Strategies to increase downloads of COVID–19 exposure notification apps

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Background

Digital contact tracing

- Contact tracing is a key intervention to control the spread of SARS-CoV-2

- As incidence of the virus increases, "traditional" contact tracing (i.e., operators making calls, home visits etc…) gets overwhelmed.

- Some exposures might also not be reported to contact tracers, e.g., due to poor recall or social desirability biases.

- Digital contact tracing might help address these issues via exposure notification.

Digital contact tracing

- A lot of engineering/CS work to develop safe, private and accurate exposure notification apps.

- Mathematical models indicate that the effectiveness of digital contact tracing in preventing new cases in populations increases with the number of users.

- However, in most countries, the uptake of existing apps has been more limited than expected.

Strategies to improve download of digital contact tracing apps

- Promotion of digital contact tracing has emphasized protection of personal data and accuracy of notifications

  - Technical improvements

  - Legislation

  - Altruism

- Integration of digital contact tracing with information, symptom tracking, scheduling system for tests etc…

- More limited attention to financial incentives to download/use digital contact tracing

Financial incentives

- Incentives are payments that are conditional on specific actions or behaviors.

  - Immediate and personal reward for actions that largely benefit others or the community at large

- Patients and at-risk populations are often responsive to rewards that encourage sustaining healthy behaviors or undergoing specific diagnostics and procedures.

  - Smoking cessation

  - HIV/STI testing

- Financial incentives also promote participation in surveys and data collection.

Objectives

To assess the relative importance of privacy, accuracy and financial incentives in users' decision-making about digital contact tracing.

To evaluate how much the download rate would increase if potential users were offered varying levels of financial incentives to download an exposure notification app.

Data and methods

Discrete choice experiment

- A discrete choice experiment is a survey methodology in which respondents choose between hypothetical versions of a good or service, characterized by a small number of randomly selected attributes.

- Analysis of choice data then allows measuring how much these attributes "weigh" in decision-making.

- Very often used in marketing and healthcare/health services research.

Design of the experiment

Strategy to improve uptake of EN app	Attributes	Levels
Improving Accuracy	False notifications	1 in 100 notifications received from the app is an error
		5 in 100 notifications received from the app are errors
		15 in 100 notifications received from the app are errors
	Sensitivity	You are notified about 60% of your contacts with infected app users
		You are notified about 80% of your contacts with infected app users
		You are notified about 95% of your contacts with infected app users
Strengthening Privacy	User details	App does not ask for user details (health dept. cannot contact you)
		App asks for phone number or email (health dept. can contact you)
	Location	App does not collect any location data
		App asks user for zip code
		App tracks location (by GPS)
	Data sharing	You make your own COVID status available only to other app users
		You make your own COVID status available to health department
		You make your own COVID status and list of contacts available to health department
Offering financial incentives	Price/incentive to download	User pays $4.99
		App is free
		User gets $10
		User gets $50
		User gets $100

TABLE 1:
Strategies, attributes and levels included in the discrete choice experiment.

- Literature review & consultation of topic experts to design attributes and levels.

- Formed choice sets by selecting at random among 810 possible combinations of levels.

- Each choice set also includes an "opt-out" option.
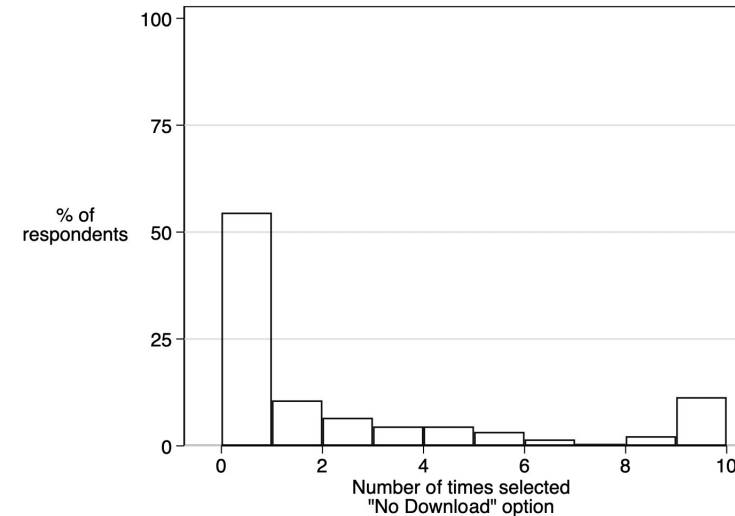
Design of the experiment
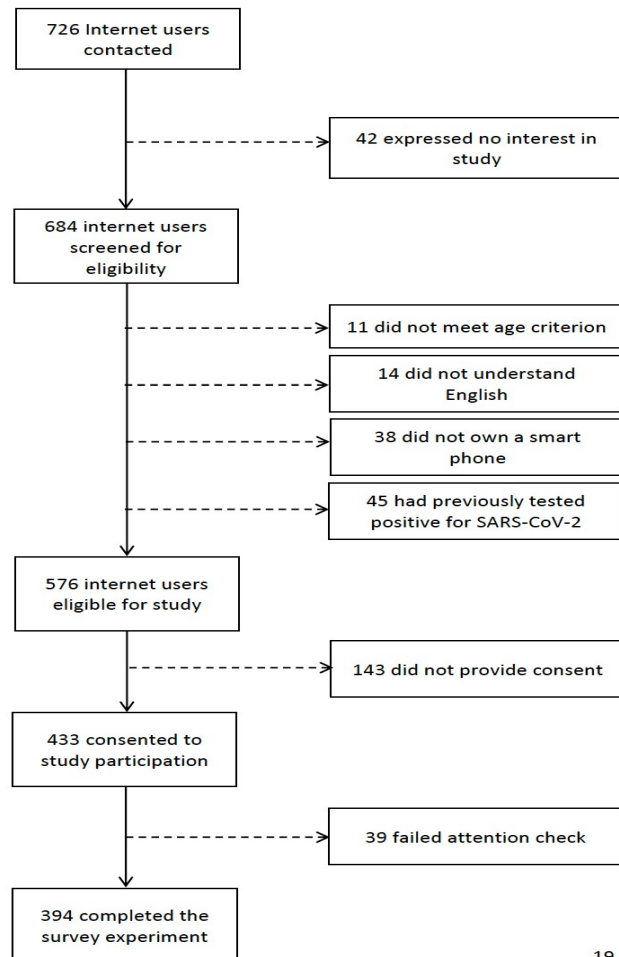
- · We recruited participants online, via the Qualtrics aggregator of panels.

