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## Determinants of Acceptability of Contact Tracing Apps for COVID-19: Initial Results from Luxembourg<sup>1,2</sup>

### Abstract

This paper illustrates the results from the first survey to study people's support for COVID-19 contact-tracing apps. It takes advantage of answers from a unique, online and representative survey administered to the adult population in Luxembourg. The results indicate that residents in Luxembourg are on average positive towards contact-tracing apps, but their willingness to use one is hampered by privacy and data security issues. Among motives in favour of contact-tracing apps, respondents prevalently mention responsibility towards the community and loved ones. The contributions of this paper are manifold: first, it contributes to the growing literature to understand what drives people's willingness to adopt contact-tracing apps; second, it gives insights on app's features and design that may facilitate the apps up-taking, should an app be introduced; third, it helps explaining the observed discrepancy between willingness to install and what people do in practice.

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2. The authors are affiliated to STATEC and STATEC Research. Thanks are due to Steinn Steinsson for his support during the data collection and for the graphs, to Guillaume Osier for granting access to EU-SILC data, to Marc Pauly for his help with GDPR issues, and Kelsey O'Connor for reviewing an earlier draft of this paper. Authors are grateful to Johanness Abeler and Daniele Nosenzo for sharing the questionnaire for the UK, Germany and France. We also gratefully acknowledge the insights on survey design provided by Peter Lugtig, Markus Dürmuth, Peter Ryan and colleagues at STATEC. Views expressed in this paper are those of the authors, and do not represent the views of STATEC or STATEC Research, and funding bodies.

## 1. Introduction

In recent months, countries worldwide deployed mobile contact-tracing apps to fight and control the spread of COVID-19. Their usage has been surrounded by public debate. The use of tracing apps raises privacy concerns due to the sensitive nature of the collected data, but provides an efficient notification mechanism of exposure to COVID-19 infected individuals. Manual tracing is overwhelmed when the rate of contagion grows rapidly, which hampers the ability to limit the spread of the disease. Existing physical distancing measures, while effective, take a toll on society and the well-being of its individuals.

Surveys have been conducted in several countries to determine the acceptability of mobile tracing apps. In Luxembourg health authorities have declared that they do not plan to deploy a contact tracing app,<sup>3</sup> but little is known about public support for this technology.

**How many people would be willing to install a contact tracing app? What explains people's willingness to adopt a tracing app? What are the main concerns of potential users?**

The answers to these questions are important. The potential benefits of contact tracing technology depends on the public's willingness to use it. The public's intentions and preferences regarding tracing apps provide useful insights in case such an app were to be designed. Answers also provide information about incentives and barriers that may affect the public's compliance with various health policies.

To address these questions, we designed and administered two online surveys on a representative sample of residents in Luxembourg. The surveys are (1) longitudinal in design, permitting us to track changes within individuals over time and (2) based on earlier surveys administered in Germany, France, Italy, UK and US (Altmann, et al., 2020), allowing us to compare our results with those from other countries. We depart from and contribute to the previous studies in two ways. Firstly, we add questions on the technical design and the geographical scope of the apps. Secondly, unlike the previous studies based on single-surveys, the longitudinal nature of our survey allows us to study how attitudes and support towards the apps change over time. The present work provides an initial set of results based on the first survey administered during the summer of 2020.

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<sup>3</sup> See for example [https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/travel-during-coronavirus-pandemic/mobile-contact-tracing-apps-eu-member-states\\_en](https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/travel-during-coronavirus-pandemic/mobile-contact-tracing-apps-eu-member-states_en). The adoption of tracing app is largely debated in Luxembourg. For instance, the Prime Minister Xavier Bettel expressed some concerns related to the privacy and the geographical scope of the app (see for example <https://delano.lu/d/detail/news/it-time-luxembourg-adopted-contact-tracing-app/212118>). On the contrary, the Commission Nationale d'Éthique (C.N.E.) took a more favourable stance and stated that the "tracing app must be considered a useful element, which must therefore be taken into account". It clarifies that "the tracing must be voluntary, transparent, minimalist and limited in time with a clearly defined objective" (<https://cne.public.lu/dam-assets/fr/publications/avis/Prise-de-position-tra%C3%A7age.pdf>).

The paper is organized as follows. Section 2 provides some background and motivates the study. Section 3 describes the method and the data. Section 4 presents the empirical results, and the last section concludes.

## 2. Background

Anecdotal evidence and scientific studies suggest that digital tracing technologies are effective in countering the spread of the novel coronavirus, under certain conditions. The key to their effectiveness is in the timeliness of information provided by mobile phone apps, i.e. their rapidity in identifying and notifying potentially infected individuals (Kretzschmar et al. 2020), in particular in presence of large numbers of, and rapidly increasing new infections. Case studies based on the experience of East Asian countries provide evidence indicating tracing apps are indeed effective (Huang, Y. et al., 2020; Sieh and Child, 2020; Jian, S., et al. 2020).

Theoretical studies show that tracing apps reduce infections, hospitalisations, and deaths, and could even stop the pandemic (Abueg et al., 2020, preprint; Ferretti et al., 2020). In one study, high levels of app usage proved to be essential to control and suppress disease transmission (Ferretti et al., 2020). Abueg et al. (2020) found that digital exposure systems could reduce infections and deaths by approximately 8% and 6%, if 15% of the population adopted the technology. Braithwaite et al. (2020) review automated contact tracing studies, concluding that uptake is crucial to its effectiveness.

Previous evidence suggests that even at low levels of uptake digital contact tracing is an effective complement to traditional contact tracing and distancing measures. What is more, tracing apps mitigate the otherwise substantial social and economic cost of lockdowns and distancing.

