TidyHome: A Persuasive App for Supporting Victims and Survivors of Domestic Violence

Joseph Orji[✉] ⓘ, Amelia Hernandez ⓘ, Biebelemabo Selema, and Rita Orji ⓘ

Dalhousie University, Halifax, NS B3H1W5, Canada
{joseph.orji,amelia.hernandez,bselema,rita.orji}@dal.ca

Abstract. Domestic violence is a prevalent issue affecting women worldwide. This issue has been intensified by the COVID-19 pandemic. While several measures have been attempted to address domestic violence, the use of technology has been shown to provide support for victims when planning for their safety. In this paper, we designed a persuasive mobile app, called TidyHome, targeted at women ages 15–49 years who are victims or survivors of domestic or intimate partner violence. The app addresses the issue of domestic violence with the aim of promoting safety behavior and safety consciousness in victims and survivors of domestic violence. To achieve this, we followed a user-centered design approach. Specifically, we obtained user preferences by conducting focus group sessions to gather ideas and opinions on features to be implemented in the app. We then designed low-fidelity prototypes (LFP) illustrating various features of TidyHome based on our findings from the focus group. Thereafter, we conducted a user study evaluating the LFP and assessing the perceived persuasiveness of the features illustrated in the LFP. Based on the results obtained from the LFP evaluation, we designed high-fidelity prototypes (HFP) reflecting only the features perceived as significantly persuasive. Finally, we conducted an evaluation of the HFP assessing its usability, and refined the HFP based on qualitative feedback after thematic analysis. Our results indicate that 8 features of the app were considered persuasive and very relevant for supporting female victims of domestic violence (Knowledge-Box, Panic Button, Third Ear, Meditime, Daily Companion, Diary, Encourage, and Self-Discovery). Likewise, the results display that the TidyHome app shows effective usability and user experience.

Keywords: Domestic violence · Victim · Survivor · Safety · Augmented reality · Persuasive app

1 Introduction

Domestic violence is a prevalent issue affecting women worldwide. This issue has been intensified by the COVID-19 pandemic. Domestic violence (DV) refers to patterns of behavior (not limited to stalking, physical, sexual, and emotional violence) used by one person to gain power and control over another person with whom they have or previously had an intimate relationship [2, 7, 24]. While anyone can experience domestic violence irrespective of their age, race, socio-economic status or gender, women are

greatly impacted in Canada. The United Nations records that 1 in 3 women worldwide experience physical or sexual violence, mainly from an intimate partner [26]. Also, data across Canada shows that seven out of ten people who experience domestic violence are women or girls with Indigenous women being three times more likely to experience domestic violence than non-Indigenous women [2].

This number has also drastically increased in Canada and around the world with the occurrence of the COVID-19 pandemic [23]. Several governments worldwide including Canada implemented a stay-at-home policy as part of the public health interventions to reduce the spread of the virus [23]. While this was shown to be effective at protecting public health, this led to a surge in the occurrence of domestic violence [23]. Hence, there is a need to find ways to tackle the occurrence of domestic violence and support victims.

The widely recommended intervention to address domestic violence is the safety planning [12, 21]. This involves developing a plan that can assist with the victim's mental and physical safety in a case of domestic violence and help reduce the risk of future harm [21]. Due to the complexity of safety planning, the use of technology could play a role in making the process easier for victims and survivors.

