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



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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



[1] Saudi Arabia ranks 3rd globally for smartphone use http://www.arabnews.com/node/1075126/corporate-news
[2] Consultancy.uk, https://bit.ly/2NPW8Qj

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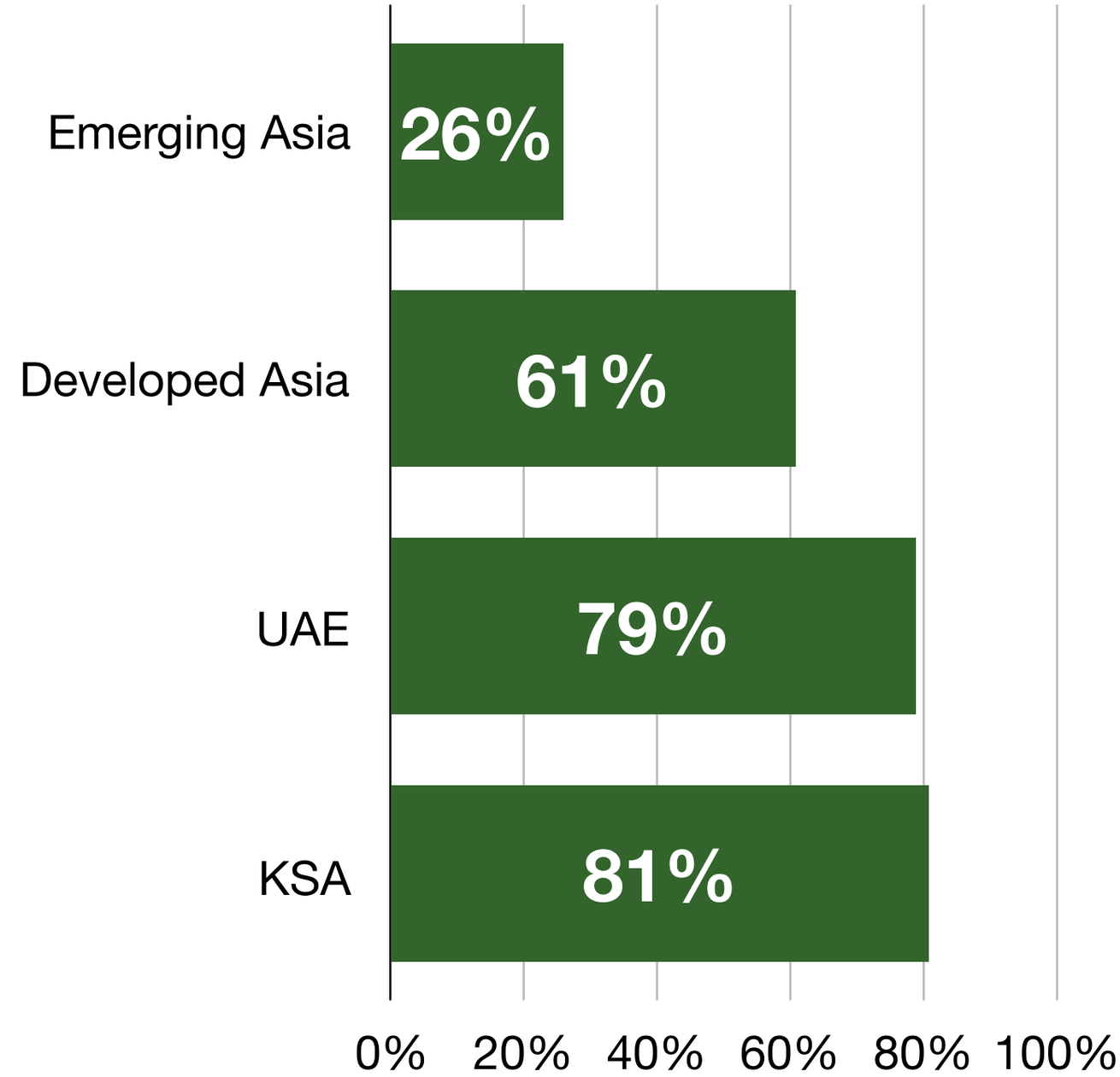

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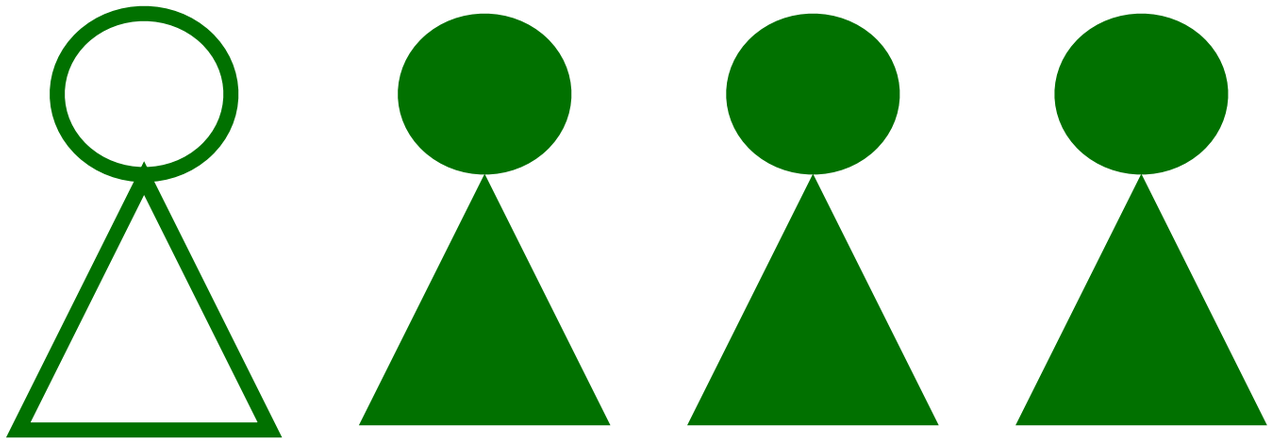
Cybersecurity in Saudi Arabia