## 3. Methodology and Data

We use a representative, longitudinal dataset to study people's likelihood of adopting contact tracing apps in Luxembourg. The dataset is compiled from respondents' answers to an online survey, which was administered in two waves to a sample of Luxembourg's residents. In the present work, we report the results from the first wave of data collection.

The survey was conducted during the summer 2020, between the 10<sup>th</sup> of July and the 10<sup>th</sup> of August, on a sample of 1300 residents. The final answer rate is about 60%, yielding a total of 730 completed questionnaires<sup>4</sup>. The survey was administered after a national lockdown,

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<sup>4</sup> Respondents that completed the survey received a reward of 5€ for their participation.

issued by national authorities from the 18th of March to the 11th of May 2020, in a period of relative resurgence of the virus.<sup>5</sup> A few weeks before administering the survey, the first tracing apps were introduced in several European countries. (The German Corona-Warn tracing app was also available for download in Luxembourg).

### 3.1. The probability-based online panel

The target set of respondents, essentially a list of e-mail addresses, is made up of 1300 individuals older than 18 years of age. Individuals were recruited from the participants of the Luxembourg Survey on Income and Living Conditions (SILC) 2019, conducted by STATEC.<sup>6</sup> This gave us the unique possibility to compute the participating individuals' probability to opt-in, which is key to make the data representative of Luxembourg's adult population.

Being nationally representative is a significant advantage over the majority of online surveys, which typically rely on a list of respondents that are recruited using voluntary opt-in schemes, such as advertisements on internet portals or newsletters. In such cases, the probability of recruiting particular respondents is unknown, and, as a consequence, the results of the survey cannot be generalised to the population.

Opt-in probabilities form the building blocks of sampling weights to correct for potential bias in the sample. To compute them, we use a logit model on data from the EU-SILC survey.<sup>7</sup>

### 3.2. Questionnaire

The questionnaire is based on the one designed by Altmann et al. (2020). Surveys based on this questionnaire have been administered in the UK, Germany, France, Italy, and the US, between February and March 2020. We replicate the survey for Luxembourg, providing information for an additional country to the international project on "Support for app-based contact tracing of Covid-19" (Altmann et al., 2020).<sup>8</sup> This offers cases to compare and better interpret our results.

The questionnaire takes about 10 minutes to respond to. It is available in four languages (Luxembourgish, German, French and English), and includes respondents': acceptability of the

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<sup>5</sup> <https://paperjam.lu/article/covid-19-pourrait-toucher-8-00>

<sup>6</sup> Of the 8800 respondents of EU-SILC 2019, 1300 gave their consent to be contacted for other surveys and voluntarily shared their private email addresses. The following question was asked to the 8800 respondents of EU-SILC 2019, who were at least 16 years-old in 2018: "Le STATEC réalise régulièrement des études qualitatives (groupes de discussion, entretiens cognitifs etc.) portant sur des sujets variés. Ces études permettent au STATEC de mieux comprendre certaines thématiques et aussi de tester ces questionnaires afin d'améliorer leur qualité. Accepteriez-vous de participer à ce type d'études? »

<sup>7</sup> Probabilities of opt-in are estimated using the following variables: gender age, country of birth, nationality, education, marital status, income, employment, health status, life satisfaction, area of residence, access to internet, language used during the interview, attention to complete the interview (as assessed by the interviewer), consent to use administrative data for completing the survey, participation to previous wave of EU-SILC. This data are only used at this stage of the analysis.

<sup>8</sup> <https://osf.io/v45y2/>.

app-based system of contact tracing; preferences on different installation regimes; socio-demographic characteristics; trust in government; and other characteristics.<sup>9</sup>

Compared to the original questionnaire by Altmann et al. (2020), we include questions to investigate the public's preferences on app design (centralised vs. decentralised), and issues relevant to the public debate in Luxembourg, such as preferences for national versus European apps.

We also introduce two methodological changes compared to the original study. Firstly, as mentioned, we run the survey twice on the same set of respondents, with a slightly modified questionnaire, in order to obtain a longitudinal (panel) dataset. Secondly, Altmann et al. (2020) drop answers from respondents that do not own a smartphone, and those that fail a set of comprehension questions. We retained those respondents' answers. The reason is that these respondents are part of the population pertinent to policy makers in Luxembourg (i.e. the adult population residing in Luxembourg), and their inclusion improves the estimation of potential app adoption rates in Luxembourg.

## 4. Results

### 4.1. How many residents would be willing to install a tracing APP?

Figure 1 shows that 38 % of respondents would definitely install a tracing app if one was made available, and 34 % would probably install it. In contrast, 11% of respondents would definitely not install the app. These figures indicate that **the support for a tracing app is high in Luxembourg**. However, does that mean people would actually install a tracing app if one were available? The experience from other European countries suggests the answer is not straight forward and indicates our results should be interpreted cautiously.