In this paper we designed a safety app, called TidyHome as a technology intervention for promoting safety behavior and safety consciousness in both survivors and victims of domestic violence or intimate partner violence using a user-centered design approach. The application is targeted towards women ages 15–49 years who are victims or survivors of domestic or intimate partner violence. The age group was chosen as the target audience because statistics shows that 243 million women around the world within the target age range have been significantly subjected to domestic violence [23, 26]. Although the words victims and survivors have been used interchangeably, this paper makes firm distinctions to both words for design purposes. In this paper, a victim refers to a person who is currently living in the same domestic sphere with their abuser whereas a survivor is a person who was once a victim of domestic violence in the past but no longer lives in the same domestic sphere as their abuser. The objective of the app is to:

- Regain and promote the user's feeling of safety at home and other environments
- Promote users' safety awareness of their surroundings
- Develop safety consciousness after trauma
- Build users' confidence and self-esteem to encourage them to leave a violent situation
- Develop user's knowledge on actions that can be taken to ensure their safety

To achieve our goal, we employed the user-centered design (UCD) approach [25] to app design and evaluation, as described in the following five stages:

1. We obtained user preferences by conducting two focus groups with participants who had varying levels of interaction with our target audience. The objective of the sessions was to understand users' willingness to use the safety app and the features they would like to see implemented in a safety app that targets victims and survivors of domestic violence. The interview method allowed us to gather ideas and opinions from the participants and streamline features implemented in the app.

2. We designed low-fidelity prototypes (LFP) showing our selected features based on the qualitative feedback and suggestions received during the focus groups.
3. We conducted a user survey to evaluate the perceived persuasiveness of the features in the LFP design. The perceived persuasiveness [3] measures each feature's perceived effectiveness in promoting safety for victims and survivors of domestic violence.
4. We designed high-fidelity prototypes (HFP) implementing the features perceived as persuasive based on the results of the LFP evaluation.
5. We conducted another user survey to evaluate the usability of HFP design and thereafter implemented design feedback received.

2   Related Work

Technological solution is one that has proved helpful in the aspect of domestic and intimate partner violence. As part of a literature review, we identified some applications that provide technology solutions for victims or survivors of domestic violence. A summary of all safety related technology interventions as shown in Table 1 [1, 5, 8, 9, 11, 13, 17, 19, 20, 22, 27, 28].

Table 1. Summary of existing software applications for victims of domestic violence

App name	System objective	Software platform
Abhaya	By a single click in the app, the victim's location is sent to registered contacts message with location coordinates [27]	Android
A safety decision app	Provides educational resources to assist men identify abuse in their relationships and get access to additional help and resources specific to men [8]	All smart phones
Bonitaa	Provides resources and support that assist victims with their mental and physical health as well as provide legislative information in the event of rape [9]	Android
Evo	Provides a platform for victim to create a safety plan and keep relevant information regarding their safety [17]	All smart phones
FEMME	Sends an alert to local authorities via SMS to a contact saved on the app [11]	Android

(*continued*)

Table 1. (*continued*)

App name	System objective	Software platform
Fightback	The app assists the victim by sending a call for help alert to victim's contacts through email or SMS [13]	Android
MyPlan	Provides a safety and educational platform for college students and young women to prevent intimate partner violence during dating [5]	Web-based and all smart phones
Rakhsa	By pressing a button, the app can send a location of the user to emergency contacts and send an SMS alert when there is no internet connectivity [19]	Android
Safetipin	Notifies user of safe environments ranked by a scale of safety scores assigned to neighborhoods [20]	Android
Suraksha	Sends instant location and a SOS message to local authorities and saved emergency contacts [1]	GSM
Smart	Predicts unsafe situations to the user by observing facial expressions [28]	Image processing, GSM
Security SafeRing	Sends a safety alert and victim's last location to emergency contact [13]	GPS
Sunny	Provides an educational module on domestic violence to victims and provides information to federal authorities to contact if help is needed [22]	All smart phones

3   Method

Our goal is to develop a user-centered app that targets domestic violence on women. To achieve this goal, first, we ran a focus group to learn from users' thoughts and needs. We used the feedback obtained from the focus group to design a low fidelity prototype (LFP). Second, we ran a study to evaluate the perceived persuasiveness of the LPF. Afterwards, we used the results from the second study to turn the LPF into a high-fidelity prototype (HFP). Finally, we ran a third study to evaluate and later improve the HFP.

