

Exit Violence: Comparing Usability of Physical and Visual Alarm Buttons in SOS App in the Context of Domestic Violence

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This study investigated the effectiveness of SOS apps in supporting domestic violence victims, specifically examining the activation process through visual user interface (UI) and physical UI. Using a roleplay method and interviews, participant preferences and behaviours were assessed. Participants used an Android phone with an SOS app, activating it through either visual UI or physical UI. While participants displayed similar behaviours and visually focused on the screen for both methods, a strong preference for the physical UI was observed. Despite no significant behavioural differences, participants expressed higher satisfaction and perceived efficacy with the physical UI.

Additional Key Words and Phrases: Domestic violence, SOS apps, Victim support, User experience, Graphical user interface, Physical user interface

1 INTRODUCTION

Domestic violence remains a pervasive and alarming issue, with high prevalence rates of intimate partner physical and sexual violence against women globally [3, 4]. However, it is essential to recognise that domestic violence affects individuals of all genders [2, 5]. Efforts to address this pressing issue have led to the development of innovative solutions, including the utilisation of SOS apps, which aim to enhance support for domestic violence victims and improve intervention strategies [7, 11–13, 17].

SOS apps provide immediate assistance to victims through SMS-based functionalities such as panic buttons, emergency contacts, and location tracking, enabling swift access to help, connection with friends or family, and vital resources. These apps have the potential to enhance victims' safety and empowerment, potentially saving lives [16]. According to [8, 16], mobile apps that allow individuals to reach out to nearby family, friends, and organisations for help in conflict or dangerous situations inspire greater confidence, safety, and are more likely to be used in self-defence compared to pepper spray. Additionally, research [1] highlights the importance of intervention by family and friends in supporting victims of intimate partner violence. Therefore, our research focuses on exploring the user experience of SOS apps, which contributes to the ongoing efforts of promoting safer communities by developing and enhancing these applications.

2 BACKGROUND

More and more app-based interventions for domestic violence prevention are emerging [16]. Such apps dealing with the domain of abuse prevention or escape should be designed and implemented to be user-friendly as well as easy and quick to trigger [15]. Recognising the significance of such apps, and inspired by the Violence at Home Signal for Help [6], we contend that there is a need to investigate physical, ubiquitous solutions in this domain, emphasising the current lack of research in this area. The goal of our paper is to compare visual UI and physical UI approaches for an emergency alert function on smart devices.

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Smartphone SOS applications or abuse prevention applications are not uncommon. There is a number of related literature on the topic. For example, in [15] already existing SOS Android applications are presented and a new application is being introduced, which enables instant communication of one's whereabouts to certain, authorised persons. The findings in [14] concern an Android application, which can generate a swift alert for route change when the user finds themselves in a risky area. However, to our knowledge, there is still a lack of comparative studies of physical designs for signalling an alarm in cases of emergency. Furthermore, it is still unclear whether one has considerable benefits, such as ease of use over the other. In light of this, our primary research question is centered around assessing the efficacy of SOS apps in fulfilling their intended purpose.

3 ROLE-PLAYING APPROACH

To address the issue of detached problem-solving in research tasks, the role-play technique was employed, as referenced in [10]. The inclusion of context was crucial to encourage participants to engage with the problems in a realistic and emotionally relevant manner, as discussed in [9].

The research focused on domestic violence and involved a pair of participants: one assuming the role of the victim and the other acting as the enabler (a common friend attempting to prevent the victim from leaving or resolving the situation). To prioritise participant well-being, we deliberately avoided assigning the role of the abuser. Each participant received scenario descriptions, name tags, and instruction cards. Following an initial briefing, the participants were separated. The victim was informed about the digital and physical solutions, while the enabler remained unaware of these solutions during the role-play. In the given scenario, the victim was at their house, with the enabler visiting. The victim made discreet attempts to leave and activate the SOS, while the enabler tried to persuade them otherwise. To counterbalance the data, the order of testing the two solutions was altered for each participant pair. In tests lasting a maximum of 3 minutes, victims had to press the SOS button to send an SMS with their location to an emergency number, replicating the urgency of real-life situations. Failure to accomplish this within the time limit was considered a failure. After completing the role-play, the solutions were explained to the enabler. Subsequently, interviews were conducted with both participants to gain further insights.

For data collection, smartphones were used to record video footage of the role-play sessions. Additionally, the audio from the interviews conducted with the participants was recorded and later transcribed to facilitate detailed analysis.

Convenience sampling was used to recruit a total of 20 participants, without any specific criteria. The sample consisted of individuals from diverse ethnic backgrounds, encompassing all genders and aged between 18 and 39 years. Among the participants, one individual was below 20 years old, another fell in the 30-39 age range, and the remaining 18 were aged between 21 and 29. Out of the participants, thirteen were female and seven were male. Seven participants reported experiencing abuse, twelve did not, and one chose not to disclose. Moreover, only one out of the twenty participants had prior experience with an SOS app. The tests for both the visual interface and physical interface were conducted ten times, with the order of the tests being changed or reversed for each iteration.

4 RESULTS

We conducted a qualitative analysis using sequential analysis for the video recordings, reviewing and coding participant behaviours. Through this iterative process, we identified key themes. Additionally, we used thematic analysis for the transcripts from all participants, expanding the scope and depth of our qualitative analysis.