- **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]



[3] Cybercrime hit 6.5m in kingdom last year. http: //www.arabnews.com/node/967966/saudi- arabia

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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**

[4] A. Alzahrani and K. Alomar. Information security issues and threats in Saudi Arabia: A research survey. International Journal of Computer Science Issues (IJCSI), 13(6):129, 2016

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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

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  - 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

Groups	Locked Screen
Control group (No Video)	21%
Treatment group (Video)	50%

[5] Y. Albayram, M. M. H. Khan, T. Jensen, and N. Nguyen. "... better to use a lock screen than to worry about saving a few seconds of time": Effect of fear appeal in the context of smartphone locking behavior. In Symposium on Usable Privacy and Security (SOUPS), 2017

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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

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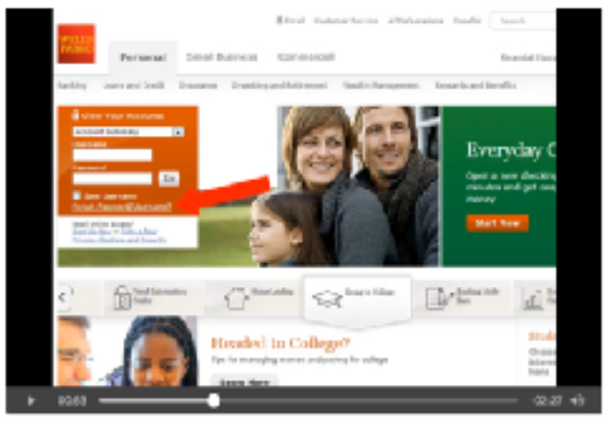
Study Groups

- **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



A frame from the original video



A frame from the dubbed video



A frame from the subtitled video



A frame from the customized video

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Designing the Customized Video

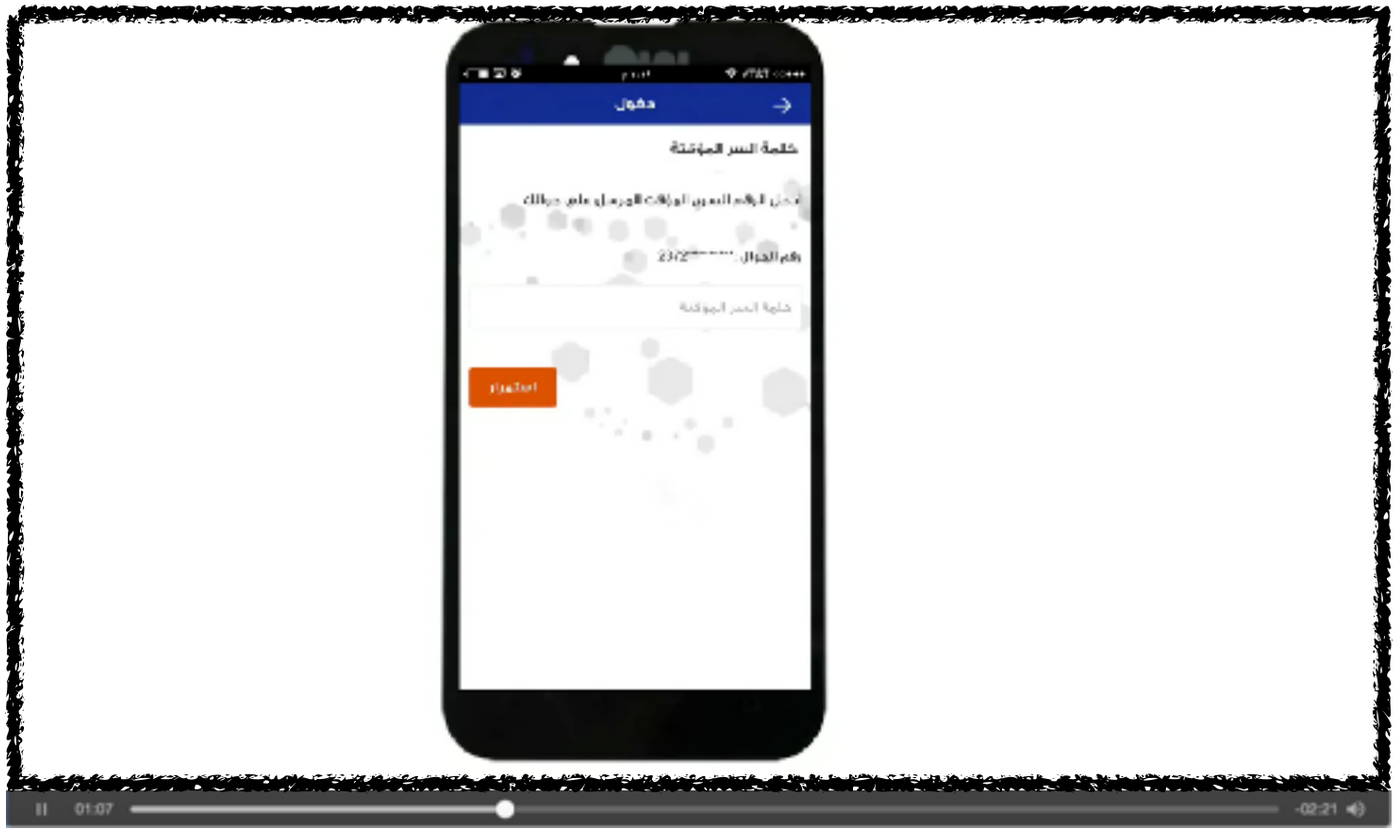
- **The effectiveness of video media on communicating fear appeal to the Saudi population**
  - The customization focuses on the following aspects