Surveys on the acceptability of contact tracing apps have been conducted in Germany, France, Italy and United Kingdom (UK) during spring 2020. In the same period, the health authorities of those countries made contact-tracing apps available to the public.<sup>10</sup> Despite wide support for such technology (see Figure 2), the apps' adoption rates remained lower than what was indicated by the surveys. As an example, the proportion of respondents that would definitely

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<sup>9</sup> The questionnaire is available in the

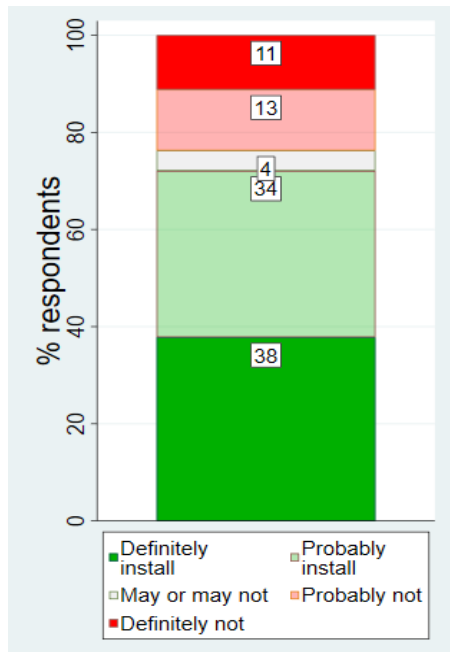
Appendix to this paper.

<sup>10</sup> There are no official data on the adoption rate of tracing apps in European countries. Adoption rates reported in this article are authors' estimates based on information retrieved from the apps' official websites (or the media), on the 22/10/2020. We define the adoption rate as the number of downloads over the adult population (more than 18 years old). The most recent population data by age group are retrieved from Eurostat and ONS. In the case of UK, app data refer to England and Wales, where the NHS COVID-19 app is available on the 22/10/2020.

install the app was nearly 45% in the UK and France. In contrast, the estimated adoption rate is 34% in the UK, and 5 % in France. Germany and Italy have an adoption rate of 27% and 18%, respectively.

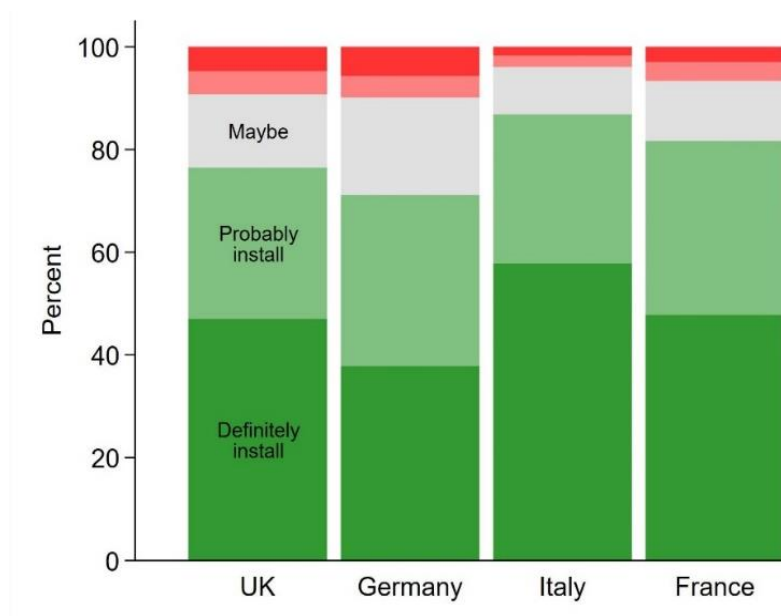
Why do we observe such a discrepancy between intentions and behaviours? The answer to this question is important because tracing apps must be adopted in order to limit the spread of COVID-19. Factors such as users' concerns, app features and design, and the evolution of the pandemic might influence installation behaviour.

*Figure 1 Would you install the app?*



Source: Authors' calculations on data from the APPRECIATE survey, July-August 2020. Note: The category "Definitely install" includes respondents that have already installed a tracing app (1.3%); the category "Definitely not" includes respondents that have no smartphone (4.3%).

Figure 2 Would you install the app? European countries.

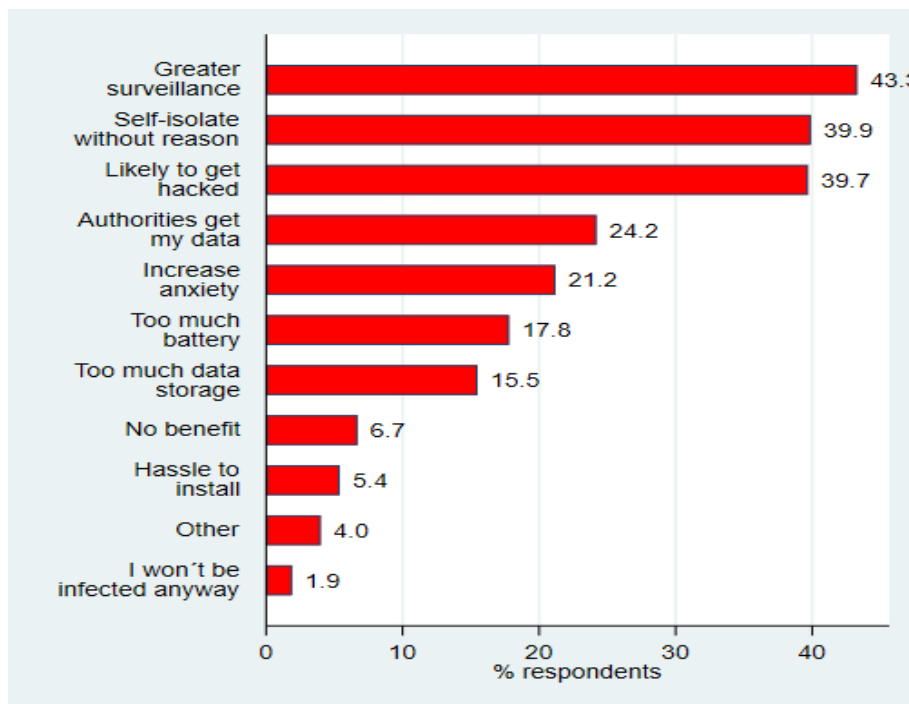


Source: Altmann et. al. (2020, Figure 1, pag. 6), available at <https://osf.io/v45y2/>

#### 4.2. What are the reasons for and against installing the app?

Investigating the concerns and motivations for installing and using the app help us to understand the observed discrepancy between stated-willingness to install and installation behaviours. It could also provide guidance on factors that incentivise the installation and use of the app. Figure 3 shows that the main reasons for not installing the app include: fear of greater surveillance (43 % of respondents); fear of mandated self-isolation without a legitimate reason (40 %); and fears that the app might be hacked (40%). In contrast, excessive use of battery and data storage do not seem to be sources of much concern.