3.1   Study 1: Focus Group

To design a user-centered app, we were interested in learning what our target audience wanted to see in an app targeting domestic violence in women; therefore, we ran a focus group. Focus groups are a great approach to discover what users want from a system, their preferences and needs [4]. We leveraged the potential of the focus group to determine what participants thought would be useful to have in an app as a victim or survivor of domestic violence. Hence, we recruited 8 participants within the ages 20 to 35, which we divided into two groups of four participants each one FG1 (n = 4) and FG2 (n = 4). Each session lasted 60 min and included the participants, a moderator, and two assistant moderators. The moderator described different features, asked questions, and facilitated the conversation between the participants. The assistant-moderators took notes, took track of the time, and recorded the session. The focus group was divided into two main parts:

- Introduction: The moderator introduced the purpose of the study and collected demographic information from the participants. Likewise, the moderator made sure that all the participants agreed to record the session.
- Discussion: The moderator described 10 different features that have the purpose of helping female victims and survivors of domestic violence obtained from the literature. The moderator described the features one by one, and asked the two following questions: (1) would you use this feature if you were a victim? Why or why not? (2) Would you use this feature if you were a survivor? Why or why not? At the end of the interview, the moderator asked for general recommendations for an app targeting domestic violence in women.

Data Analysis and Results. In order to analyze the results, we transcribed the two focus group recordings into text. Afterwards, we used the text from the recordings and the notes we took to carry out a thematic analysis. The thematic analysis helped us to identify common themes from all the participants' input to later inform the design of the app's low fidelity prototype LFP.

Through the whole session participants shared their thoughts and views on different features. From the different contributions, we uncovered 6 themes. (1) Privacy concerns, (2) requesting emergency help, (3) emotions and wellbeing, (4) connecting with people, (5) cognitive load, (6) secondary effects. The themes helped us to make sure that the needs of the target users were satisfied. The preferred features of the participants from the focus groups are the following:

1. Panic button: 75% of the participants mentioned interest in a feature that allows them to press a button, and the system will automatically contact the authorities to send help. "If something happening over here, I think I will use the panic button when I am in distress." (P1)

2. Daily companion: 50% of the participants mentioned interest in a feature to connect with a hotline, a counsellor, or chatbot for having someone to talk to and receive support. The first half of the participants think that a chatbot (SallyDBot) could encourage them to speak about their problems without being judged. However, the other 50% of the participants mentioned that they are more interested in connecting with humans and not chatbots because they lack the human touch. "Yeah, I think I would use it because I would prefer to speak to the bot more than speaking to someone personally." (P4)

3. Self-Discovery: 75% of the participants mentioned they would be interested in a feature in the form of questionnaire that would assess where a user is in their DV journey and their mindset towards DV. The responses to the questionnaire will help the app to personalize the content to the user's needs. "I will use the feature because the questionnaire would help me even better understand what I'm going through." (P2)

4. Diary: 62% of the participants mentioned interest in a feature to log their daily thoughts such as mood, feelings, and activities. From participants' feedback, we decided to include a functionality to track their mood through what the user writes in their diary and use machine learning ML for performing sentiment analysis. "I think that it is really good idea journaling and mood tracking, and especially when you can see over years or months how you've been doing, that will be really helpful and also for managing emotions or managing the situation." (P3)

5. Knowledge-Box: 50% of the participants mentioned interest in a feature that would provide personalized materials and resources to help them through their journey based on the results from the Self-Discovery feature. Participants mentioned that they are interested in resources such as videos or short articles. "Getting those types of articles to read, encouraging articles to read, at least it will put a smile on yourself or your face, at least for the day or for the time." (P2)