Customized video

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.







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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



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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



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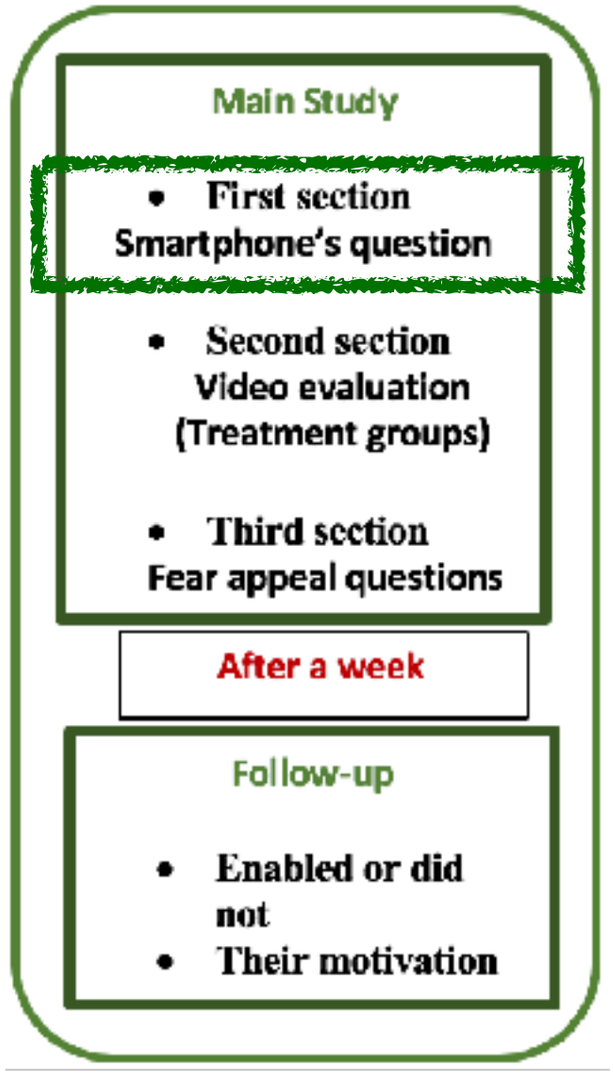
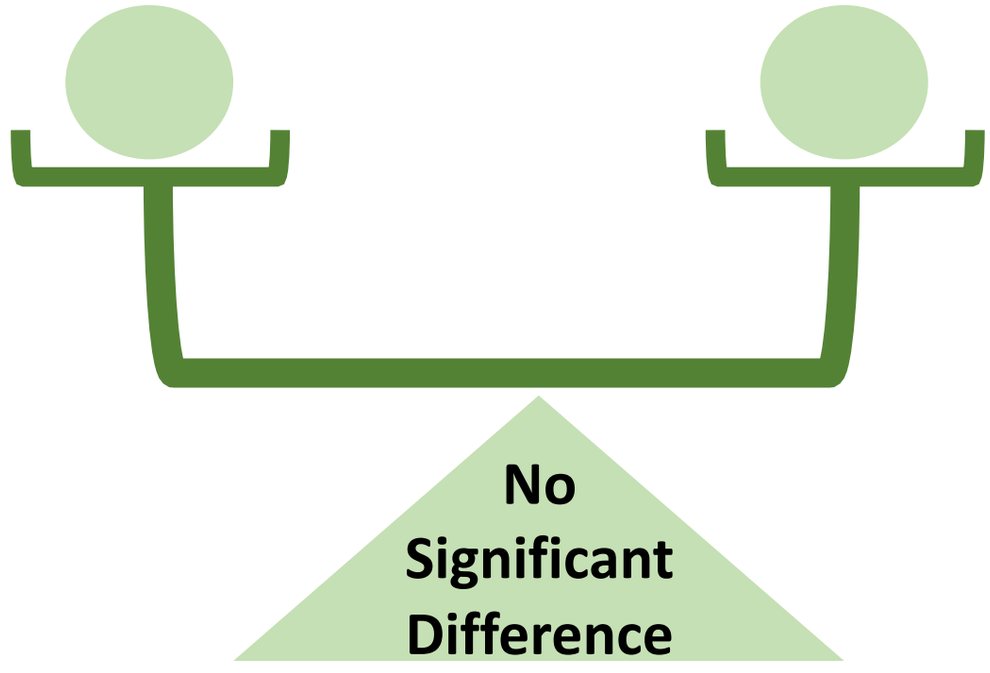
First Section of the Main Study

