Abstract
Older adults are disproportionately affected by scams, many of which target them specifically. In this interactive demo, we present Fraud Bingo, an intervention designed by WISE & Healthy Aging Center in Southern California prior to 2012, that has been played by older adults throughout the United States. We also present the Scam Defender Obstacle Course (SDOC), an interactive web application that tests a user's ability to identify scams, and subsequently teaches them how to recognize the scams. SDOC is patterned after existing phishing-recognition training tools for working professionals. We present the results of running a workshop with 17 senior citizens, where we performed a controlled study that and used SDOC to measure the effectiveness of Fraud Bingo. We outline the difficulties several participants had with completing SDOC, which indicate that tools like SDOC should be tailored to the needs of older adults. We also discuss how to adapt Fraud Bingo and SDOC for international audiences.

Author Keywords
Scams, Fraud, Interventions, Older Adults

CCS Concepts
→ Human-centered computing; User studies;
Introduction

Older adults are disproportionately affected by scams and frauds of various kinds. For example, the United States' Federal Trade Commission reported that romance scams resulted in more reported losses ($143 million) than any other type of scam in 2018 [5]. While the median loss reported per victim was $2,600, it rose to $10,000 for victims 70-year-old or over. Prior work identified factors that are correlated with susceptibility to scams, among which age is often cited as a key factor [7, 8, 6]. Researchers found that older adults experience declining sensitivity to untrustworthy information [1, 3] and a reduced ability to detect lies [1, 10]. Studies also highlighted age-related functional brain changes in response to untrustworthy cues [1].

The lack of intervention tools specifically designed for older adults motivated the WISE & Healthy Aging Institute to develop Fraud Bingo—an activity to educate participants about frauds while playing the popular game Bingo—which has since been recommended by federal and state governments throughout the USA for use at senior centers.

We also developed the Scam Defender Obstacle Course (SDOC), an interactive web application, in similar vein to existing training tools used to educate working professionals about phishing scams [9]. Utilizing Fraud Bingo as a scam training, we explored SDOC’s suitability as an evaluation tool during a workshop that involved 17 senior citizens in Santa Monica, California. We found that tools like SDOC that are designed to evaluate and train working professionals to recognize phishing scams are less effective for many older adults. Here, we present Fraud Bingo, SDOC, and lessons learned from running both with groups of older adults.

Fraud Bingo

Fraud Bingo is an educational game that is similar to Bingo, with the main difference that when a participant announces a square they are asked to read a fraud-related advice that is written on the back of their Bingo card. Fraud Bingo was developed and rolled out quietly by WISE and Healthy Aging, who have run dozens of events in Los Angeles County for over eight years to groups of between 30 and 150 participants. The game has spread by word of mouth to other parts of the United States. It has also been translated to languages other than English, including Armenian, Chinese, Korean, and Spanish. Various incarnations of the game exist, some of which cover frauds broadly, while others focus on specific frauds (e.g., investment frauds).

Fraud Bingo’s development was motivated by a need to create an engaging educational tool that could attract large audiences, and in which people of all skill levels and cultures could participate. It builds on bingo’s popularity, and prizes given out in events help attract audiences.

The majority of advice that we printed on the Fraud Bingo cards were derived from the original WISE & Healthy Aging Institute’s game. From this set of advice we eliminated ones that were less relevant to computer security. Moreover, following prior work [4, 8], we added advice related to online romance scams, typo-squatting, and techniques that are typically used by scammers to mislead victims. Additionally, we decided to modify Fraud Bingo from a 5×5 to a 4×4 square since we were concerned that the values in the card cells would not be random enough based on the size of our pool of advice and number of cards we needed to generate.

Scam Defender Obstacle Course

The Scam Defender Obstacle Course (SDOC) is an online evaluation and training tool that we developed to 1
measure susceptibility to a set of common on-line fraud schemes; and 2) educate users on scam warning signs.

SDOC asks the participant to imagine that they are handling the affairs of a good friend who is out of the country and away from her computer for some time (see Fig. 3). The participant is then shown a series of emails and browser windows that they encounter while using their friend's computer to accomplish this task (Fig. 4). Some of the challenges present a legitimate correspondence with an action that should be performed – for instance, the gas company sending a notice that the payment for service was declined and the balance must be paid. Other exercises present emails that are common, real-world scams that include a range of lures that attempt to get users to click a link, open an attachment, or otherwise take an action that could lead to the recipient being defrauded. For each of these challenges, the participant is asked to indicate what action they would take (e.g. “Ignore and delete email”, or “Click on link to update billing information”). The participants are also presented a free-form text box and asked to explain why they chose a particular answer.