6. Third ear: 50% of the participants mentioned interest in a feature that listens and analyses the sound in the environment. If any distress sound is detected, the app contacts the authorities automatically. Nonetheless, participants expressed privacy concerns related to this feature. Participants don't want the feature to listen to all the sounds in their environment. Additionally, participants are concerned about false positives that could cause an undesired call to the emergency service. Thus, we decided to add an option to enable and disable the third ear feature, so that users can decide when to activate the feature. Likewise, we included the possibility for the users to record their own emergency code, so that the system will recognize that specific word or sound and only then call the emergency service. "I think it can recall lots of false positives and that will be a lot of privacy and security issues attached, so, I would not want someone to be listening all the time because then that will not be something I'm comfortable with." (P3)

7. Disguise feature: 37% of the participants were interested in a feature to help them hide the app from their abusers. The participants that were not interested in this feature, mentioned that having two different passwords added cognitive load and made the feature hard to use specially in dangerous situations when their abusers are nearby. This feedback made us redesign the feature for the LFP. Instead of having two passwords, we created a safe mode in which the user can enter the following PIN "0000", and it will unlock an app for home organization instead of a domestic violence app. Here is a sample comment: "From your description, it sounding sounds very complicated and if it's something I'm supposed to reach easily." (P2)

8. Encouragement: 37% of the participants mentioned interest in a feature that gives them encouragement phrases to improve their mood. "This situation being a very sensitive situation, it can be very depressing. So checking your phone and creating that type of message, it will be very, very encouraging." (P2)

9. Trust finder: 25% of the participants mentioned interest in a feature to locate other victims or survivors (people using the app) in their area, so that they can connect with and discuss their challenges and journey. However, participants also showed many privacy concerns. Their main worry is that their abusers could join the app and they would be able to locate them. This would represent a potential danger to the victim or survivor. Therefore, from the feedback, we decided to remove this feature to make it safer. "I suggest disabling the feature of finding people nearby or in the location. It should only be a social platform where people from different places connect irrespective of their location, otherwise if the abuser figure it out it could be troublesome." (P1)

10. Meditime: 12% of the participants mentioned interest in a feature that uses Augmented Reality (AR) to give the user an opportunity to virtually practice domestic violence scenarios that could happen in real life and survival skills. Likewise, it could also help survivors to overcome the shock of their past experiences, or offer a guided meditation using AR. However, participants were concerned of the secondary effects of this feature, as it could trigger bad memories and increase the trauma. Hence, we decided to transform the feature into an AR meditation feature to promote wellbeing. "I won't want to use that because it would mean imagining or listening to traumatic memories that affect my psychological state or my mental health." (P2)

3.2 Study 2: Low-Fidelity Prototype and Evaluation

The findings of the focus group (FG) session enabled us fine tune the proposed features, make some adjustment based on feedbacks from the FG, then design Low Fidelity Prototypes (LFP) using Balsamiq tool [16] to illustrate the 11 features. Using the LFP, we conducted a user study of 14 people to assess the perceived persuasiveness of the features. Figure 1 shows the LFP for Knowledge-Box, Third Ear, and Panic button features.
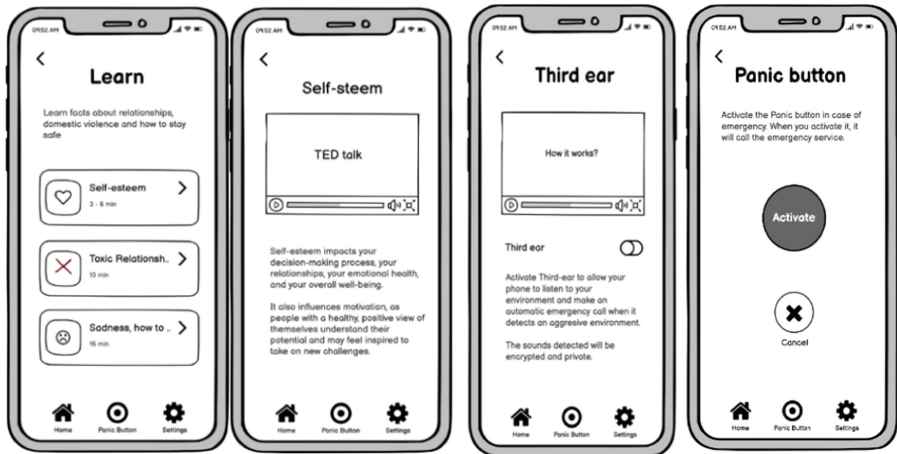
Fig. 1. Low fidelity prototype illustrating learn (knowledge-box), third ear feature and panic button feature.