Figure 3 Reasons against installing the app.

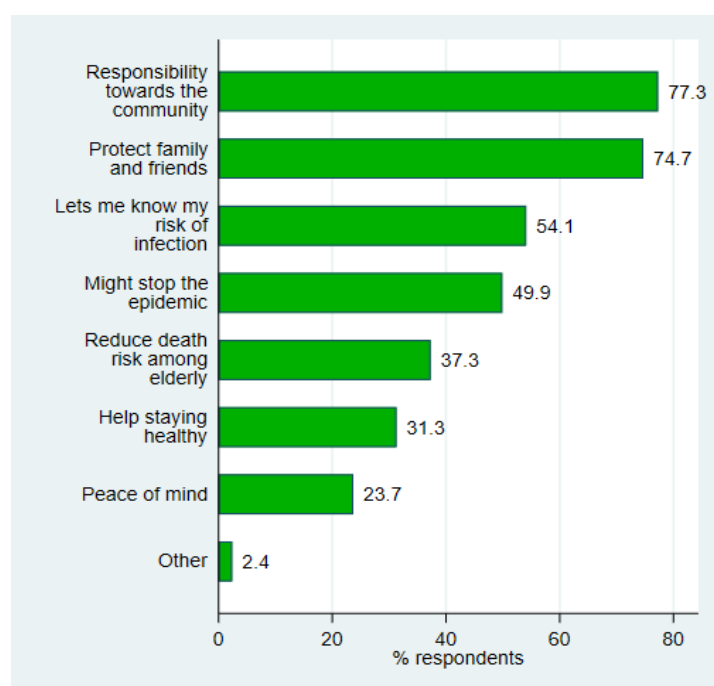


Source: Authors' calculations on data from the APPRECIATE survey, July-August 2020. Note: each respondent could choose up to 5 reasons.

Respondents report that the main reasons for installing the app are feelings of responsibility towards the community (77%), and protecting family and friends (75%). Almost half of the respondents declare that a good reason for installing the app is that it may stop the epidemic (see Figure 4).



Figure 4 Reasons to install the app



Source: Authors' calculations using data from the APPRECIATE survey, July-August 2020. Note: each respondent could choose up to 5 reasons.

### 4.3. Willingness to install, installation regimes, and design.

Technical solutions, installation regimes and geographical scope might also play a role in the willingness to install an app, especially if they are linked to concerns expressed by potential users. Respondents' answers regarding these aspects also provide an indication of what explains the observed discrepancy between willingness to install and installation behaviour.

#### *Respondents prefer a decentralised system to a centralised one.*

We find two different types of apps in Europe,<sup>11</sup> whose main difference lies in the system to match the identifiers of users and their infected contacts. These are referred to as the centralised and decentralised designs. The two designs have somewhat different privacy implications, with the decentralised one having milder implications.<sup>12</sup>

<sup>11</sup> Up to date, almost all European health authorities opted for a decentralised app, and these apps are all potentially interoperable. Notable exception are France and Slovakia. UK recently moved from a centralised to a decentralised infrastructure. See [https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/travel-during-coronavirus-pandemic/how-tracing-and-warning-apps-can-help-during-pandemic\\_en](https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/travel-during-coronavirus-pandemic/how-tracing-and-warning-apps-can-help-during-pandemic_en)

<sup>12</sup> The privacy implications of different COVID-19 tracing apps is highly debated. Some apps allow for stronger surveillance by authorities than others. Overall, European apps implement high privacy standards, as they exchange anonymised identifiers via Bluetooth, do not trace location of individuals, and they do not access users' contact lists. On the 21 April 2020, the European Data Protection Board recommended that the contact tracing

In a “*centralised*” system, a central server stores all anonymised identifiers, and matches infected people and contacts. Health officials are able to access the entire network of contacts of infected users. In the “*decentralised*” system, anonymized identifiers of infected contacts are stored in a server, while the anonymized identifiers stay on the local device. The app downloads the identifiers of infected users from the server and matches them with the user’s contacts on the phone. If a match is made, the app alerts the user. The “*decentralised*” system does not allow the health officials to see the entire network of potentially infected contacts. This design is considered less prone to abuse or hacking.

Figure 5 shows that respondents prefer a decentralised to a centralised system. An 18% share would definitely install a decentralised app, whereas the share is reduced to 12 % for centralised apps. Summing the two categories “definitely install” and “probably install”, support for centralised and decentralised apps stand at 42% and 56% of respondents, respectively. This is lower than the corresponding 72% willingness to install a digital contact tracing, which was reported when the question did not specify any technical details of the app.<sup>13</sup>

Thus, survey results suggest that technical features linked to privacy influence the intentions to install the app. This is an indication that privacy concerns could at least partly explain the discrepancy between intentions and observed installation behaviours in European countries.

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applications should be voluntary and should not rely on tracing individual movements but rather on proximity information regarding users.

