Coping strategies and social support in a mobile phone “chat” application designed to support smoking cessation

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Abstract

Background: Smoking is one of the most significant factors contributing to low life expectancy, health inequalities, and illness at the worldwide scale. Smoking cessation attempts benefit from social support. Mobile phones have changed the way we communicate through the use of freely available message-oriented applications. Mobile application-based interventions for smoking cessation programs can provide interactive, supportive, and individually tailored interventions.

Objective: To describe the emotions, coping strategies, beliefs, values, and cognitive evaluations of smokers who are in the process of quitting, and to analyze online social support provided through the analysis of messages posted to a chat function integrated into a mobile application (app).

Methods: Descriptive qualitative research. Informants were smokers who participated in the chat of Tobbstop. The technique to generate information was documentary through messages collected from September 2014 through June 2016, specifically designed to support a smoking cessation intervention. A thematic content analysis of the messages applied two models: the Lazarus model to assess participant experiences and perceptions and the Cutrona model to evaluate online social support.

Results: During the study period, 11,788 text messages were posted to the chat by 101 users. The most frequent messages offered information and emotional support, and all of the basic emotions were reported in the chat. The three most frequent coping strategies identified were: increased physical activity, different types of treatment such as nicotine replacement, and humor. Beliefs included the inevitability of weight gain and the notion that not using any type of medications is better for smoking cessation. Health and family were the values more frequently described, followed by freedom. A smoke-free environment was perceived as important to successful smoking cessation. The social support group that was developed with the app offered mainly emotional and informational support.

Conclusions: Our analysis suggests that a chat integrated into a mobile application focused on supporting smoking cessation provides a useful tool for smokers who are in the process of quitting, by offering social support and a space to share concerns, information, or strategies.

Keywords: Primary health Care, qualitative research, mobile applications, smoking cessation, social support, psychological adaptation.
INTRODUCTION

Smoking is one of the most significant factors contributing to low life expectancy, health inequalities, and illness at the worldwide scale [1]. Every year, tobacco kills approximately 6 million people, and causes economic losses in the order of half a billion dollars. However, the deaths caused by smoking are the most preventable and, as a World Health Organization (WHO) report points out, the impact of the tobacco epidemic can be reduced by using low-cost, high-efficiency means [1]. According to data from the 2014 European Health Survey, carried out in Spain by the National Institute of Statistics, 30.4% of men and 20.5% of women in Spain are smokers, compared to the European mean of 21.9% and 15.1%, respectively [2].

Online support for smoking cessation

The rise of Internet use and mobile phones has introduced two key features in the way we communicate with each other: communications are now (i) ubiquitous, that is, you can talk with almost anyone anytime (24 hours a day) anywhere, and (ii) nearly instantaneous, as messages can be received and answered within seconds or minutes. Moreover, individuals can be connected at minimal cost, eliminating barriers to in-person participation in group programs, such as childcare, disability, and employment responsibilities [3].

Current guidelines recommend that all smoking cessation programs incorporate some type of social support [4]. This may include social networks and mobile communication-based systems that provide a platform where those trying to quit smoking can share concerns and offer emotional support, useful advice, personal stories, and reinforcement during all the smoking cessation process [5]. Even people who have a sound network of 'offline' support from family and friends may benefit from online social support [6]. Online support groups also offer a degree of anonymity that would not be possible in face-to-face communication, which may encourage individuals to openly discuss their experiences without fear of a negative reaction [7].

