the one in the study with the general population [26], it is lower than in the study with the clinical population [27] and lower than the common average attrition rate (57%) reported in online health interventions for depression [44]. Dropout before completion or sudden cessation of use represents a significant challenge in this type of intervention [45, 46]. Participants who completed the app were older than those who did not; in fact, older age has been associated with higher adherence in previous studies [47]. Other causes of attrition, as noted by participants, could be the duration of the app, the desire for more interactive elements or perceiving the app as not personally relevant [48]. Mitigation strategies for future versions of esTOCma could include shortening the app, including more gamified elements, incorporating enhanced push notifications, or progress tracking [49]. Enhancing usability features, as advised by participants, could help improve user engagement and completion rates [50]. Additionally, attrition-specific measures could be included in future studies [49].

Regarding usage patterns, the app recommended completing one mission per day, although adherence to this guideline was not mandatory. The most frequent pattern, observed in 26.3% (5/19) of participants, was completing esTOCma in one day or less, consistent with findings from studies in the general population [26]. On the contrary, participants in clinical population studies dedicated up to nine days to completion [27]. In the present study, most participants completed several missions on the same day following periods of inactivity, either continuously or at different times throughout the day. Interruptions may have resulted from participants forgetting or disregarding app notifications. Although all missions were brief (< 10 minutes), dropout during missions was concentrated in specific ones (missions 1, 6, and 7). This pattern was also observed in the study with the general population (missions 3, 4, 5, 7, 8) [26], although only the dropout trend in mission 7 was replicated here. These pauses may be attributable to the length or format of the missions. Mission 1 introduces OCD symptoms and typically follows completion of the pre-intervention assessment and introductory video, which may cause fatigue when receiving new information. Missions in module 2 (missions 6 and 7) are the longest (7–8 minutes) and include videos of patients describing OCD symptoms and interference. Shorter, more dynamic missions (i.e., missions 2, 3, 4, 5, 8, and 9) appeared more engaging.

The results suggest that esTOCma serves as a viable and applicable tool across diverse educational settings. Despite the limited number of participants, the heterogeneous characteristics of the sample help support this claim. The study includes teachers with a high educational level, a wide age range (28–62 years), and considerable variability in the educational levels (pre-school, primary and secondary

education, vocational training, language school, and others) and types of institutions in which they teach, both public and private.

esTOCma demonstrated excellent acceptability, as measured by usability (SUS) and perceived usefulness (USE), with teachers reporting satisfaction with the application. These findings are consistent with those found in clinical populations [27]. Therefore, we have a tool that is easy to use and perceived as useful by teachers. Most participants would recommend the app to other colleagues, especially those interested in mental health. Moreover, they reported learning a lot about OCD: They formed a general idea of the disorder, its symptoms, and treatment. esTOCma illustrates the wide range of OCD content with effective mechanisms such as vignettes, practical examples/case studies, and personal experiences [51]. The need for this type of training is reflected in the literature [9].

Most teachers believe that esTOCma would be a useful tool for identifying students with OCD, although they expressed the need for additional information on how OCD symptoms manifest in the classroom, as they often appear covertly [6]. One teacher specified that receiving training on action protocols would increase their confidence in providing help. Understanding how confidence translates into helping behaviors constitutes a valuable future research direction. This would improve mental health literacy among teachers and, consequently, the mental health of students [18].

Several participants reported not having learned a resource directly applicable to the classroom, possibly because this version of esTOCma is not adapted to school contexts, as it is designed for the general population. The ultimate goal of this work is to explore the app in the teaching context to create a specific module for teachers as part of the application, providing an effective tool for identifying and managing students with OCD within the classroom. Hence, in this study, we aimed to assess which aspects teachers would consider relevant to include in a new version. The recommendations can be summarized as follows: (1) understanding possible manifestations of OCD symptoms in the classroom (e.g., include a list of OCD symptomatology in students, etc.); (2) establishing an action protocol (e.g., how to act when a student presents OCD symptoms, which school professional to approach, etc.); and (3) shortening the app's duration. Following participants' recommendations and literature [51], the next iteration of esTOCma for teachers should include a teacher-specific module featuring case studies of OCD symptoms in students, practical classroom action protocols, and interactive exercises. These adaptations would contribute to increased individualization and user-centered design [45]. In this way, adherence would be enhanced and the app would be more appealing and useful for teachers.

Regarding preliminary effectiveness, the current version of esTOCma improves mental health and OCD literacy. These results are consistent with traditional psychoeducational programs for teachers in the mental health field [16, 22] and for OCD [19, 23, 24]. These findings also align with studies of the app conducted in the general [25, 26] and clinical population [27]. App usage has also significantly decreased the levels of stigma associated with OCD. The same result has been observed with the extended version of the app in the general population [25, 26] and in interventions targeting stigma related to other mental disorders in educational contexts [52]. The results are also consistent with other training programs in mental health for teachers [16, 22]. esTOCma has proven more effective as an anti-stigma program than other educational interventions that use information sheets (e.g., [19]). Additionally, completing the application increases help-seeking intention among teachers, a result also observed after using esTOCma in the general population [25]. With this type of intervention, teachers can learn about how to early detect OCD symptoms and where to seek evidence-based help [25]. esTOCma could empower teachers to seek help for themselves and help their students to ask for formal help and have fewer stigmatizing attitudes towards it.