[https://edpb.europa.eu/sites/edpb/files/files/file1/edpb\\_guidelines\\_20200420\\_contact\\_tracing\\_covid\\_with\\_a\\_nnex\\_en.pdf](https://edpb.europa.eu/sites/edpb/files/files/file1/edpb_guidelines_20200420_contact_tracing_covid_with_a_nnex_en.pdf)

<sup>13</sup> Note that centralized and decentralized designs are the subjects of two different questions. These questions have been administered only for Luxembourg.

Figure 5 A centralised vs a de-centralised app.



Source: Authors' calculations on data from the APPRECIATE survey, July-August 2020.

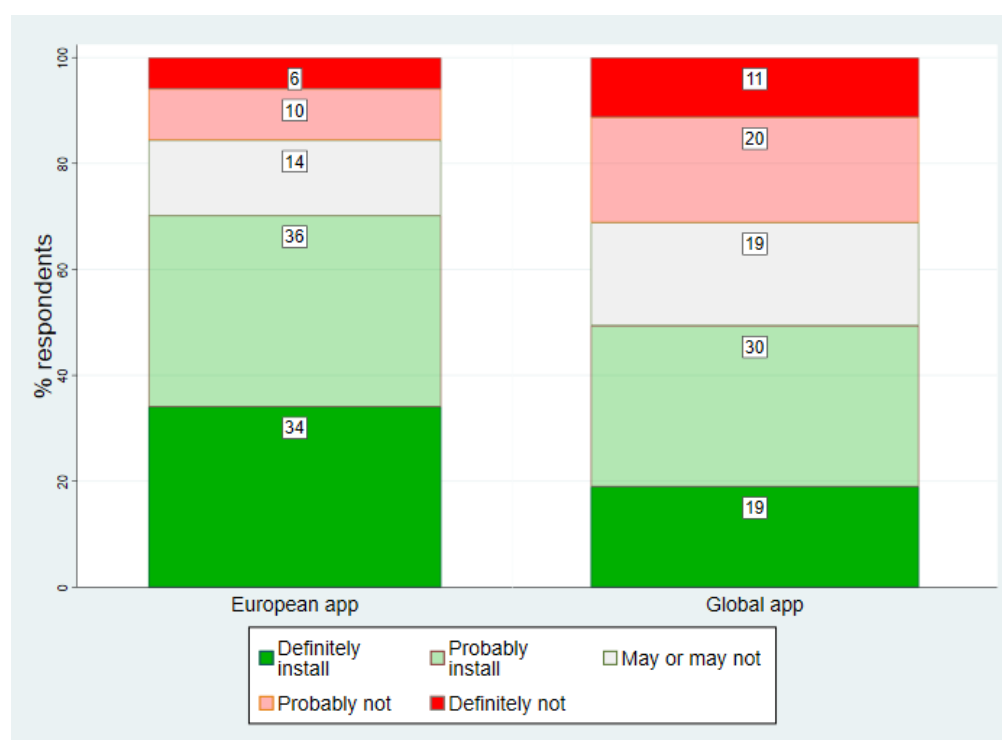
### Respondents prefer European apps to global apps.

Apps that operate across countries, also known as interoperable apps, might do a better job at reducing virus diffusion. This is especially true in countries characterised by higher population mobility and cross-border movements, the case of Luxembourg. Currently, there is no app that works in all European countries, although the German, Italian, and Irish tracing apps have been interoperable since the 19<sup>th</sup> of October. Becoming interoperable was made possible through the gateway service of the European Commission for decentralised apps and there are plans to extend this service to other countries in the future.<sup>14</sup> Interoperable apps are controversial as personal data must be shared across countries.

In Luxembourg, 34% of respondents would definitely install a European app, and 19% would definitely install a global interoperable app, as shown Figure 6.

<sup>14</sup>[https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/travel-during-coronavirus-pandemic/how-tracing-and-warning-apps-can-help-during-pandemic\\_en](https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/travel-during-coronavirus-pandemic/how-tracing-and-warning-apps-can-help-during-pandemic_en)

Figure 6 European vs. global apps.



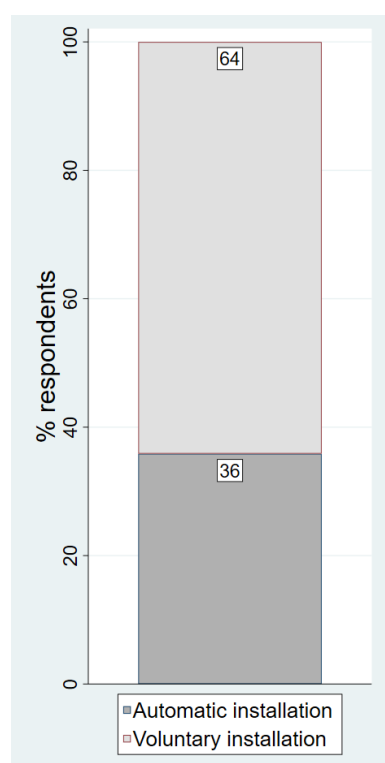
Source: Authors' calculations using data from the APPRECIATE survey, July-August 2020. July-August 2020.

### *Respondents prefer a voluntary installation regime.*

*In terms of installation regime, the options available to health authorities are a voluntary against an automatic installation regime. In the automatic installation regime, the app is pre-installed on the mobile phone by mobile providers, and the user has an option to uninstall it. In the voluntary regime, the user can choose whether or not to install the app. The latter approach, however, can lead to a substantially lower uptake than automatic installation.*

Figure 6Figure 7 shows that 64 % of respondents declared they preferred the voluntary regime, compared to 36 % that preferred automatic installation.