However, little is known about the efficiency and the importance of online support in smoking cessation programs. To our knowledge, previous studies published about this topic found that the support of social networks may be beneficial immediately when smokers want to quit, and also during the first weeks of a smoking cessation program [3,6].
Conceptual models

Stress occurs when a person considers that what is occurring endangers his or her personal well-being. Lazarus and Folkman’s theory defines the concept of stress by referring to the interrelationships that occur between a person and the context in which that individual finds himself or herself. Their transactional perspective distinguishes between two broad functional dimensions of coping, task-oriented and emotion-oriented, where coping is defined as those constantly changing cognitive and behavioral efforts that are developed to handle external demands and/or internal evaluations that exceed the resources of the individual. Task-oriented coping serves to manipulate or adapt the problem to the causative environment (i.e., dealing with the problem) and emotion-oriented coping regulates the emotional response that appears as a consequence of the problem. The Lazarus and Folkman’s theory addresses six categories [8]: (a) emotions, for which our study applied the Ekman classification of primary emotions (joy, sadness, anger, disgust, fear, and surprise) [9]; (b) coping strategies, both task-oriented and emotion-oriented; (c) beliefs, defined as pre-existing notions of reality, whether individually created or culturally shared, and in this case referring to the smoking cessation process; (d) values, encompassing the objectives that express what is important to the individual and will help him or her to quit smoking; (e) cognitive evaluation, process that determines the consequences that a particular event will generate in an individual, and (f) social support, coping resource whereby we have somebody that provides emotional, informative and/or tangible support.

The discussion of emotions is a key element of online support groups. Cutrona and Suhr developed a coding scheme to classify social support behaviors as emotional, informational, self-esteem, social network, and tangible support [10]. They identified all five types of social support in online posts, with informational and emotional support most frequently observed. People who decide to quit smoking may benefit from having developed coping strategies to overcome the habit.

Tobbstop trial

The Tobbstop trial was a multicenter randomized clinical trial (Trial Registration NCT01734421) carried out in Tarragona, Reus, and surrounding areas (Catalonia - Spain) that aimed to assess the efficacy of a mobile phone application for smoking cessation. Smokers were recruited from primary healthcare centers and were randomized into two groups: (a) an intervention group that included access to the Tobbstop mobile app and the usual counseling about smoking
cessation provided in primary health care consultations [11] and (b) a control group that received only the usual smoking cessation counseling.

The current study was a secondary analysis of data from one of the components of the Tobbstop app, a private chat that allowed study participants to communicate with each other [12]. The objectives of this study were to describe the emotions, coping strategies, beliefs and values together with cognitive evaluations, of smokers during the process of quitting, and to analyze online social support provided through messages posted to this chat.

**METHODS**

**Design**

Descriptive qualitative study to identify the emotions, motivations, and perceived benefits that could be observed in daily experiences within the process of change, experienced by people who used this chat function during the action phase of the change process.

**Participants**

Of the 309 people randomly selected for the intervention group, 101 participated writing comments in the chat, constituting our study population. The sample was opportunistic [13]. Inclusion criteria were adults (older than 18 years) with a motivation ≥6 points on the Richmond test [11], in the action phase according to Prochaska and DiClemente [14], who had an iOS or Android based smartphone. Table 1 shows the characteristics of the participants included.

**Table 1.** Characteristics of participants with an activation code for the application who participated in the chat (N=101)
Chat participants

<table>
<thead>
<tr>
<th></th>
<th>N=101 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>57.4</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Arithmetic mean (TD)</td>
<td>45.3(9)</td>
</tr>
<tr>
<td>Civil Status</td>
<td></td>
</tr>
<tr>
<td>Single (%)</td>
<td>20.8</td>
</tr>
<tr>
<td>Married (%)</td>
<td>59.4</td>
</tr>
<tr>
<td>Widower (%)</td>
<td>2.0</td>
</tr>
<tr>
<td>Divorced (%)</td>
<td>17.8</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
</tr>
<tr>
<td>No studies (%)</td>
<td>0</td>
</tr>
<tr>
<td>Primary (%)</td>
<td>26.0</td>
</tr>
<tr>
<td>Secondary (%)</td>
<td>57.0</td>
</tr>
<tr>
<td>University or higher (%)</td>
<td>17.0</td>
</tr>
</tbody>
</table>

**Description of the mobile application**

The Tobbstop application was designed to support participants during the first three months of the smoking cessation progress, with three main goals in mind: (a) to help individuals record their progress in the smoking cessation program; (b) to increase the user's knowledge about the problems related to smoking and the health benefits associated with smoking cessation; and (c) to provide distraction for moments of craving.