Lessons from our Bingo & SDOC Workshop
We ran a two-hour workshop whose intended purpose was to serve a controlled study evaluating the effectiveness of Fraud Bingo as an intervention technique. The event was free and advertised and open to the general public. Participants were informed that they would participate in Fraud Bingo and in a computer training. 17 older adults participated in the workshop, and they were divided into two groups. One group of eight participants began the workshop in a computer lab where they tried their hand at SDOC. Eight additional participants began the workshop in an adjacent room where they played Fraud Bingo. After 50 minutes, the two groups switched rooms, and participated in the opposite activity. One additional senior citizen arrived at this time and participated only in SDOC. Eight of the 17 participants were part of a class hosted by WISE & Healthy Aging for individuals experiencing early-stage memory loss. These participants were split evenly between both groups.

Running this workshop taught us valuable lessons about how to run an improved version of our study in the future. We share those insights below.

Running Fraud Bingo
When asked, participants reported being satisfied with the experience of playing Fraud Bingo, or made no comment. We observed several reasons for which Fraud Bingo works well as an educational tool for older adults. In particular, the actual game of Bingo exists in various incarnations throughout the world and is easily learned. At least three participants had never played Bingo before our event, yet they were able to participate in our workshop without any difficulty. Moreover, the activity was inclusive—even partici-
pants with memory loss and other forms of cognitive decline were able to participate effectively. Last, via interactions throughout the workshop, participants were able to contextualize frauds for one another by relating experiences they have had. Such form of cooperative learning can potentially make the educational activity more effective [13].

Running SDOC
Our workshop represented the first occasion on which senior citizens had tried out the SDOC. The course was successful in certain ways, but the workshop also taught us several lessons in how to improve upon SDOC’s design.

On the positive side, participants who were able to complete the SDOC (about half), reported enjoying the activity. Furthermore, SDOC increased participants’ confidence in their knowledge, as several reported that it “reinforced what they already knew.” This can potentially motivate the participants to adopt secure behavior in the future [11].

At the same time, the workshop highlighted several limitations of SDOC that should be addressed to improve its applicability for educating older adults. To mention some: 1) The emails may have been long for certain participants, some of whom had difficulties scrolling through and answering the subsequent questions (especially participants with cognitive decline); 2) Participants were biased to mark emails as scam (potentially because the rate of scam was higher than what would be expected in practice [12]); and 3) Free-form answers took up time (as certain participants had difficulty typing) and left too much room for interpretation. These limitations may also be relevant for other educational tools in the vein of SDOC (e.g., [9]).

Adaptations for a Global Audience
To serve the needs of international audiences, Scam Bingo and SDOC should be adapted to local needs (e.g., certain frauds are mostly encountered in specific parts of the world [2]). Fraud Bingo has already been translated into several languages, which is a good first step, yet the clues and tips themselves are still tied to scams that prey upon older adults in the United States. Fortunately, existing bingo-card generation software makes it easy for advocates for older adults replace US-specific scams with local equivalents, while preserving tips that are universally applicable.

Similarly to Fraud Bingo, SDOC can be easily adapted to include scams that are relevant to the region and culture of the participants. In general, scams that prey upon similar fears tend to exist across many cultures, yet customization is necessary, as much of the educational value of SDOC lies in its ability to expose participants to scams that they are likely to encounter in practice. Localized patterns of computer or device usage must also be considered. For instance, in countries where older adults are more likely to use mobile devices than computers, scam-detection training should focus on mobile devices.

Conclusion
In conclusion, we found Fraud Bingo to be an effective training tool for older adults that span a wide range of cognitive abilities. While SDOC was appreciated by some older adults, it needs to be adapted to different skill levels, particularly in a workshop setting. In addition to adopting design guidelines for improved usability, we advocate that similar training tools be of flexible duration so that participants can complete as many or as few challenges as they can get to in a set amount of time and still receive feedback on their performance.

REFERENCES