*Figure 7 Voluntary vs Automatic app installation.*

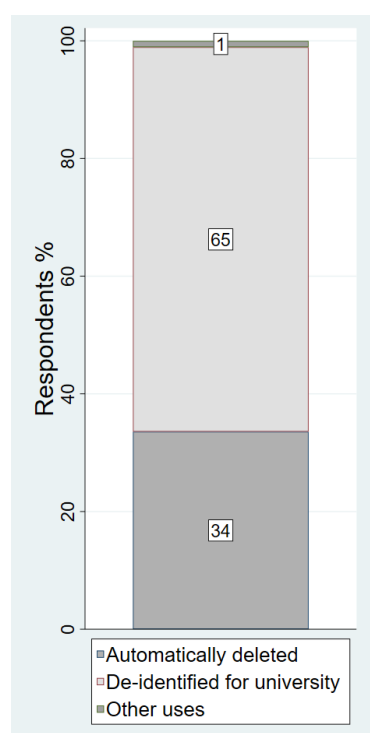


*Source: Authors' calculations using data from the APPRECIATE survey, July-August 2020.*

### ***Respondents prefer data to be used for research.***

At the end of the epidemic, a decision would need to be made about what to do with the data collected. Figure 8 shows that 65 % of respondents prefer that all data will be anonymized and made available to researchers to prepare for future epidemics. This result is consistent with the work by Altmann and colleagues (2020, pag. 37), who found that 60% of the respondents agreed that the data should be made available to researchers. The authors explain this finding with the sense of responsibility towards the community that motivates the installation of the app (see also Figure 4). It is important to note that the 34 % of respondents would prefer to delete all data, probably due to privacy concerns.

Figure 8 Use of data at the end of the pandemic



Source: Authors' calculations using data from the APPRECIATE survey, July-August 2020.

## 5. Conclusions

Results from a nationally representative survey conducted in Luxembourg during summer 2020 show widespread public support for an app-based contact tracing of COVID-19; 72% of respondents declared they would probably or definitely install the app. Respondents are in favour of apps that: operate across borders and in Europe, can be installed on a voluntary basis, and store data on the users' mobile device rather than on a central server. It is plausible that privacy concerns explain at least part of the discrepancy between declared support and observed low installation rates when an app is implemented. Our results further indicate that a strong motivating factor for installing the app is the sense of responsibility towards the community.

From a methodological point of view, the research constructs and exploits only probability-based online panel available in Luxembourg to collect data from a representative sample of residents in Luxembourg. This panel can be used to collect timely data in the future, thereby improving the resilience of STATEC and of the Luxembourgish research community to unpredictable and new events that could otherwise disrupt the usual stream of data collection and elaboration.

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## 7. Appendix

### Questionnaire 1<sup>st</sup> wave APPRECIATE

Smartphone Do you use a smartphone for private purposes?

- ☐ Yes (1)
- ☐ No (2)

*Skip To: question 20 If Smartphone = No*

description1 The current coronavirus epidemic (“COVID-19”) is all over the news. People can get infected if they are in close contact with someone who has the virus. People do not notice when they get infected. They only notice when they start having a fever or a cough, perhaps a week later. In many countries, an app that you could install on your mobile phone is available. This app automatically alerts you if you had been in close contact with someone who has been diagnosed with the coronavirus. We, researchers from STATEC Research, are interested in understanding what you would think about such an app. The next pages explain how such an app could work and will ask comprehension questions.

description2 If such an app were available, you would need to install the app by simply clicking a link. Once installed, the app registers which other users are close to you. The app would do this by assigning anonymous random identifier to each user and by using Bluetooth. Therefore, upon installation you would give permission for the app to use Bluetooth. The app would NOT access your location, contacts, photos or other data held on your phone. Only the health authorities in Luxembourg would have access to the data collected.

comprehension1 **Comprehension check:** What permission would you need to give the app?

- ☐ Permission to use Bluetooth (1)
- ☐ Permission to access my photos (2)
- ☐ Permission to access my WhatsApp contacts (3)



Display This Question:

If comprehension1 = Permission to access my photos

Or comprehension1 = Permission to access my WhatsApp contacts

Explain1 Actually, the correct answer to the question is "*Permission to use Bluetooth*"

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description3 If the health authorities diagnose the coronavirus in somebody you have been in close contact with, the app would notify you automatically. The app would give you advice on what to do. It will ask you to self-isolate at home for 15 days or until you have been tested for the virus. This would be useful since people can infect others even before they have a fever or a cough. Self-isolating would thus protect your family, friends and colleagues from being infected by you. At the same time, only people who were in contact with an infected person would need to self-isolate. If you had not been in close contact with a confirmed case, then the app would show you an "all clear" message.

comprehension2 **Comprehension check:** What would the app do if you were found to have been in contact with someone diagnosed with coronavirus?

- ☐ Ask me to self-isolate (1)
- ☐ Give me an "all clear" message (2)
- ☐ Tell me the name of the person who was diagnosed (3)

Display This Question:

If comprehension2 = Give me an "all clear" message

Or comprehension2 = Tell me the name of the person who was diagnosed

Explain2 Actually, the correct answer is "*Ask me to self-isolate*"

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End of Block: App Description & Comprehension 2

Start of Block: App Description & Comprehension 3

description4 If you are diagnosed with coronavirus, the app would notify all people you have been in close contact with, without identifying you to them, and advise them to self-isolate. This would increase the chance of finding all the people you might have infected and help make sure they can keep their loved ones safe as well. If enough people use the app, it will slow down the epidemic and might even stop it entirely.

comprehension3 **Comprehension check:** What would the app do if you were diagnosed with the coronavirus?