With an online Survey, we evaluated the Low Fidelity Prototype (LFP). We presented detailed description of what the prototype does, and a link to the Balsamiq platform were users can interact with the LFP. For each of the features, we presented to the participants an image illustrating the feature, a brief description of the feature followed by questions that assesses the perceived persuasiveness of the feature. Adapted from [3], the questions were based on Validated scale which is often used in many persuasive computing research as seen in [14, 15]. The questions were measured on a 5-point Likert scale ranging from 1 – Strongly disagree to 5-Strongly Agree. We personalized the questions to each feature and asked the participant how persuasive the feature was to them. Example, the Knowledge-Box feature had the following questions:

- This feature would motivate me to take action for my safety and wellbeing.
- This feature would improve my habits to take action for my safety and wellbeing
- This feature would influence my action towards safety and wellbeing.
- The Diary feature had the following sets of perceived persuasive questions:
- This feature would motivate me to change my current behavior of dealing with overwhelming emotions.
- This feature would improve my habits of dealing with overwhelming emotions.
- This feature would influence me to deal with overwhelming emotions.

In addition, we also asked demographic questions and open-ended questions to enable the participants give us qualitative data. We got a total of 14 responses but removed 3 due to incomplete responses, we targeted audience between the age of 18 and 45 who may have experienced or been in close contact with someone who has experienced domestic violence. The demographic information revealed that 50% of our participants were between the ages of 18–25, 35.7% between the ages of 26–35, while 14.3% were between 36–45 years old. We had 57.1% male participants and 42.9% female participants, amongst the participants were 71.4% singles and 28.6% married.

Data Analysis and Results. For analysis, we computed the average score of response gotten for each feature, and then with a One Sample t-test, we were able to determine the persuasiveness of each feature with respect to the neutral score 3 (from a 5-point Likert scale). The result of the one sample t-test showed that 9 out of the 11 features were perceived to be significantly persuasive by the participants. As shown in Fig. 2.
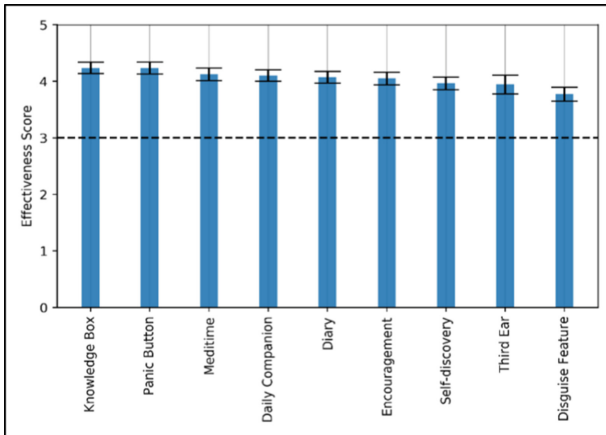
Fig. 2. A bar chart showing the effectiveness of the features on a scale 1 to 5 and 3 as the neutral point.

Knowledge-Box (mean = 4.24, SD = 0.47) and Panic Button (Mean = 4.24, SD = 0.51) were perceived most effective features followed by Meditime (Mean = 4.13, SD = 0.52) and "Daily Companion" (Mean = 4.10, SD = 0.48). However, "Disguise feature" was perceived as the least effective (Mean = 3.77, SD = 0.56). The other features' ("Diary features", "Third ear", "Self-Discovery", TrustFinder and "Encourage") were in the middle.

