

# POSTER: Can Edutainment Videos Change Software Updating Behavior?

Elissa M. Redmiles\*, Angelisa Plane, Candice Schumann, Rock Stevens, Peter Sutor, and Michelle L. Mazurek†  
University of Maryland

Email: \*eredmiles@cs.umd.edu, †mmazurek@cs.umd.edu

**Abstract**—Users often struggle to stay digitally secure. Despite a multitude of security advice, they find it challenging to identify threats and develop appropriate behaviors to prevent potential attacks, especially in complex domains such as software updating. Our work seeks to improve the efficacy of security advice by exploring a new approach: video entertainment education (e.g. edutainment). Prior work has shown that negative experiences can be powerful teachers and has suggested that security stories users see on TV may actually teach them new behaviors. Building on this foundation, we conducted a participatory design study (n=13) to develop a video that entertains users into updating their software. This edutainment video was professionally produced and compared to text-based security advice in a controlled experiment (n=151). Based on this experiment, we find preliminary evidence that our security edutainment video increases users’ likelihood of updating their software more than traditional text-based security advice. This suggests that edutainment holds promise for digital security education and that edutainment videos may eventually become viable replacements for corporate security videos and some text-based security advice.

## I. INTRODUCTION

There is a multitude of security information available to users. While we should not rely on end-users to address all vulnerabilities, some improvement to end-user behavior can significantly improve collective security. Yet the textual advice, corporate trainings, and IT newsletter warnings of the past decade have not fully remedied user behavior.

Prior work shows evidence that negative security experiences—that is, negative experiences of the user or stories of family and friends negative experiences—can be effective teaching tools [12]. Although effective, these experiences come with financial and emotional costs that we do not wish upon users. It would be much better if we could simulate the impact of such experiences without users needing to have, or know someone who has had, a negative experience. Our recent work shows evidence that negative security experiences of TV characters can alter user behavior [14]; and in a later study we found that at least 25% of users report “receiving security advice” from a TV show or book character [13].

Thus, we propose using short, entertaining videos of negative experiences happening to real, relatable characters to change user attitudes and behavior. Narrative entertainment-education (i.e. edutainment) has been used extensively and effectively in the health behavior change field [7], [10], for behaviors related to drunk driving [8], and sexual health [2], [9]. In our work, we seek to identify the key components of an effective edutainment video for security behavior change and to evaluate

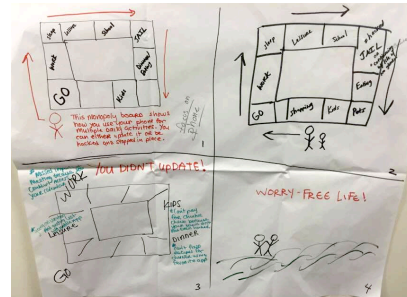


Fig. 1. Storyboard created by design study participants.

the impact of such a video on users’ software updating behavior and attitudes.

## II. DESIGN

In order to design and produce an effective security edutainment video, we conducted participatory design sessions with 13 demographically diverse participants from May through July 2016. During these sessions, we invited pairs of participants to come to our lab and construct a storyboard for a story (Figure 1) that they would find compelling and that would make them want to change their software updating behavior. We then asked the participants to critique the storyboards developed by other groups. Prior to the session, participants were provided with a short training about software updates so that they were equipped with the necessary information to perform this task.

We performed a qualitative content analysis [5] on the transcripts from these sessions and the storyboards themselves, reaching an intercoder agreement of 88% (Krippendorff’s Alpha = 0.71). By affinity diagramming [1] the themes of this content analysis, we identified five high-level recommendations for developing security advice, and specifically security edutainment materials.

- Contrast positive and negative experiences to not just scare users, but show them on the benefits of security.
- Use realistic examples of negative consequences to motivate behavior change. Specifically for software updating: focus on notification annoyance, loss of functionality, or information theft.
- Use a trustworthy, personified security-advisor (e.g. security superhero) to deliver information about the *purpose* of a security practice.
- Make characters relatable by showing them engaged in common-place activities and using familiar language.



Fig. 2. A still from the update security edutainment video.

- Use cheesiness and imaginative elements to increase viewer/reader engagement, add humor, and make security “cooler”.

### III. EVALUATION

Following the participatory design sessions, we used the storyboards created by participants and the characteristics we identified during our analysis to develop a final script and storyboard, which was professionally produced as a 2-minute video: <https://vimeo.com/198395339>, Figure 2.

