The Effectiveness of Fear Appeals in Increasing Smartphone Locking Behavior among Saudi Arabians

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1000 Foot View

This study investigates different fear appeal video designs customized for the Saudi population.
Outline

• Motivation
• Methodology
• Evaluation
• Discussion
Smartphone Usage in Saudi

- Saudi Arabia ranked third in the world for smartphone use [1]

- Saudi Arabia has 81% Mobile Banking penetration [2]

72.8% of Saudis using smartphones

Smartphone Usage in Saudi

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Cybersecurity in Saudi Arabia

- **58%** of Saudi population has experienced different forms of online cybercrime [3]
- **One in four users** had a mobile device stolen, potentially exposing sensitive information to cyber thieves [3]

Why Study Saudi Arabia?

- Lack of awareness of security behind users’ insecure behavior [4]
- The increase of online cybercrime in Saudi Arabia
- Our study investigates the efficiency of communicating risk to the Saudi population by using different fear appeal videos

Fear Appeal

- **Fear Appeal**: it is a persuasive message that describes the seriousness of the risks to motivate users to cope with recommended behavior.
- Protection Motivation Theory:
  - Perceived severity

(How serious a user rates a threat)
Fear Appeal

• **Fear Appeal**: it is a persuasive message that describes the seriousness of the risks to motivate users to cope with recommended behavior

• Protection Motivation Theory:
  • Perceived severity
  • Perceived vulnerability

(A user feels susceptible to the threat)
Fear Appeal

- **Fear Appeal**: it is a persuasive message that describes the seriousness of the risks to motivate users to cope with recommended behavior
- Protection Motivation Theory:
  - Perceived severity
  - Perceived vulnerability
  - Self-efficacy

(A confidence about performing the recommended action)
Fear Appeal

- **Fear Appeal**: it is a persuasive message that describes the seriousness of the risks to motivate users to cope with recommended behavior
- Protection Motivation Theory:
  - Perceived severity
  - Perceived vulnerability
  - Self-efficacy
  - Response efficacy

(A user’s belief about taking the recommended action)
Replication Study

- The original study (SOUPS 17) by Albayram et al. [5]
- Effectiveness of risk communication for changing users’ risky behavior, rather than annoyance
- A fear appeal video design
- Amazon’s Mechanical Turk in USA

<table>
<thead>
<tr>
<th>Groups</th>
<th>Locked Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group <em>(No Video)</em></td>
<td>21%</td>
</tr>
<tr>
<td>Treatment group <em>(Video)</em></td>
<td>50%</td>
</tr>
</tbody>
</table>

Conducting Similar Study in SA

• Challenges
  • Cultural and language Barrier
  • Social and relevance Barrier
  • In addition to IRB approval, we needed approval from the Saudi Government
Outline

• Motivation

• **Methodology**

• Evaluation

• Discussion
Study Groups

- **Control**: No video
- **Original**: The same video in the original study
- **Dubbed**: The original video with Arabic dubbing
- **Subtitled**: The original video with Arabic captions
- **Customized**: A customized video for Saudis
Designing the Customized Video

- The effectiveness of video media on communicating fear appeal to the Saudi population
  - The customization focuses on the following aspects
Designing the Customized Video

• Relevant Risks and Fears
  • Risks and fears that are related to the target audience
  • A victim is being blackmailed via stored personal media in WhatsApp
  • The risks of reputation damage specially in a conservative society
  • A victim’s bank information was stolen by sending a 2FA code and accessing the bank password and username.