In Summary, these 9 features are perceived to be significantly effective: Knowledge-Box, Panic Button, Meditime, Daily Companion, Diary, Encouragement, Self-discovery, Third ear, and Disguise feature, see Fig. 2. We used these features in designing the high-fidelity prototype (HFP).

Thematic Analysis of Qualitative Feedback of LFP. As part of the low fidelity prototype evaluation, we conducted a thematic analysis on the feedback and suggestions to find patterns and themes from participants' responses. Table 2 exhibits sample comments from participants copied verbatim, 6 themes were uncovered: improvement in safety; personal improvement, self-esteem, and wellbeing; motivated to use the app; motivated to seek help, social integration; and suggestion.

Table 2. Resulting themes of the LFP thematic analysis.

Improvement in safety: Users' affirmation to the app's ability to improve their safety in domestic violent environment. "I think this combined with the third ear would be a very good safety system in place for users of the app to easily access help, but that of course depends on if the help is gotten or not. How effective the service is" (P11)
Personal improvement, self-esteem and well-being: Users' affirmed the app's ability to help them improve their self-esteem and wellbeing. "This would function as a typical diary/journal and thus would be helpful in dealing with my emotions" (P5)
Motivated to use the app: Users' affirmation to their tendency to use the app. "Being greeted with a simple message of encouragement can be a positive reinforcement. It might make the end user feel more inclined to open the app each day." (P5)
Motivated to seek help: Users' affirmed the app's ability to motivate them seek for help instead of suffering in silence. "Having the option to message instead of talking on the phone can make people who are usually shy feel more comfortable" (P8)
Social integration: Users' affirmed the app's ability to help users interact with people in a similar violent situation. "This is a great way to share experiences and learn from one another's journey "(P1)
Suggestions: Recommendations from participants. "This seems useful, but I am unsure how much a user in distress want to be looking at tutorial videos will. Probably such short tutorial videos can be added as a suggestion to view on completion of Self-Discovery feature. A suggestion like "You should check out what Mr. XYZ from Harvard has to say about anger issues. Would you like to watch a 2 min video?" (P12)

3.3 Study 3: High-Fidelity Prototype and Evaluation

Based on the results obtained from the LFP evaluation in Study 2, we created a high-fidelity prototype (HFP) illustrating the 9 features that were perceived as persuasive and effective in promoting safety for female victims and survivors of domestic violence. Moreover, we used the qualitative feedback and suggestions provided by the participants to improve the usability of TidyHome. Study 3 provided us with the knowledge to make sure that TidyHome is usable and acceptable to users.

The HFP was designed using the Proto.io prototyping tool [18]. Thereafter, we conducted a user study with 21 participants to evaluate the usability of our app. Our participants consisted of both male and female between ages 18–49 who followed the study from the interview stage to the usability testing of the system. Table 3 shows the demographic information of participants.

The online survey consists of three parts: demographic questions, overall system usability question, and feature based usability questions. Participants were asked to interact with the HFP using a link to the prototype included in the survey and thereafter respond to the survey. Likewise, the survey included a link to a short video explaining how to interact with the prototype using Proto.io to make it easier for the participants

Table 3. Demographic information of participants.

Total participants = 21	
Age	18–24 (40%), 26–35(48%), 36–45 (12%)
Gender	Male (48%), Female (53%)
Marital status	Single (68%), Married (32%)
Education level	High School Diploma (4%), Bachelor's (48%), Master's (48%)

to explore the app. The usability questions in the survey evaluated the features and the overall system to explore the following:

- Ease of use and overall user experience.
- Determine whether users were able to complete tasks successfully and independently.
- Assessed the users' performance and mental state (willingness or frustration) as they try to navigate the app.
- Evaluate the willingness to use the app based on the aesthetics (e.g., color, graphics, layout, etc.)