The Tobbstop application included four components: (a) a library with information about tobacco; (b) a private chat for study participants where they could ask for help, share concerns, or offer help to others; (c) a set of minigames designed specifically to entertain and educate participants; and (d) a progress registry to show the evolution of the participant's health throughout the treatment process. The application also included a panic button and consultation with an expert.

**Technique to generate data**

The technique to generate information was documentary through written text messages. During the Tobbstop study period (September 2014 to June 2016), 11,788 text messages were written in Catalan and Spanish by participants. These were downloaded into an Excel table for analysis, replacing personal information about the participants with identification codes that protected anonymity.

**Analysis**
A thematic content analysis of the messages posted in the chat was performed by two members of the research team (EGF and GFM), as follows: a) an initial reading of all messages; b) identification of relevant topics and texts; c) fragmentation of the texts into units of meaning; d) codification of texts by topics; e) creation of first-order categories and second-order categories based on the Lazarus and Cutrona models by grouping the codes; and f) interpretation the meanings of each category. Analysis was carried out with the support of the Atlas.ti 7 program.

Criteria of rigor and quality

To ensure the rigor and quality of the study, the criteria of rigor suggested by Calderón were followed: epistemological and methodological adequacy, relevance, validity and reflexivity [15]. The context, the characteristics of the participants and the research process are described. The messages obtained are analyzed and a period of reflection is carried out by two members of the research team.

Ethical aspects

The study entitled “Efficacy of an application for mobile devices in smoking cessation in young people (Smart_Smoke): a cluster-randomized clinical trial” was approved by the Ethics Committee of IDIAP Jordi Gol (P12 / 041). The applications used was called Tobbstop. Participants voluntarily agreed to participate and provided their signed informed consent. The research team coded the stored messages with an identification number to guarantee confidentiality and protection of the participants' identity. No names are used in the reported quotations.

RESULTS

The results are structured in two blocs according to the Lazarus and Cutrona model categories (Figure 1).

1. In the Lazarus model, analysis revealed the following five main categories:

1.1. Emotions

Participants express positive and negative emotions related to smoking cessation process following Ekman classification [16]: fear, surprise, disgust, sadness, joy and anger. At the beginning they send messages of sadness and as the time passes the messages are more positive. The emotion that appeared most frequently at the beginning was fear, such as a fear of facing certain social events at which they usually would have smoked. Once these events
have passed without falling back into the habit, they showed the joy they felt at remaining abstinent.

*Id* 548: "I have a dinner tonight and I’m really scared about it."
*Id* 399: "Well, I passed an important test, a calçotada party with friends."

The emotion of surprise also appeared when a participant realized he or she had not thought about tobacco for a long time.

*Id* 422: "... which means that I did not have time to think about smoking, and even I was surprised."
*Id* 192: "I think I’m the newbie here, but it is truly surprising, the changes you notice, from smell to taste ... and I’m only on my fifth day!"

Some people resort to the emotion of disgust to avoid smoking again.

*Id* 452: "I pressed the panic button because I would like one cigarette. I’m not so well today.

As the following dialogue shows, in the early stages of the cessation process, sadness emerged as a powerful emotion and there was a sort of a duel about quitting smoking, a habit that had been with them for a long time. This mourning for what participants got out of smoking is also observed in this comment, which also recognizes that the pleasure of smoking was because of addiction.

*Id*: 647: "I wonder if other people have also felt sad, thinking how happy they were to smoke and now not smoking ... I enjoyed the ‘misbehavior’ of smoking ...."
*Id* 548: "Yes... I didn’t even want to get out of bed because I thought, 'What will I do if I don’t smoke???'"
*Id* 647: "and did you get over it?"
*Id* 548: "Oh, sure. But it will take you a few more days yet."