- ☐ Give my name and address to all people I have been in close contact with (1)
- ☐ Advise all people I have been in close contact with to self-isolate (2)
- ☐ Shut down my phone (3)

Display This Question:

*If comprehension3 = Give my name and address to all people I have been in close contact with  
Or comprehension3 = Shut down my phone*

Explain3 Actually, the correct answer is "*Advise all people I have been in close contact with to self-isolate*"

install\_app How likely would you be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
- ☐ Probably install (2)
- ☐ May or may not install (3)
- ☐ Probably won't install (4)
- ☐ Definitely won't install (5)
- ☐ I already have installed an app (e.g. Corona Warn) (100)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

☐ Skip To: question 20 If Install App= 1

main\_quest\_intro

**For the following questions, please consider the app described before.**

reasons\_for\_inst What would be your main reasons for installing the app (you may click up to five)?

- ☐ It would help me stay healthy (1)
  - ☐ It would let me know my risk of being infected (2)
  - ☐ Seeing the "all clear" message would give me peace of mind (3)
  - ☐ It would protect my family and friends (4)
  - ☐ It would help reduce the number of deaths among older people (5)
  - ☐ A sense of responsibility to the wider community (6)
  - ☐ It might stop the epidemic (7)
  - ☐ It can increase my freedom of movement or travelling (9)
  - ☐ Other (please indicate in the field below): (8)
-

reasons\_against\_inst What would be your main reasons **against** installing the app (you may click up to five)?

- ☐ The app would be too much hassle to install (1)
  - ☐ I would not benefit from the app (2)
  - ☐ I don't want the health authorities to have access to my data (3)
  - ☐ I won't be infected anyway (4)
  - ☐ I worry the government would use this as an excuse for greater surveillance after the epidemic (5)
  - ☐ I don't want to feel more anxious than I already feel (6)
  - ☐ I worry that my phone will be more likely to get hacked (7)
  - ☐ I fear I can be asked to self-isolate without valid reason (9)
  - ☐ I worry that the app would use too much battery (10)
  - ☐ I worry that the app would use too much data storage (11)
  - ☐ Other (please indicate in the field below): (8)
- 

comply\_isolatio How likely would you be to comply with the recommendation of the app to self-isolate at home for 15 days if you had been in close contact with an infected person?

- ☐ Definitely comply (1)
- ☐ Probably comply (2)
- ☐ May or may not comply (3)
- ☐ Probably won't comply (4)
- ☐ Definitely won't comply (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

comply\_test Would you be more, or less, likely to comply with the advice to self-isolate for 15 days if the health authorities committed to test you for the virus within 2 days from the start of your self-isolation? If you tested negative, you could stop self-isolating immediately.

- ☐ More likely (1)
- ☐ Equally likely (2)
- ☐ Less likely (3)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

inform\_test If you are diagnosed with coronavirus, the app needs your explicit consent to share this information and advise all people you have been in close contact with to self-isolate. This is done without identifying you to them. If you are diagnosed with coronavirus, how likely would you be to share this information?

- ☐ Definitely allow to share (1)
- ☐ Probably allow to share (2)
- ☐ May or may not allow to share (3)
- ☐ Probably won't allow to share (4)
- ☐ Definitely won't allow to share (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

Display Question 11 :

If install\_app != Definitely install

deathnum\_intro Many people in Luxembourg worry about the effect of the virus on their community and on their family and friends.

install\_app\_commun Suppose *someone in your community* had been infected with the virus. How likely would you then be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
- ☐ Probably install (2)
- ☐ May or may not install (3)
- ☐ Probably won't install (4)
- ☐ Definitely won't install (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

Display Question 12 :

*If question 11 install\_app\_commun != Definitely install*

install\_app\_personal Suppose *someone you personally know* had been infected with the virus. How likely would you then be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
- ☐ Probably install (2)
- ☐ May or may not install (3)
- ☐ Probably won't install (4)
- ☐ Definitely won't install (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

lockdown\_intro Imagine there is another outbreak and government reintroduces the restrictions of the past lockdown. Imagine that these restrictions would be lifted for those people for whom the app showed an “all clear” message.

install\_app\_ld In this situation, how likely would you be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
  - ☐ Probably install (2)
  - ☐ May or may not install (3)
  - ☐ Probably won't install (4)
  - ☐ Definitely won't install (5)
  - ☐ Don't know (98)
  - ☐ Prefer not to say (99)
- 

Design\_intro Health authorities are implementing different technological solutions across Europe for the app. Each design has advantages and disadvantages. We would like to better understand your preferences.

Installation\_volunta Which of the two app installation regimes would you prefer?

- ☐ Voluntary installation (1)
- ☐ Automatic installation from the mobile providers (with an option to uninstall) (2)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

Intro\_EU There is an app that communicates with the apps of other **European countries**. This requires data sharing between countries but may increase the effectiveness of the app.

install\_app\_EU In this situation, how likely would you be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
- ☐ Probably install (2)
- ☐ May or may not install (3)
- ☐ Probably won't install (4)
- ☐ Definitely won't install (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

Intro\_world There is an app that communicates with the apps of other countries **worldwide**. This requires data sharing between countries beyond European Union but may increase the effectiveness of the app.