- 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





SOUPS 2016
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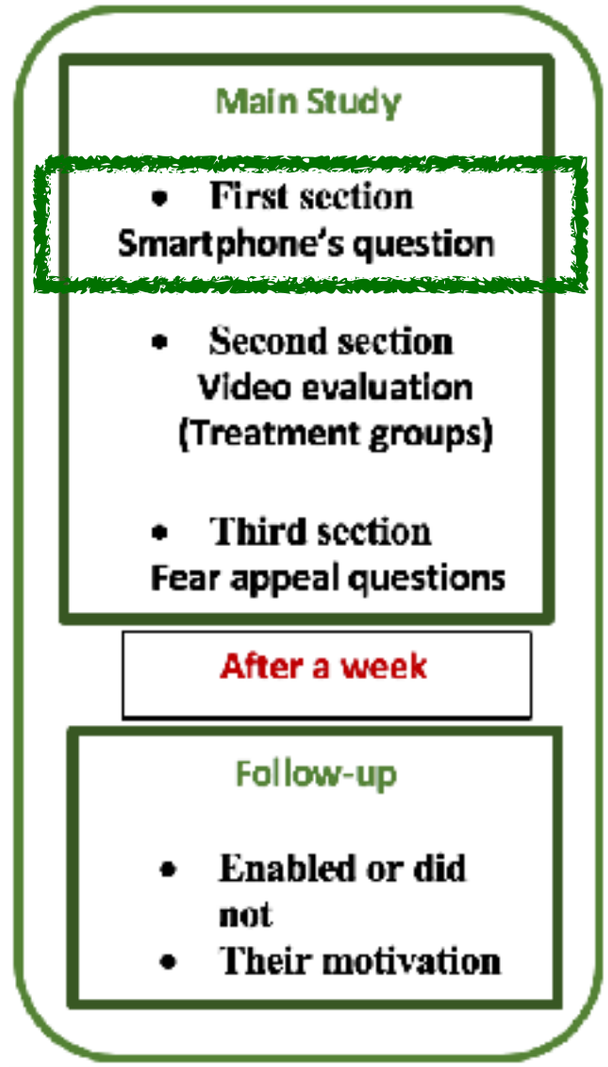

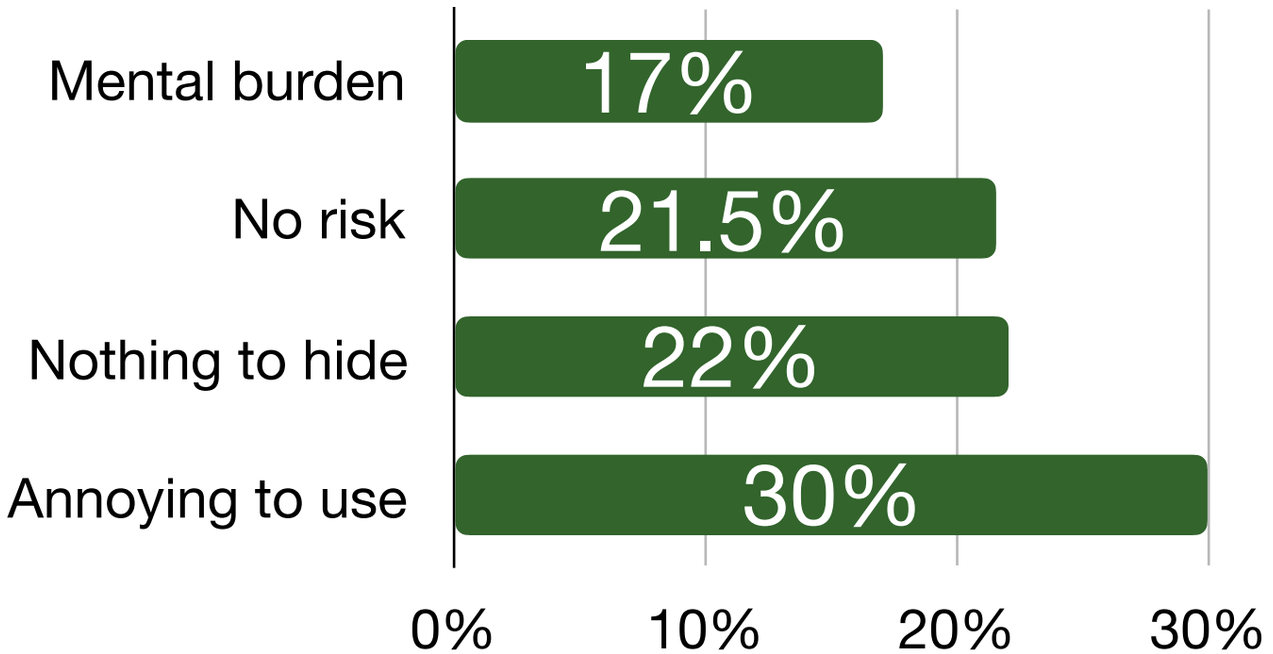

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First Section of the Main Study