Once the first few weeks have passed, participants reported an immense joy. Many were counting the days that they had gone without smoking and expressed pride in their achievement.

*Id* 548: "Happy Wednesday. Today makes 120 days I have not smoked. I am very happy and proud of what I’m doing. Don’t give up, everybody!!!"
The emotion of anger also appeared the first days when a participants started to quit smoking. The Tobbstop app check emotion when people start the application every day.

*Id* 543: “Every time I open the application and ask you how are you... the first days I said anger, sad, bad... and now I have been saying form some time that happy.”

### 1.2. Coping strategies

Coping strategies as cognitive and behavioural efforts developed to manage specific external and/or internal demands that are evaluated as excessive or overwhelming for the resources of the individual. The most frequent coping strategy identified to decrease psychological stress, anxiety, and fear of relapse was increased physical activity. Other strategies used to decrease psychological distress and avoid thinking about tobacco included listening to music, cleaning, reading, cooking, or playing.

*Id* 279: “Stationary bicycle ... to not think about tobacco.”

*Id* 429: “All I do is clean and listen to music to not think about it.”

*Id* 406: “Well, I go to fix supper and spend time on that.”

*Id* 363: “When I get overwhelmed I look for a game and I get over it.”

Eating certain foods, drinking liquids, and eating candies as a distraction were also used as a way to reduce stress.

*Id* 192: “I'm sure the people happiest about my not smoking are in the shops that sell sunflower seeds in the shell!! I've already eaten 2 packages today!

*Id* 259: “I don't know how to get over that need, I'm trying right now to think about other things and I am at work but I would really like to smoke. I am going to drink water or a Coca-Cola I might find around the office.”

In order to decrease symptoms of nicotine abstinence, the participants used different types of treatments such as Varenicline, a nicotine substitute. The participants explained the difficulties they experienced with nicotine substitutes to calm the anxiety produced by not having nicotine, especially patches in the case of those receiving no treatment or a different treatment.

*Id* 399: “I take the pills but now the doctor called to give me the patches because I had a problem with Champix but the truth is that they work.”

*Id* 266: “For now, the patch gives me the nicotine I need ... I only miss having a cigarette between my fingers...”
The following dialog shows that humor is another strategy that was frequently used to reduce stress and anxiety.

Id 647: “So, how’s the revision car going?”
Id 485: “No defects. Hahaha.”
Id 647: “and the 0 buffer?”
Id 485: “bad joke, no?” “carboximetry at 2.”
Id 422: “Tell the nurse to send the carbon dioxide meter out for repairs. It must not be working right ...”. At follow-up visits, participants tested their carboximetric level; seeing a score of zero became an element of self-reinforcement. In addition, they thought that a low (or zero) score meant they had clear lungs.

Id 422: "Today at the exhalation test I almost jumped out of the chair, I was so happy. I never thought I’d react like that!"
Id 491: “I went to see the nurse and I got a "2" on lung toxicity. ”

1.3. Beliefs about weight, physical activity and medication

Beliefs are cognitive configurations individually created or culturally shared, pre-existing concepts of reality that act as a perceptual lens. Despite being counseled to follow a healthy diet and drink a lot of liquids, the chat participants showed a belief that it would be impossible to avoid gaining weight during the smoking cessation process. If the timing coincided with menopause and other aspects of aging, they believed there would be greater weight gain.

Id 694: “Did you gain weight too?”
Id 577: “Five kilos (10 pounds) in three months!! But it was worth it. Later on you can lose them, but slowly.”
Id 548: “Age is helping me [gain weight] too....”
Id 577: “That could be.”
Id 422: “Well, with menopause besides, I can’t tell you what all else is going on with me, hahaha.”

Nonetheless, they believe it is worse to smoke than to gain weight and that they will not be able to lose the weight while they are quitting smoking, so they propose it as a challenge for the near future.