- · Inclusion criteria were:

  - - Age 18 and older

  - - Owner of a smart phone

  - - No positive test for COVID-19

  - - English speaker

Results

Data quality and choices

- Data passed reliability checks often included in DCE.

- Quiz questions indicated good understanding of instructions and procedures.

- Respondents made 3,940 choices. They selected the "opt-out" option 850 times (21.6%)

Appendix A2:
Selection of the opt-out "No download" option during the discrete choice experiment (n=394).

Preferences

- Random coefficient logit models to estimate the weight of each attribute.

  - Models allow for heterogeneity in preferences for attributes across respondents

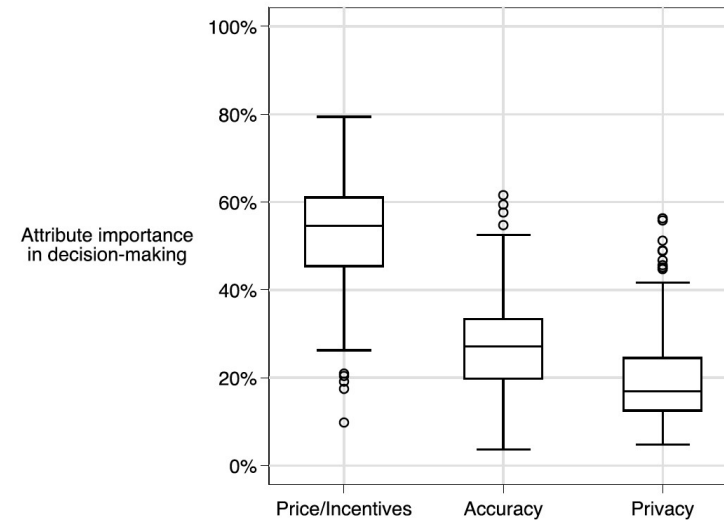- Incentives twice as important as privacy and accuracy in explaining decisions.

Figure 2:
Relative importance of attributes in explaining decision-making about app downloads (n=394)

Potential increase in download rate

- Used estimated weights to assess how many more respondents would download an app if offered a certain level of incentive.

- Compared to baseline scenario of free app, downloads increased by 40% when respondents offered a $100 incentive.

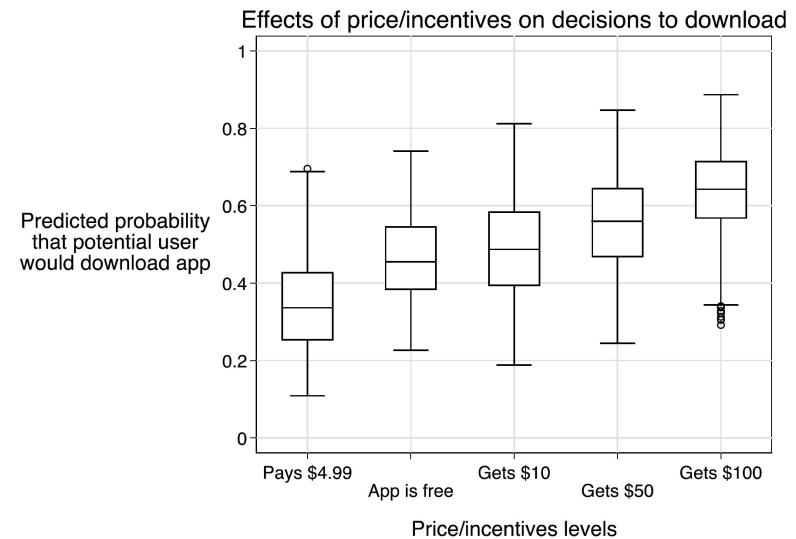- Evidence of "peanuts effects" when

incentives set too low (e.g., $10)

Effects of price/incentives on decisions to download

Predicted probability that potential user would download app

Price/incentives levels

Figure 3:
Predicted effects of price/incentives on decisions to download EN apps (n=394)

Lmitations

- Online sample: not representative of particular populations.

- Estimated preferences depend on options presented to respondents.

- Stated preferences and hypothetical bias: individuals might reveal different preferences in real-world settings.

- Only investigated download of digital contact tracing apps

  - sustained use?

  - Recommendations in peer networks?

Conclusions

- Financial incentives might represent a powerful tool to stimulate the adoption of digital contact tracing apps.

    - need pragmatic trials to assess their impact in real-life conditions

- Additional work is also needed to optimize incentive schemes

    - avoid peanuts effects

    - Targeting at groups most affected/most likely to transmit