Although a reduction in social distance desire towards a person with OCD symptoms was observed, it did not reach statistical significance. This reduction was significant in studies conducted with the general population [25] and another serious game about stigma in mental disorders for students [52]. Likewise, distress scores related to OCD symptoms did not change. High levels were not expected in this variable, as it assesses personal OCD symptoms, which participants may not have. Studies with general [25] and clinical

[27] populations did find a significant reduction in these symptoms. The non-significant reductions in social distance (SDS) and OCD symptom distress (OCI-4) may be due to the small sample size, low baseline scores, or the use of abbreviated instruments. Future studies should employ full versions of these scales to enhance sensitivity. Normalizing intrusions and increasing knowledge about OCD may function as protective factors for vulnerable groups [28, 30]. Learning about the OCD cognitive model (mission 3), the universality of the intrusions (mission 2), and the role played by dysfunctional appraisals (mission 3) could help participants not to worry or focus on their own normal intrusive thoughts. This would avoid appraising these thoughts dysfunctionally, therefore not facilitating that intrusive thoughts escalate into obsessions.

Some limitations must be considered. This is a pilot study, with a small sample size and no control group. While the sample size of 19 is consistent with other pilot studies ( $n = 10-14$ ) evaluating user experiences in digital interventions [53–55], a power analysis suggests that a larger sample ( $n = 34$ ) would be needed for more robust statistical conclusions in future trials for detecting medium effect size changes. However, due to the sample size, we advise caution in the generalizability of our findings to broader teacher populations. Also, the absence of a control group poses a limitation on the interpretation of causal claims made; a randomized controlled trial should be conducted for future validation. It must be considered that around 70% of the sample were women. The predominance of female participants may have influenced outcomes, as women have been found to be more prone to seeking professional help [56, 57]. Future studies should aim for balanced gender representation to explore potential gender-specific effects. Also, there is a considerable dropout rate (i.e., not completing the 10 missions), probably due to participants forgetting to continue. Another point is the narrative analysis of the open-ended questions, as there was only a single coder. Future studies should employ at least two independent coders and calculate inter-rater reliability (e.g., Cohen's kappa) to enhance the robustness of thematic analyses.

Despite these limitations, this is the first study to evaluate the feasibility and acceptability of a psychoeducational intervention for OCD using indirect contact and cognitive restructuring for teachers with a mental health app. Moreover, preliminary data on its effectiveness are provided. Considering the aforementioned results, esTOCma has proven to be an effective tool for reducing stigma, increasing help-seeking intentions and knowledge about OCD, and is a feasible and acceptable tool to implement in educational settings.

Mental health literacy programs for teachers appear as a response to current social needs, given the increasing impact of mental disorders [58]. These consequences are also present in educational contexts, where school psychologists and teachers play a key role as they work with vulnerable populations daily. esTOCma provides a platform to make the reality of OCD visible in classrooms, offering a tool that allows for a better-informed and less biased teaching staff in mental health. When teachers are more knowledgeable about OCD symptoms and treatment, they can detect possible cases, encourage earlier help-seeking, and guide students towards professional help.

## Abbreviations

ADHD: attention-deficit/hyperactivity disorder

AQ-9: Attribution Questionnaire-9

GHSQ: General Help-Seeking Questionnaire

MHLQ-R: Mental Health Literacy Questionnaire-Reduced

OCD: obsessive-compulsive disorder

OCI-4: Obsessive-Compulsive Inventory-4

SDS: Social Distance Scale

SUS: System Usability Scale

USE: Usefulness, Satisfaction, and Ease of Use Questionnaire

## Supplementary materials

The supplementary table for this article is available at: [https://www.explorationpub.com/uploads/Article/file/101169\\_sup\\_1.pdf](https://www.explorationpub.com/uploads/Article/file/101169_sup_1.pdf).

## Declarations

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### Author contributions

LBP: Conceptualization, Formal analysis, Writing—original draft. SA: Methodology, Writing—review & editing, Investigation. GGS: Conceptualization, Methodology, Validation, Writing—review & editing, Supervision, Investigation, Project administration, Funding acquisition. All authors read and approved the submitted version.

### Conflicts of interest

The authors declare that they have no conflicts of interest.

### Ethical approval

This study was approved by the Human Research Ethics Committee of the Universitat de València (2534203).

### Consent to participate

Informed consent to participate in the study was obtained from all participants.

### Consent to publication

Not applicable.

### Availability of data and materials

The raw data supporting the conclusions of this manuscript will be made available by the authors, without undue reservation, to any qualified researcher.

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