Id 192: “The weight doesn’t worry me too much if we don’t put on too much! Anyway, better 10 extra pounds than smoking again, no?”
Id 399: “Yeah, we’ll get rid of the kilos and we will also be rid of the addiction to tobacco.”
Participants believe that physical activity is positive and useful to decrease craving symptoms. Most participants explained that they were exercising regularly.

*Id 192:* "The truth is that doing sports helps a lot to overcome this vice."

*Id 164:* "Doing sports is the best!!"

Although many participants were quitting smoking with the help of medication, there was still a belief that it was best to do it without any pharmacological help.

*Id. 164:* "Anyway, if you can leave without anything, that’s the best. It’s just a head issue. Be strong. And say no. In a week, the monkey just no longer exists”

*Id 429:* "I do not know anyone who has done it on medication. My friends have quit with nothing."

Participants believe that being in a tobacco-free environment would help them in their quit process, and were concerned when they faced situations where they normally would have smoked and where they knew they would meet other smokers.

*Id 499:* "I'm lucky that my circle of friends does not smoke, almost nobody."

*Id 422:* "My son and daughter-in-law also quit a few years ago. My daughter sees it as more difficult for her partner, who also smokes."

### 1.4. Values

Values are compromises that express what is important for the person. The most important value expressed by participants was health, which was stated as the main motivation to quit smoking.

*Id 406:* "I want to quit for my health and for my wife and my son. If I get sick they will have a very hard time."

*Id 470:* "I'm quitting because I do not want the doctor to tell me one day, either quit or you will die."

*Id 548:* "Not even 24h yet but I am happy because I need to quit smoking. To health!!!"

They also highlighted the benefits of smoking cessation for their health. They described benefits they perceived in their body, how food smelled and tasted better, how they didn’t run out of breath while exercising, and how the various follow-up tests reinforced their decision to stop smoking.

*Id 192:* "but it really is surprising, the changes you notice, from the sense of smell to taste ... and I'm only on my fifth day!"
Id 164: “I can breathe better, I can smell better AND I smell better. Food tastes better, and I’ve saved 280 euros.”

Family was another important value and one of the main motivators to start the process of smoking cessation. Concerns included having a negative influence on their children, grandchildren, or other relatives, or impairing the health of family members, especially children, with second-hand tobacco smoke.

Id 422: “My 4-year-old granddaughter, whose parents do not smoke, saw me and her aunt smoking, and told my daughter-in-law that “when I grow up I’m going to smoke like yaya and auntie.” You should have seen my face, and I told her that I would not smoke anymore because it makes ‘owies’.”

Id 843: “I have 2 little children who have a lot of bronchitis and the smoke is really bad for them ... and then for my health ... I’m 33 years old and I have a lot of breathing problems.”

In other cases, the family had asked that they stop smoking, but the participants were not always receptive to these messages when they were in the early precontemplative stage. They still didn’t see that smoking would cause any harm and it was not until the contemplative and preparatory stage when they became aware of all the messages they had gotten from relatives, health professionals, and friends.

Id 280: “My two children asked me to quit and I am doing it for them.”

Id 429: “My husband is anti-smoking and has been telling me to quit for 9 years and I paid no attention; then one day, looking at Facebook, I saw [the TOBBSTOP study] and I decided.

Another important value was freedom, when participants tired of being dependent on tobacco and became conscious of their nicotine addiction. Once they had started the cessation process and were aware they had regained their freedom, this awareness became an important motivator to succeed. They were also critical of people who continued to smoke.

Id 485: “First of all, I didn’t smoke because I liked it but because I was addicted. Tobacco tastes bad.”

Id 577: “I’m tired of being dependent on tobacco.”

Id 647: “I won’t go back to it because even when I smoked the monkey stayed on my back. Many times, right after I smoked, I thought, “Really? Again? and I would have smoked another one ...”
Id 337: “Look, yesterday I was in Les Gavarres and for the first time I was inside, not out on the terrace, and I looked at the smokers who were out there. The image was grotesque to look at. It was like they were being controlled. Think about that.”