We conducted a month-long controlled experimental study on MTurk with 151 participants to preliminarily evaluate this video as compared to text security advice and a control edutainment video. Participants were randomly assigned to one of three conditions: the edutainment group—where they were shown our video, the text advice group—where they were shown an article about smoking from NIH and an article about updating from McAfee, or the video control group—where they were shown a smoking cessation edutainment video. Participants in all groups were administered the updating sub-measure of the Security Behavior Intentions Scale (SeBIS) [3], and two additional items regarding the purpose and importance of updating drawn from prior work [13], as well as multiple personality and risky behavior questionnaires [4], [6], [15] to distract them from the true purpose of the study. One month later, all participants were invited to complete a follow-up survey that included a different personality measure [11], the SeBIS measure, and the same two updating items from the pre-measure.

In this experiment, we sought to specifically evaluate three hypotheses: (H1) participants who viewed the edutainment video would have higher post-intervention SeBIS scores than control group participants; (H2) participants who viewed the edutainment video would have more positive post-intervention responses about the importance of software updates than the control group participants; and (H3) participants who viewed the edutainment video would have more correct post-intervention responses about the purpose of software updating than control group participants.

We find that H1 is supported: the negative security narrative video improves self-reported software updating behavioral intention more than text-based advice (Table I) as measured by the SeBIS scale, which has been shown to strongly correlate with real-world updating behavior [3]. Hypothesis 2 was not supported by the ANCOVA analysis. However, we do observe a trend in the direction of H2: participants who watched the

Comparison	$p$	$d$
edutainment vs. control video	< 0.03	0.34 (medium)
edutainment vs. text advice	< 0.03	0.33 (medium)

TABLE I  
ANCOVA ANALYSIS ON POST-INTERVENTION SeBIS SCORES,  
CONTROLLING FOR PRE-INTERVENTION SCORES.

edutainment video ( $\Delta\mu = 0.24$ ) or who read advice about updating ( $\Delta\mu = 0.17$ ) tended to have a positive change in their post-intervention responses about the importance of software updates; while participants who were only shown the control video about smoking had an average decrease in their reported opinion that software updating was important ( $\Delta\mu = -0.23$ ). H3 was not supported by ANCOVA analysis.

### IV. SUMMARY & FUTURE DIRECTIONS

Our work provides preliminary evidence that edutainment videos about software updating may be effective for altering users’ updating behaviors. We suggest that future work may wish to examine the impact of security edutainment over a longer period of time, using a more diverse sample, targeting a different security behavior, and/or comparing edutainment to traditional security education videos (e.g. those used for corporate training).

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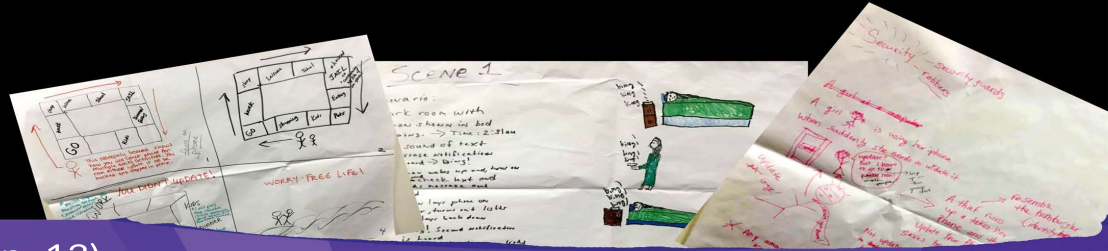
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Participatory design study (n=13) to construct edutainment video.

Analyzed via qualitative coding.

Professional production of edutainment video for software updating based on themes identified from design sessions.

[go.umd.edu/eduVideo](http://go.umd.edu/eduVideo)



Experimental evaluation on MTurk (n=151).

3 conditions: edutainment, text security advice, and control (smoking video)



Comparison of behavioral intentions (SeBIS), which are correlated with real-world updating behavior, and beliefs about importance and purpose by condition (ANCOVA).

**Edutainment video increased updating behavioral intent (SeBIS) more than text-based security advice.  $p < 0.03$ ,  $d = 0.34$  (medium)**

Change in Beliefs about Updating Importance



Change in SeBIS Updating Score