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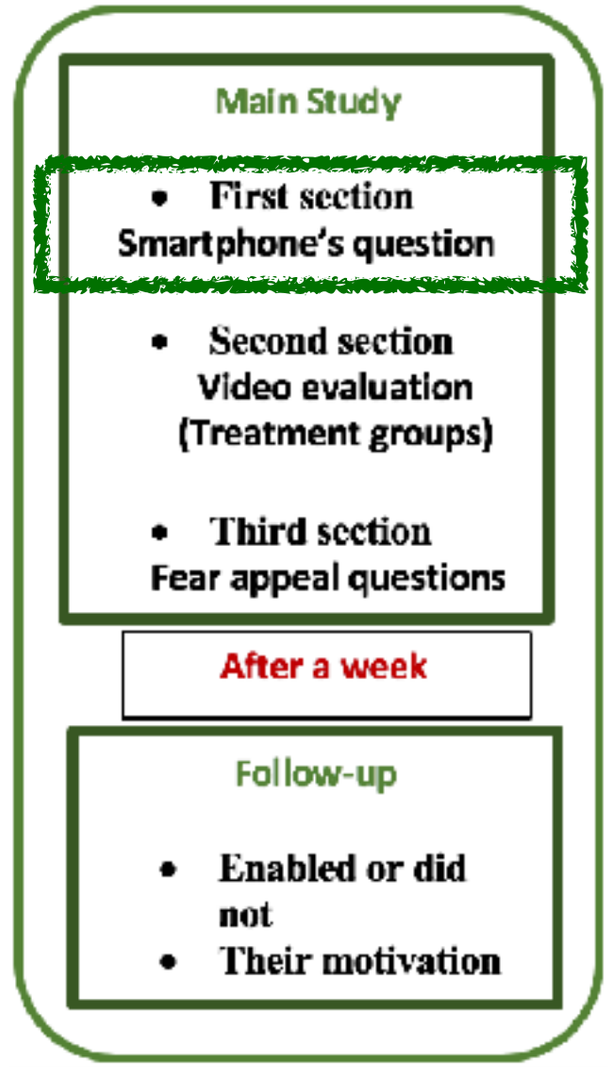

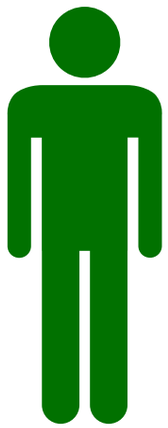

" Maybe they have bad photos on their phones and misfortunes to hide from others"



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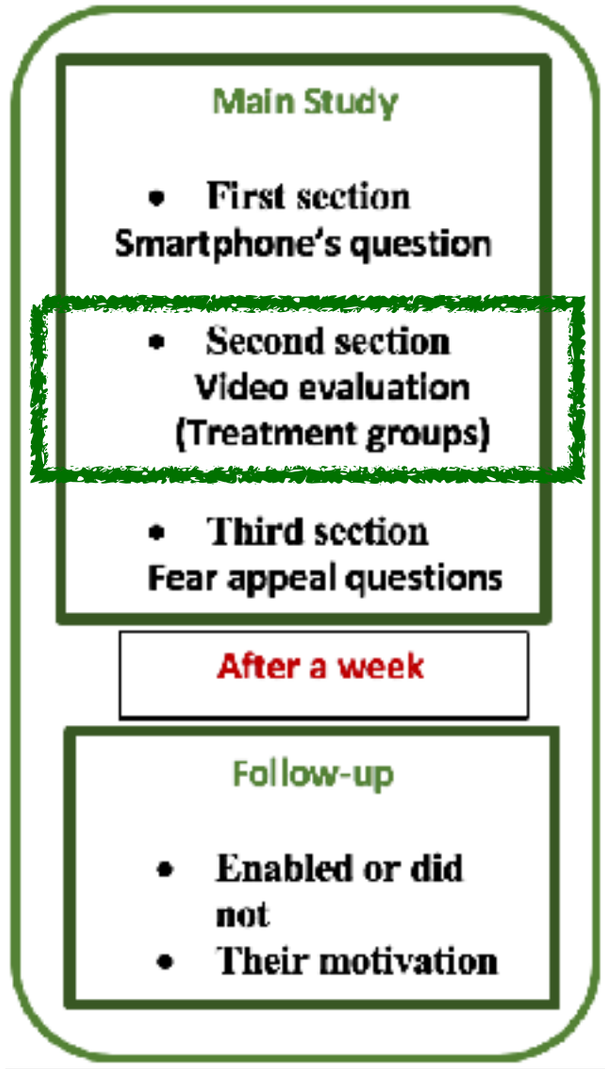
Second Section of the Main Study

- 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



	Original	Subtitled	Dubbed	Customized
Persuasion	17.5%	35%	72.5%	87.5%
Believability	10%	47.5%	72%	90%
Effectiveness	15%	40%	82.5%	92.5%