Another value was to help others to quit smoking, especially friends and family.

Id 192: “I have convinced three people in my circle to quit ... I’m on a crusade against tobaccoooo!”

Money was a great motivator to begin a cessation attempt, although it was combined with other elements. Saving money was an important value in remaining abstinent. The participants talked about what they wanted to buy with the money saved.

Id 541: “I don’t want to smoke -- for my health, the money, the smell on my clothing...”

Id 364: “With what we spent on tobacco, my partner and I could take a cruise you won’t believe ...”

1.5. Cognitive evaluation

Cognitive evaluation is the process that determines the consequences of smoking cessation in the individual. When participants smoked a cigarette or just took a drag, they were less active in the chat group because they felt sad, guilty, and ashamed even though the group encouraged them to continue trying.

Id 259: “I keep reading you... but I have not been able to quit.”

Id 399: “I feel bad because I wear the patch and don’t smoke cigarettes (it bothers me) but I use the electronic cigarette. With non-nicotine liquid and I don’t inhale. I don’t inhale the smoke but I use it and feel guilty about it.”

Although they were aware that the first days are the most difficult, and are when it is easiest to have a relapse, in some cases they minimized the risk they had overcome during the first weeks.

Id 192: “No prob, man. Once you get through the first week and say a few times, “No, I don’t smoke anymore,” that’s it.”

Id 422: “So, yeah, it’s true that it’s hard at first but after that it’s not.”

2. According the Cutrona model, online social support was classified into five subcategories. :
Chat was perceived by participants as a strength, as it provides cognitive support by sharing advice and practical information with others. Many of the messages offered suggestions about not gaining weight during the cessation attempt.

_id 164: “My advice is to be careful; enjoy the food, which will taste better than ever ... but do not forget that you can go from gaining 4 kilos to 10 without even noticing.”
_id 429: “Try with natural juices and sport. Cheer up!! These are the first few days.”

In many messages, participants recommended physical exercise as a method to control anxiety, and described the different activities they performed.

_id 192: “The trick is to make up your mind that you really want to stop and do some sport. Try a “fun run” event and I’m sure you will get hooked on it.
_id 162: “Sport or physical activities works well !!!”

Among the advice given to help overcome the withdrawal syndrome was natural remedies (e.g., herbal teas, tryptophan).

_id 623: “It is important to stand firm and not smoke or take even one puff. Lime-blossom or valerian tea can help you.”

Often the participants had made previous attempts to quit smoking, and they shared these experiences with the group, including the reasons that led them to relapse. They warned the others not to smoke even a single cigarette because that was what led them to fail.

_id 363: “From all this I learned that if you stop smoking you should never smoke even one.
_id 422: “You’re right. I did not smoke with the pregnancies and then people offered me one and I went back to smoking.”

Some messages referred to the opinions and advice of experts, sometimes with verbatim phrases of what a doctor had told them.

_id 320: “As my doctor says, quitting smoking is learning and there is no learning without relapses.”

2.2. Self-esteem support

The group offered compliments to those who were achieving their goals and considered them to be role models.

_id 422: “Thank you, you have become champions!”
_id 477: “Congratulations!!! A good example to follow.”
2.3 Network support

Recurrent messages were found that provided group support to overcome the worst moments, especially in the first few days. In the group, people found others who were in the same situation and understood what was happening to them at that time.

  *Id* 354: “It’s my second day. I’m having a nervous attack!!!!
  *Id* 348: “Hang in there! It’s my FIRST day and I don’t have to tell you anything you don’t already know.”
  *Id* 363: “Together we’ll make it through!”

The chat also allowed those who were just beginning the program to ask questions of those who had been in the process longer.

  *Id* 355: “[NAME], I have a question. After 103 days, do you still think about smoking?”

2.4 Emotional support

Participants sought support from the group when they felt a need to smoke, and received messages of support and motivation to help them get past the “craving” episodes [17].