Stolen bank information scenario from the customized video
Designing the Customized Video

- Relevant applications and attributes
  - Information related to the top-ranking applications among Saudis
  - For example: WhatsApp and ALRajhiBank rather than those used in the original video, such as PayPal, Netflix, and Bank of America app.
Designing the Customized Video

• Cultural
  • The video dialog used culturally relevant vocabulary delivered in Arabic
Hypotheses

• The customized group will have higher ratings for:
  • Perceived sensitive data
  • Concerns about their smartphones’ security and privacy
  • Perceived severity and risk awareness
  • Response efficacy
  • Number of participants who enabled a screen lock

• The customized group will have lower ratings for:
  • Perceived response cost than other groups
Study Design

- We interviewed 200 Saudi participants (In-person study)
  - > 18 years old
  - No screen locking mechanism on their phone
  - Assigned randomly to one of the five groups
- The participants were recruited through flyers and face-to-face recruitment
- We collected participants’ cell phone numbers to follow up after the initial interview
- Same questions of the original study but in Arabic
Outline

• Motivation
• Methodology
• Evaluation
• Discussion
First Section of the Main Study

- Participant’s Background
- Smartphone usage behavior questions
- Online security behavior questions
- Initial reasons for not using a screen lock
- Their opinions about people who use a lock screen on their smartphone

Main Study

- First section
  Smartphone’s question

- Second section
  Video evaluation (Treatment groups)

- Third section
  Fear appeal questions

After a week

Follow-up

- Enabled or did not
- Their motivation

No Significant Difference
First Section of the Main Study

- Participant’s Background
- Smartphone usage behavior questions
- Online security behavior questions
- Initial reasons for not using a screen lock
- Their opinions about people who use a lock screen on their smartphone

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental burden</td>
<td>17%</td>
</tr>
<tr>
<td>No risk</td>
<td>21.5%</td>
</tr>
<tr>
<td>Nothing to hide</td>
<td>22%</td>
</tr>
<tr>
<td>Annoying to use</td>
<td>30%</td>
</tr>
</tbody>
</table>
First Section of the Main Study

- Participant’s Background
- Smartphone usage behavior questions
- Online security behavior questions
- Initial reasons for not using a screen lock
- Their opinions about people who use a lock screen on their smartphone

“Maybe they have bad photos on their phones and misfortunes to hide from others”
Second Section of the Main Study

- Video evaluation for treatment groups
- Persuasion, believability and effectiveness for each video
- What are the aspects of the video they liked and did not like

<table>
<thead>
<tr>
<th></th>
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<th>Subtitled</th>
<th>Dubbed</th>
<th>Customized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persuasion</td>
<td>17.5%</td>
<td>35%</td>
<td>72.5%</td>
<td>87.5%</td>
</tr>
<tr>
<td>Believability</td>
<td>10%</td>
<td>47.5%</td>
<td>72%</td>
<td>90%</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>15%</td>
<td>40%</td>
<td>82.5%</td>
<td>92.5%</td>
</tr>
</tbody>
</table>

Rating for each video
Third Section of the Main Study

- The value of stored data on their smartphone
- Their concerns on Security and Privacy
- The possibility of losing their smartphone or someone access it
- The cost of using the screen lock if it is an inconvenience or hard to remember
- Their confidence in performing the recommended behavior

We found significant differences for all questions at $p \leq .001$ by performing the Kruskal-Wallis test and post hoc multiple comparison.
Follow-Up

A week after the initial interview, we called participants to ask them:
• If they have enabled the screen lock or not
• What was their motivation behind their decision
• Significant difference ($H(4) = 39.46$, $p \leq .001$)

Percentages for participants who enabled the screen lock:

- Control: 17.5%
- Original: 20%
- Subtitled: 42.5%
- Dubbed: 62.5%
- Customized: 72.5%
Reasons Behind Their Decision

• The highest-ranking reason for not enabling the screen lock changed to “Forgettable/Mental burden” (28.9%)

• The highest reason for their motivation
  • The control group: the questionnaire
  • The treatment groups: the video
Reasons Behind Their Decision

• Enabled:

“Previously, I saw no risk from not locking the screen because my mobile was with me all the time, but after watching the video I learned a lot”

• Not enabled:

“I and my family use my phone as a personal hotspot for sharing Internet data, and it is annoying to put a screen lock on, especially when someone who trusts you shares your phone”
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Discussion

- Responses from the original group were very close to the control group.
- Original video was only minimally effective in changing Saudis’ locking behavior.
- Subtitled video was effective in a simple proportion.
- Dubbed video had the second highest level impact.
- Customized video had the most effect on participants’ perceptions.
Thank you

Questions ??

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