Throughout the survey, participants were asked to justify their responses via qualitative comments and provide recommendations as necessary. Figure 3 illustrates the HFP of Panic Button, Third Ear, and Daily Companion features.
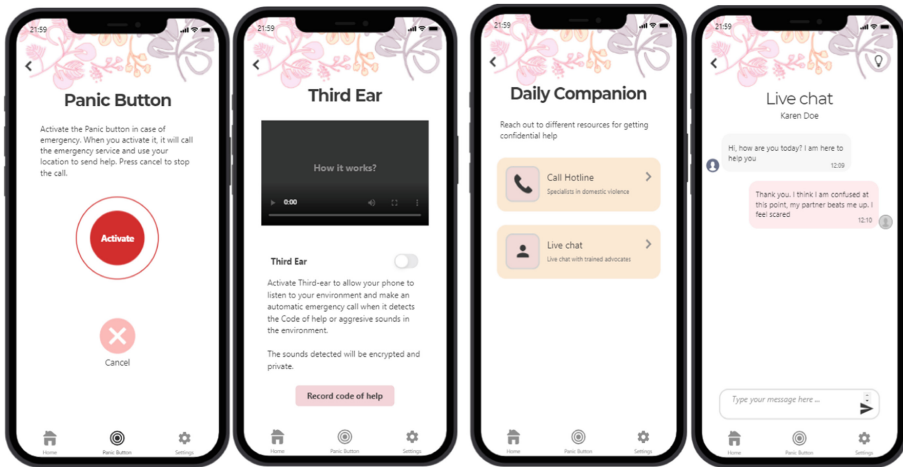
Fig. 3. High fidelity prototype illustrating panic button, third ear, and daily companion features.

Usability Evaluation of the HFP. From the quantitative analysis of Study 3, our findings show that 80% of the participants liked the aesthetics of the app, while 100% found the app to be easy to use as well as being able to use the app independently and correctly.

In terms of the overall user experience, 80% of the participants had good experience navigating the app based on their feedback of not running into difficulties while using the app. From the qualitative responses of Study 3, we performed a qualitative analysis to uncover themes related to the usability of the TidyHome app. Table 4 shows the resulting themes of the HFP thematic analysis.

Table 4. Themes, Description and Sample comments from high-fidelity prototype evaluation.

Ease of use: Users expressed how easy it's to use the app independently and correctly. 'It was straightforward to use it."(P8)
Good aesthetics: Users highlighted their overall satisfaction with app's aesthetics: colors, graphics, and layout. "The aesthetics of the app is pleasant to the eye and nothing too flashy (which I like)." (P7)
Good user experience and navigation: Users expressed positive overall experience, ease of navigation and satisfaction with the app. "It was easy to find information in the application n and navigate the system" "The application seems simple enough for me to understand and use it daily" (P10)
Theme customization: Users highlighted the need for customizable features that they can control. "The app design is clean and it looks good. I'd like to have an option to select themes. I hate pink (P1)
Simplicity and Learnability: Users highlighted that the app is simple and with a very low learning curve for first time users. "The interface is simple to use with just a few minutes without prior knowledge, it is simple to adjust to the application and navigate through" (P4)
Suggestions and Recommendations: Users provided some suggestion for improving the app. "There should be a suggestion, after writing a dairy journal" "The guide to local domestic violence laws can be added in this section too" (P1)

The following list presents the refinements we included in the HFP based on the feedback of Study 3. The improvements are organized by theme.

- Theme customization: We included an option to Change theme color for allowing users to personalize their system and make it compatible with their taste.
- Simplicity and learnability: (1) we added more detail to the descriptions of some of the features of the app. This would allow users to understand the purpose of the features and provide guidance on how to use them. (2) We added examples of codes of help for the Third Ear feature, so that the user can have guidance to record their own.
- Suggestions and Recommendations: (1) we included a link to appropriate resources after writing a diary journal according to the resulting emotions from the sentiment analysis. This with the objective of helping users to handle those emotions. (2) We added the names of organizations that are working to prevent and solve the problem of domestic violence to create trust in the content of the app. As a note, we used resources that these organizations have available on their websites to build the content of the app. (3) we included the option to access the contents to local domestic violence laws.