  *Id* 375: “I need a cigarrooooo.”
  *Id* 361: “Don’t smoke, you are stronger than that.”

They often needed to validate their emotions with the group, especially when they had not smoked for a number of days. It became important to count the days without smoking and to seek congratulations from the group; this positive feed-back rewarded them emotionally.

  *Id* 485: “83 days without smoke.”
  *Id* 548: “Congratulations!”

The group also offered encouragement when participants relapsed and had a cigarette.

  *Id* 361: “Don’t worry, try again.”
  *Id* 422: “Don’t believe that more than one hasn’t had a fall and still do; they are not all so strong.”

If somebody felt guilty about gaining weight by eating snacks to quell anxiety, the group was forgiving.

  *Id* 270: “Relax, the extra pounds go away but your lungs and your body in general will thank you ...”

Several messages show virtual affection:
Id 422: “You’re welcome. When you get the urge to smoke, think “maybe later” and that’s how you get past it. [Sending you] a kiss.”

Id 477: “I am so sorry ... there are situations that require your energy ... When you start again, you will achieve it, and will do better with experience! A super-hug!”

Id 548: “Thank you. Everybody in this group is super-cool!!!”

2.5 Tangible assistance

First of all, the group decided to make closer contact and a “whatsapp” group was proposed.

Id 299: "We could do a whatsapp group."

Id 192: "Yes, that would be cool."

Id 299: "Great, so who’s going to do it?"

Id 192: "If you want, I’ll set it up.”

As new participants were being integrated into the chat, they were invited to join the group.

192d: "Some colleagues formed a whatsapp group a few days ago to help us more personally in case someone needs it. It is a complement to the [study] app. Anybody who wants to join will be welcome.

The connection between participants that was made in the group was so strong that the need arose to get to know each other outside of the study.

Id 548: "It would be good to meet someday, and not just those from Tarragona – everybody who wants to and can!"

In total, 10 people arranged a day to meet. As a separate whatsapp group was established, to which the research team did not have access, we do not know exactly how many people got together. We do know that it was satisfactory because they talked about organizing a second one for the people who could not attend.

Id 647: "A great get-together!!!! At the end of summer, another one, ehhhh?"
DISCUSSION

Principal findings

This study found that a chat integrated into a mobile app is a useful tool for offering social support and sharing emotions, information, or coping strategies to people who smoke who are in the process of quitting the habit. To our knowledge, this is the first qualitative descriptive analysis of a chat included in an app aimed at people in the "action" stage of change who were trying to quit smoking.

The analysis of the chat messages showed that it was an active forum used by participants to exchange information, concerns, and social support. Some of the emotions described by Eckman appeared in the chat [9]. In the first phases, users show sadness and fear a relapse. These withdrawal symptoms peak within the first weeks, and last 2-4 weeks [18]. As they progress in the process, participants moved to more positive emotions such as joy and even euphoria. In addition, in the more advanced phases the participants minimize the risk of relapse, as they are considered to have already passed that phase.

Values and beliefs are essential to initiate the smoking cessation process, as well as to maintain abstinence. As in previous studies [19–22], we found that health and family, including concerns about a family member’s health or illness, or not wanting to be a bad example for children, are primary reasons for quitting smoking. Moreover, the health benefits of smoking cessation are an important driver to maintain abstinence as well as passing the health revisions, mainly to obtain a zero in the co-oximetry.

Although cigarette taxes have shown dramatic increases in Spain, following the European Union legislation (Council Directive CD 2011/64/EU), participants infrequently reported money as a reason for quitting smoking. When they did report it, money appears as a motivator in combination with other elements, such as health. These results differ from a previous study in France, in which money was the most-reported reason for quitting smoking [21] and are congruent with a study performed in Spain in which money was not a main reason for quitting smoking [22]. Moreover, a 2006 study in Spain found that the introduction of a tax on manufactured cigarettes did not affect smoking prevalence in men and had a weak effect in women [23].