Rating for each video

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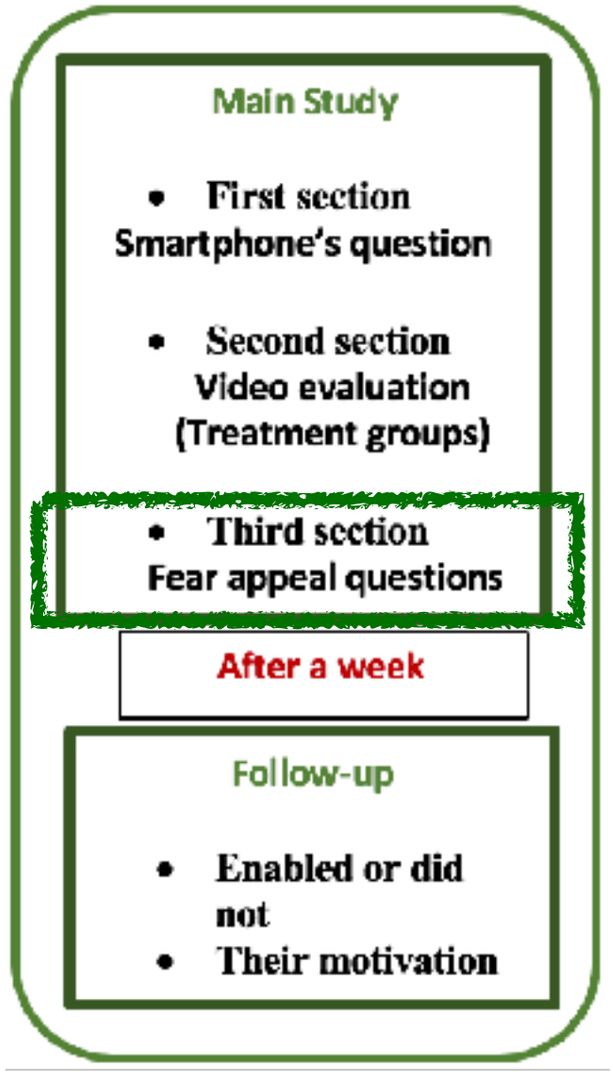
Third Section of the Main Study

- 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

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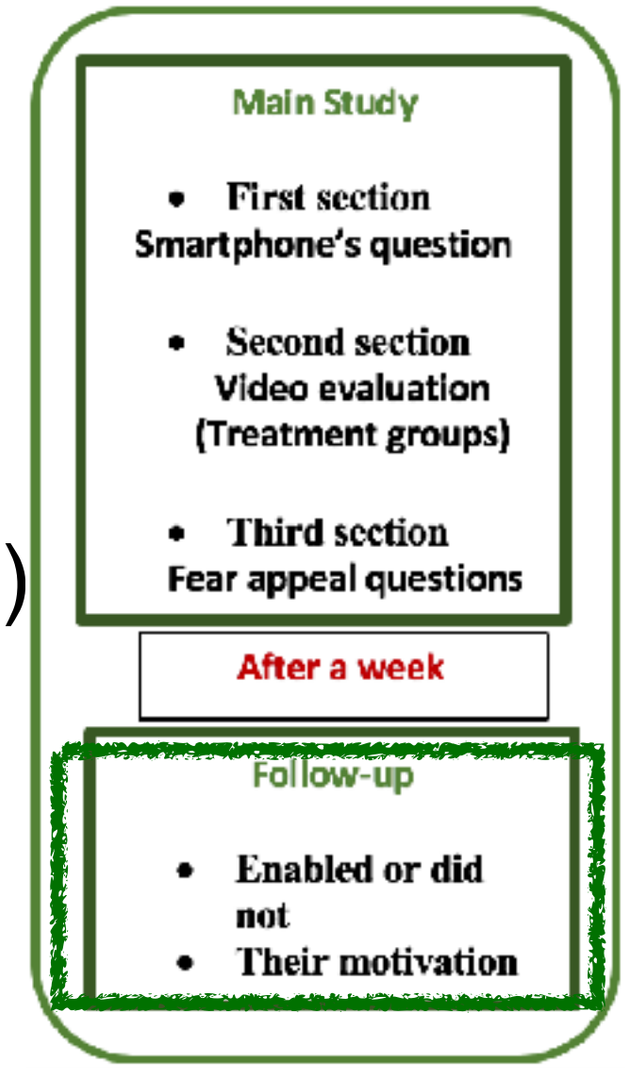
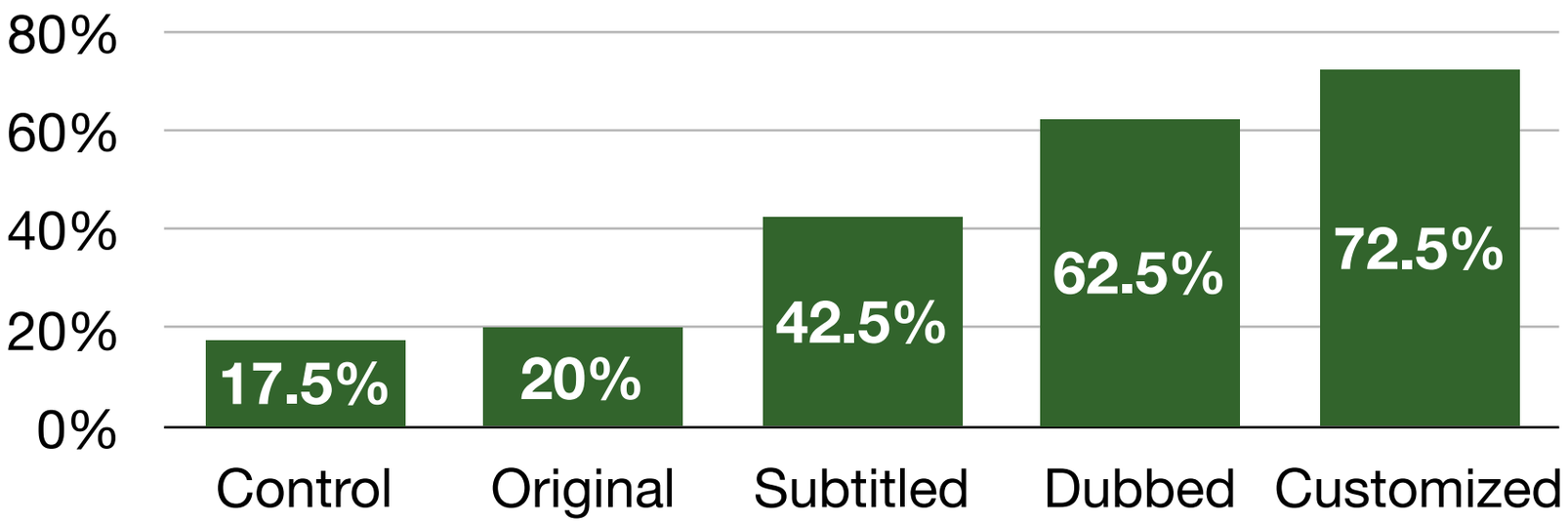
Follow-Up