4   Discussion

In this paper, we designed a user-centered persuasive mobile app called TidyHome to help victims of domestic violence to achieve several goals: seek help, access help, and discover if they are in an unhealthy relationship - as some victims of domestic violence have gotten used to it that they think it is normal. We first analyzed the thoughts and needs of victims of domestic violence with which we designed the TidyHome app. We conducted a focus group to understand how much these features can address the need of domestic violent victims, the outcome of the focus group helped us fine-tune the features and come up with a low fidelity prototype. A previous study has shown that user-centered designs, that gets users involved, often result in more effective and acceptable apps [10]. Table 5 shows the features in TidyHome and the persuasive strategies behind them.

Table 5. Core features of TidyHome and persuasive strategies.

Features	Description	Persuasive strategies
Daily companion	This feature provides an opportunity to get personalized and confidential help via specialized hotline and a live chat with trained domestic violence advocates	Expertise, authority
Diary	With this feature, the user is able to log their daily thoughts such as mood, feelings, and activities. From the text that the user types, the app automatically performs a sentiment analysis using Machine Learning (ML) to identify the predominant emotions of the user and provides them with appropriate resources to handle those emotions	Self-monitoring
Self-discovery	This feature assesses where the user is in their DV journey and their mindset towards DV through a questionnaire. The responses to the questionnaire help the app to personalize the content to the user's needs	Personalization
Knowledge-box	This feature provides the user with personalized learning resources on domestic violence topics. The resources are based on their situation and their stage in the domestic violence journey	Personalization, expertise

(*continued*)

Table 5. (*continued*)

Features	Description	Persuasive strategies
Meditime	This feature aims at distracting the user from the present violent environment, so they can meditate and have some peace. This feature provides a virtual meditation space for users with the use of augmented reality (AR). Users can transport themselves to a preferred location and practice meditation with the goal of improving their wellbeing	Tunneling
Third ear	This is a utility feature in the app that enables the user set up a pre-recorded distress sound in the case of an emergency. If the sound is detected, the user's emergency contact and emergency authorities are notified. This feature is aimed at giving the user the confidence that they are not alone and they can get help automatically	Reduction, personalization
Panic button	A second utility feature in the app that gives the user an opportunity to alert their emergency contact and relevant authorities of a dangerous situation by pressing the button	Reduction
Encourage	This feature gives daily words of encouragement from authoritative sources according to the user's mood to help them improve their self-esteem as victim or survivor of DV. It also reminds the user not to give-up on the quest to overcome DV	Authority, reminders

5 Conclusion

This paper presents the design of TidyHome, a persuasive app for supporting female victims and survivors of domestic violence as women are the most affected group by Domestic Violence after COVID-19 outbreak. We applied the user-centered design (UCD) approach by running three user studies. First, we conducted a focus group (FG) to learn from the users' need and thoughts. Based on the findings of the FG, we designed a Low-Fidelity Prototype and conducted a second study to evaluate the perceived persuasiveness of the features. The results indicated that 9 features were considered as persuasive (Knowledge-Box, Panic Button, Third Ear, Meditime, Daily Companion, Diary, Encourage, and Self-Discovery). Later, we designed a High-Fidelity Prototype that includes those features and conducted a third study to evaluate the usability of those features and the app in general. The results showed that TidyHome is easy to use, useful, easy to navigate, and has good aesthetics. Finally, we refined the HFP using the qualitative comments from the participants to enhance the usability and user experience of TidyHome.

As future work, we plan to deploy the app and conduct a long-term study with a large sample of female victims and survivors of Domestic Violence.

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