Install\_app\_world In this situation, how likely would you be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
- ☐ Probably install (2)
- ☐ May or may not install (3)
- ☐ Probably won't install (4)
- ☐ Definitely won't install (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

Intro\_centra There is an app A that allows the health officials to see the entire network of potentially infected contacts, thus increasing the chances of stopping the epidemic. All data are anonymized. However, there are risks for the privacy in case of abuse or hacking.

Install\_app\_centra In this situation, how likely would you be to install, or not install, the app on your phone?

- ☐ Definitely install (4)
- ☐ Probably install (5)
- ☐ May or may not install (6)
- ☐ Probably won't install (7)
- ☐ Definitely won't install (8)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

Intro\_decentra Imagine an app B that does not allow the health officials to see the entire network of potentially infected contacts, thus it is less effective than app A in stopping the epidemic. However, the risks for the privacy are lower in case of abuse or hacking.

install\_app\_decentra In this situation, how likely would you be to install, or not install, the app on your phone?

- ☐ Definitely install (1)
- ☐ Probably install (2)

- ☐ May or may not install (3)
- ☐ Probably won't install (4)
- ☐ Definitely won't install (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

data\_usage At the end of the epidemic, a decision would need to be made about what to do with the data collected. Which of the following policies would you prefer?

- ☐ All data will be automatically deleted at the end of the epidemic and not used for any other purpose (1)
- ☐ All data will be de-identified and made available to university researchers to prepare for future epidemics (2)
- ☐ All data will be de-identified and made available to private companies to prepare for future epidemics (3)
- ☐ Other (please indicate in the field below) (4)

- 
- ☐ Don't know (98)
  - ☐ Prefer not to say (99)

age How old are you?

- ☐ 18-30 (1)
- ☐ 31-40 (2)
- ☐ 41-50 (3)
- ☐ 51-60 (4)
- ☐ 61-70 (5)
- ☐ 71-80 (6)
- ☐ Older than 80 (7)
- ☐ Prefer not to say (99)

female What is your gender?

- ☐ Female (1)
- ☐ Male (2)
- ☐ Other (3)
- ☐ Prefer not to say (99)

region Where do you currently reside?

- ☐ Chapellen (1)
- ☐ Clervaux (2)
- ☐ Diekirch (3)
- ☐ Echternach (4)
- ☐ Esch-sur-Alzette (5)
- ☐ Grevenmacher (6)
- ☐ Luxembourg (7)
- ☐ Mersch (8)
- ☐ Redange (9)
- ☐ Remich (10)

- ☐ Vianden (11)
- ☐ Wiltz (12)
- ☐ Other (13) \_\_\_\_\_
- ☐ Prefer not to say (99)

country\_birth Where were you born?

- ☐ Luxembourg (1)
- ☐ Portugal (2)
- ☐ France (3)
- ☐ Other countries in the European Union (4)
- ☐ Other countries (5)
- ☐ Prefer not to say (99)

socialize How often are you currently in close contact with people outside of your household, for example, at work or while getting groceries, working out, etc.?

- ☐ Not more than once per week (1)
- ☐ A few times per week (2)
- ☐ A few times per day (3)
- ☐ Many times per day (4)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

med\_condition How is your health in general?

- ☐ Very good (1)
- ☐ Good (2)
- ☐ Fair (4)

- ☐ Bad (5)
- ☐ Very bad (6)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

med\_condition\_others Do you personally know someone that has been infected with the virus?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

productivity\_at\_home How much work/study would you be able to do from home, e.g., over the phone or the internet?

- ☐ None of my normal work (1)
- ☐ About a quarter of my normal work (2)
- ☐ About half of my normal work (3)
- ☐ About three quarters of my normal work (4)
- ☐ All of my normal work (5)
- ☐ I do not work or study (6)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

sick\_pay\_at\_home Would you receive sick pay or continue to receive your income if you stayed and worked from home?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Don't know (3)

☐ Prefer not to say (4)

party\_preference In political matters, people talk about 'the left' and 'the right'. How would you place your views on this scale, generally speaking?

☐ 1 (Left) (1)

☐ 2 (2)

☐ 3 (3)

☐ 4 (4)

☐ 5 (5)

☐ 6 (6)

☐ 7 (7)

☐ 8 (8)

☐ 9 (9)

☐ 10 (Right) (10)

☐ Don't know (98)

☐ Don't want to say (99)

trust\_in\_government To what extent do you agree with the following statement: "I generally trust the government to do what is right."?

☐ Fully agree (1)

☐ Somewhat agree (2)

☐ Neither agree nor disagree (3)

☐ Somewhat disagree (4)

☐ Fully disagree (5)

☐ Don't know (98)

☐ Prefer not to say (99)

trust\_in\_others To what extent do you agree with the following statement: "Generally speaking, I would say that most people can be trusted"?

- ☐ Fully agree (1)
- ☐ Somewhat agree (2)
- ☐ Neither agree nor disagree (3)
- ☐ Somewhat disagree (4)
- ☐ Fully disagree (5)
- ☐ Don't know (98)
- ☐ Prefer not to say (99)

opt\_in Would you be available to be regularly invited to respond to other surveys we might be conducting in the future? If you agree to this, you can still revoke your consent at any time by sending an email to [dpo@statec.etat.lu](mailto:dpo@statec.etat.lu).

- ☐ Yes, I consent to be invited to respond to other surveys (1)
- ☐ No, I don't consent (2)

End of Block: Opt in

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Start of Block: Feedback

health\_ministry

Thank you very much!

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feedback If you have any questions or feedback, please let us know by writing them into the field below. You can also email the researchers at [enquete.app@statec.etat.lu](mailto:enquete.app@statec.etat.lu)

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finish Please click the button below to finish the survey.

End of Block: Feedback