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

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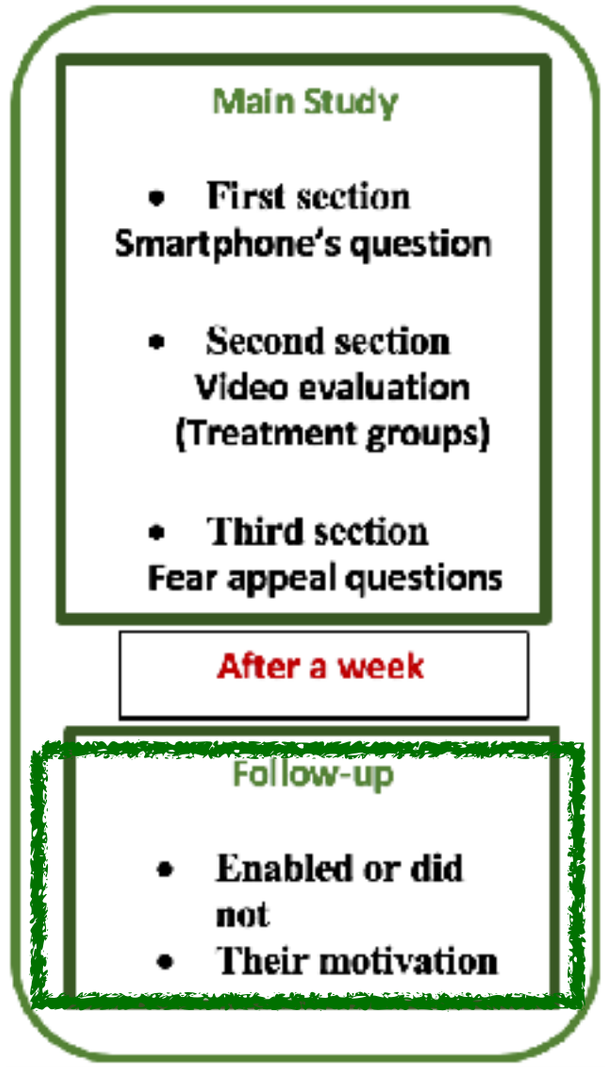
Reasons Behind Their Decision

- 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**



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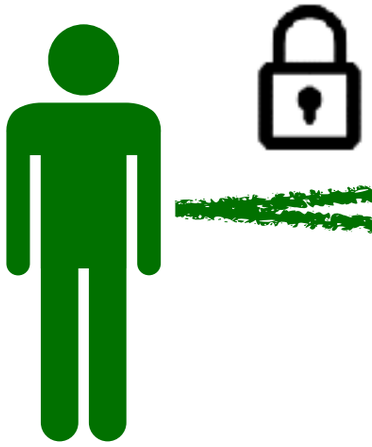
Reasons Behind Their Decision