8 out of 10 victim-role participants preferred the physical button, finding it easier and faster than the visual option. In contrast, only two participants favoured the visual button, but they also noted challenges in learning to use the physical button. When asked about their preference for future use, 17 out of 20 participants favoured

the physical button, while three preferred the visual one. Regarding the noticeability of the two solutions, none of the enabler participants reported detecting any suspicious behaviour related to the victim's use of either the physical or visual button. From the victims' perspective, 5 out of 10 believed they went unnoticed, three were uncertain about both the physical and visual buttons, and two were uncertain specifically about the visual button.

In total, 3 out of 10 participants playing the victim role did not manage to activate the SOS alarm, resulting in the non-delivery of the SMS. One participant encountered difficulties activating the alarm using both the physical and visual solutions despite their attempts to raise an SOS alarm. The remaining two participants indicated that they did not perceive the need to activate the alarm, with one of them not activating the visual button and the other not activating the physical button.

4.1 Contrasting observations

Despite expressing a preference for the physical button during the interview, participants who successfully sent the SMS were observed to consistently look at the screen in both instances. Additionally, there were no significant differences in participants' behaviour between the two solutions, except for certain cases where two out of 10 victims displayed more restless hand movements while holding the phone in the visual button scenario. This suggests that participants' behaviour was influenced not only by the functionality of the solutions but also by other factors such as habitual reliance on visual cues and interaction with the device. Furthermore, the enablers maintained a consistent attitude and approach toward the victims in both scenarios, further contributing to the similarity in participants' behaviour.

In addition to examining participants' behaviour, it is crucial to delve into the tactics employed by victims to activate the alarm discreetly. In both the visual and physical solutions, participants employed strategies such as justifying access to the phone by fabricating the need to make a call or show messages from the abuser. These tactics allowed participants to maintain direct eye contact with the screen without arousing suspicion. Some participants adopted a casual demeanour, engaging the enabler with conversation while briefly glancing at the smartphone screen during alarm activation. Notably, one participant kept their phone casually in their pocket throughout the entire physical button scenario but failed to activate the alarm, raising questions and highlighting the need for further examination of this particular behaviour.

4.2 Recommendations based on participant feedback

Taking into consideration the valuable feedback provided by study participants, we have compiled a list of recommendations aimed at enhancing the effectiveness and user experience of both physical and visual buttons.

Recommendation 1: Consider utilising a physical button as it was found to be more reliable, convenient, and safe, especially when in the pocket. It allows for effortless operation without looking at the screen, and the option for double pressing adds convenience.

Recommendation 2: It may be beneficial to address concerns about the accidental triggering of the physical alarm button by exploring alternative key combinations or requiring more key presses. Improving button visibility or location could help alleviate difficulties in locating it.

Recommendation 3: To enhance the user experience of the visual button, it may be worth streamlining the app finding and activation process, as participants expressed concerns about its cumbersome nature. Moreover, addressing the inconvenience of looking at the screen during activation and considering less prominent colours could reduce safety concerns.

Recommendation 4: Exploring the incorporation of continuous or periodic sharing of the victim's live location could enhance emergency response capabilities.

Recommendation 5: Providing an option to clarify the level of threat and the specific assistance required may facilitate appropriate support.

Recommendation 6: To minimise the impact of false alarms, including an alarm-cancelling function could be considered.

Recommendation 7: The integration of a psychological help request option during emergencies could address emotional well-being concerns.

Recommendation 8: The possibility of considering voice activation and emitting a loud noise when activating the alarm to attract attention should be explored.

Recommendation 9: Exploring standalone alarm buttons or wearable devices like watches for signaling the alarm, while considering their benefits and drawbacks, could be worthwhile.

Recommendation 10: Taking into account the exclusionary nature of smartphone-dependent solutions, it would be worthwhile to explore ways to make them more accessible to a broader range of users.

By incorporating these recommendations, the user-friendliness and effectiveness of alarm buttons can be significantly enhanced, making them more reliable and accessible during emergencies. The valuable insights provided by participants have paved the way for a safer and more efficient emergency response system.

5 DISCUSSION AND FUTURE WORK

The majority of victim-role participants found the physical UI option quicker and easier to use than the visual one. However, participants displayed a screen focussed behaviour raising questions about its significance. Participants approved of the physical button's simplicity and subtlety but had concerns and improvement suggestions for both solutions. Some proposed alternative devices, emphasising the importance of inclusive and accessible safety solutions.

Additional research is needed to understand users' screen-specific behaviour when activating physical and visual alarms, despite the physical alarm not requiring screen interaction. These findings underscore the importance of exploring the underlying motivations and influences that contribute to participants' tendency to prioritise screen attention during alarm activation. It is also important to explore the similarities in participant behaviour when activating both the physical and visual alarms, particularly in terms of the emotional sense of safety provided by the physical button. Additionally, examining the effects of haptic feedback on users after the alarm is activated would be a promising avenue for exploration. Moreover, expanding the participant pool to include a larger sample size would lead to more comprehensive and representative findings.

6 CONCLUSION

This study contributes to the evaluation of two interfaces, visual and physical, for signaling SOS alarms with smartphones. Our user-centric approach enhances the relevance and applicability of our findings. Their feedback regarding usability, accessibility, and effectiveness emerged as crucial aspects. Their input not only revealed the strengths and weaknesses of each interface but also provided practical recommendations for improving user experience and optimising the effectiveness of SOS alarm signalling on smartphones. These findings offer valuable guidance for enhancing smartphone-based SOS alarm systems.

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