Most information provided in the chat was related to avoiding weight gain. Although weight varies greatly after quitting cigarettes, a published meta-analysis found that about 16% of quitters lost weight and 13% gained more than 10 kg [24]. The participants in our study
believed it to be impossible to avoid weight gain. Smokers, and particularly women, have a high level of weight concerns that influence the likelihood of initiating a smoking cessation process [25]. However, the users of our chat believed that smoking is worse than increased weight.

Within the chat group, we observed that people who had a relapse were embarrassed and, although they might seek the help of the group, some participants may not ask for help, feeling guilty about "defrauding" themselves and above all for "defrauding" the group at the same time.

Within its social support, the group offered emotional support and informational support. We found similar results in other studios, such as Coulson et al, which indicates that group members offered informational and emotional support [26]; Ko et al [27] suggested that self-disclosure in blogs or Facebook is beneficial to users in obtaining social support and establishing or maintaining friendships [28]. However, in our study various members of the group felt a need to meet each other, and organized a time to get together. This could be because "the group" acquired such importance that its components wanted to connect in person.

**Practice implications**

The Tobbstop app was designed to accompany the process of quitting for the first 90 days, the most critical days for a possible relapse. Participants who succeeded in abstaining from smoking used the chat to help newcomers, providing advice, information, and emotional support. However, previous studies found that more than half of the messages from the support group were posted during the early stages, indicating that people require more support in the first stages of their quitting process [3].

We found an important online social support community that complemented the information and support provided in primary health care consultations and other resources (expert patient of tobacco cessation, group activities, community activities, etc) in the first phases of smoking cessation programs. Moreover, online support groups provide a unique opportunity for health professionals to learn about the experiences and views of individuals.

Online social support from an established group during the change process has several benefits. Participants are not restricted by the temporal, geographical, and spatial limitations typically associated with face-to-face groups; individuals can send and receive messages at any
time of the day or night. Also, online support groups may bring together a more varied range of individuals to offer diverse perspectives, experiences, opinions, and sources of information.

The emotional support obtained on the app may help some people deal with relapses. Little is known about how online discussions transform into real-life behavioral changes [29]. Efficacy is a concern because a recent review concluded that no robust evidence existed of the effectiveness of online peer-to-peer support groups [29]. An important next step is to assess the efficacy of online app forums by conducting randomized controlled trials.

New technologies and, more specifically, chat as a channel of communication can help us to create groups of people who are engaged in the same process, such as smoking cessation. The chat group can provide support and help 24 hours a day.

Limitations and strengths

We do not know the reasons why some participants did not use the chat, nor what their comments are; it is possible that some users only read posts and did not contribute to them. For those users, it would be useful to determine which channel of communications would work best. A descriptive analysis has been made. It would be interesting to carry out a more in-depth and interpretative analysis according to sex, age group, studies and other characteristics considered. According to the study protocol, participants who relapsed on tobacco consumption were removed from the tobbstop app [30]. Those who relapsed were dismissed from the study and could not use the app, so we lack information to determine their emotions and feelings before the relapse, a process contemplated within Prochaska and DiClemente’s stages of change [14].

Among the strengths of the study was the interaction between participants who were in different phases of the process. Some people were just starting and others had already gone 180 days without smoking. A person who has already passed through a given stage will show empathy, respect, and confidence in the other’s abilities and reinforce the social support. In addition, the chat showed a diverse and pluralistic discourse.

Conclusions

The results of this study suggest that a chat integrated into a mobile application is a useful tool for smokers who are in the process of quitting. It can offer social support and a space where
they can share concerns, information, or strategies. This type of online social support complements the information and support provided in primary health care consultations and other resources in smoking cessation programs.
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Conflict of interest
None declared

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Author Contributions
All authors participated in developing the study design, in data interpretation, or in writing and revision of the manuscript. All authors approved the final version of the manuscript for publication.

Tobbstop Study Group

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Figure 1. Models

1. Information support
2. Self-esteem support
3. Network support
4. Emotional support
5. Tangible assistance