- **Enabled:**

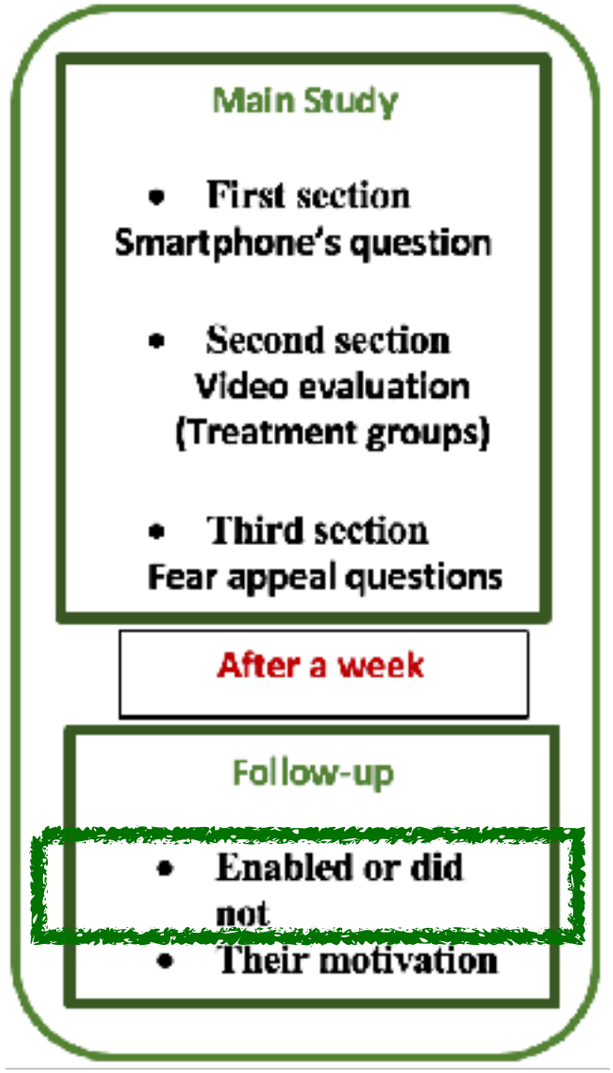


"Previously, I saw no risk from not locking the screen because my mobile was with me all the time, but after watching the video I learned a lot"

- **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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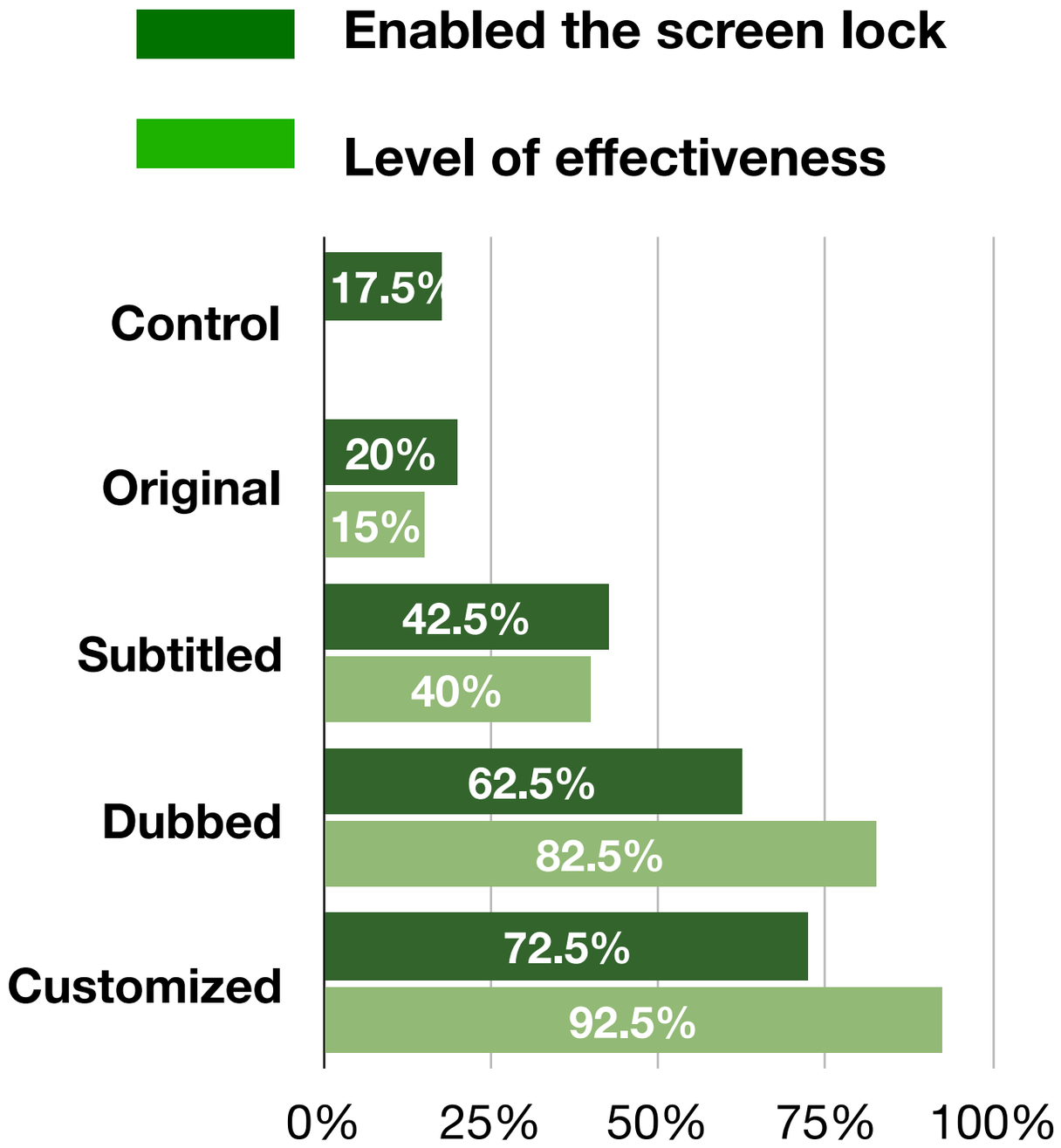
Discussion



- 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

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Thank you

Questions ??

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