Supplementary Material
For submission
"COVID-19 Information Tracking Solutions: A Qualitative Investigation of Tradeoffs between Benefits and Concerns"

Interview Guide
General questions:

1. How is your experience of living during this pandemic?
    a. (if not mentioned) Are you working from home? How is your experience so far?

2. Compared to your life before the pandemic, in what ways has the pandemic changed your life?
    a. (If not mentioned) What new things have you tried or learned during the pandemic?

3. What resources have you used to get information about the COVID-19 pandemic?
    a. (If not mentioned) Have you used any resources to check COVID-19 symptoms, new daily cases in your region, or stages of reopening the economy?
    b. (If applicable) What methods have you used to check if the information is reliable?

4. What challenges have you experienced during this time?
    a. (If it is true) How has technology helped you during this pandemic?

5. What information-tracking solutions do you know that is being used (maybe in other countries) during this pandemic? (e.g., applications that track reported cases, track close contacts of cases, and enforce quarantine)
    a. (If applicable) What is the name of the solution?
    b. If applicable) Why did you download the app?
    c. (If applicable) Before downloading the app, what factors did you consider?

Perceptions of the presented information-tracking solutions:
Now, I will introduce to you several information-tracking solutions that aim to slow down the spread of COVID-19 and help reopen the economy. We would like to learn your opinions on these solutions. We will talk about the solutions one by one. I will share my screen, therefore, you can read the descriptions of the solutions. Take as much time as you need. If there is a part you do not understand, please let me know.

[For each solution, we asked the following questions. We presented six solutions in total. Before each interview, the lead researcher randomized the sequences of the solutions by changing the slides in a PowerPoint file.]

6. What do you think about this solution?
7. Would you be interested in using the solution, if it were available to you? Why or why not?
8. (When not brought up by participants) If you can think of any, what benefits do you think the solution can provide?

9. (When not brought up by participants) How do you feel about this solution using your phone number/location information/selfies/name/health status/trip information/CCTV recordings/credit card transaction history?
    a. (If applicable) Why are you OK with providing this type of information?
    b. (If applicable) Why do not you want to provide your data?
    c. (If a trade-off is mentioned) Could you explain what trade-off you want to make? What makes you believe it is worth it?
    d. (If trust in the government/health authorities/technology companies was mentioned) Could you explain why do you or do you not trust them?
    e. (If not brought up by participants) Who are you comfortable with having access to your information collected by the solution?
        i. For the entities you identified, how long are you comfortable with them accessing your data? Why?
    f. (If a concern was voiced) Could you explain why you do not like the particular aspect (e.g., your location data is being collected) of the solution?
    g. Is there anything else about the presented solutions or the pandemic that you want to share with us?

Screening survey

Consent form: By clicking **Yes** below, you consent to us collecting some basic information about you such as your age. This short survey acts as a screening stage for a future interview study with the objective of understanding your perceptions of information-tracking applications during the COVID-19 pandemic.

Your responses to the questions in this survey will only be accessed by researchers associated with the study and will not be shared with any other entity. Your responses will be discarded once the interview participants are selected. Interview participants will be selected from the people who complete this survey. However, completing this survey does not guarantee you will be selected as an interview participant.

If you have any questions or would like further information, you may contact the Principal investigator, [Principal investigator] at [email address], co-investigators, [co-investigators] at [email address], and co-investigators at [email address]. Do you consent to participate in this study?

- Yes
- No

1. How old are you?
    a. Under 19
    b. 19~29
    c. 30~39
    d. 40~49
    e. 50~59
    f. 60 or above
2. What is your gender?
    a. Female
    b. Male
    c. Transgender Female
    d. Transgender Male
    e. Gender Variant/non-conforming
    f. Other
    g. Prefer not to answer
3. What is the highest degree or level of school you have completed (If currently enrolled, please select the highest degree received)?
    a. No certificate, diploma or degree
    b. High school diploma or equivalency certificate
    c. Apprenticeship or trades certificate or diploma
    d. College, CEGEP or other non-university certificate or diploma
    e. University certificate or diploma below bachelor level
    f. Bachelor's degree
    g. Master’s degree
    h. Doctorate degree
    i. Other, please be specify
4. What is your occupation?

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5. Where do you live?
    a. Canada

b. United States
c. Other
d. Prefer not to answer

6. How did you find this survey?
    a. Facebook Ad
    b. Twitter Ad
    c. Friend/Family
    d. Reddit Ad
    e. Kijiji
    f. LinkedIn Ad
    g. Our institution paid study list
    h. Others, please be specific
7. Are you using any contact tracing or exposure notification app (e.g., COVID Alert, Care19, Health Together, ABTraceTogether)?
    a. Yes, please list the app(s) you have used or are using.

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    b. No
8. Please provide your email address for researchers to contact you if you are selected for a further interview. Interviewed participants will get a compensation of $25 [currency] of Amazon digital card or via Interac.

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9. Please select the platform that is most convenient for you to use to participate in the online interview session:
    a. Skype video call
    b. Zoom video call
    c. I prefer **not** to schedule the interview **right now.** Please contact me through email later.
10. Please enter three separate time slots (Between **May 10 and August 31** and from **9:00 A.M. to 9:00 P.M.**) that best fit your schedule for approximately **one and a half hours** of the interview. Please also indicate the time zone.
    a. Time slot 1 (Your first priority): (e.g., June. 19, 10: 30 A.M. - 11: 10 A.M. PST)

    _____

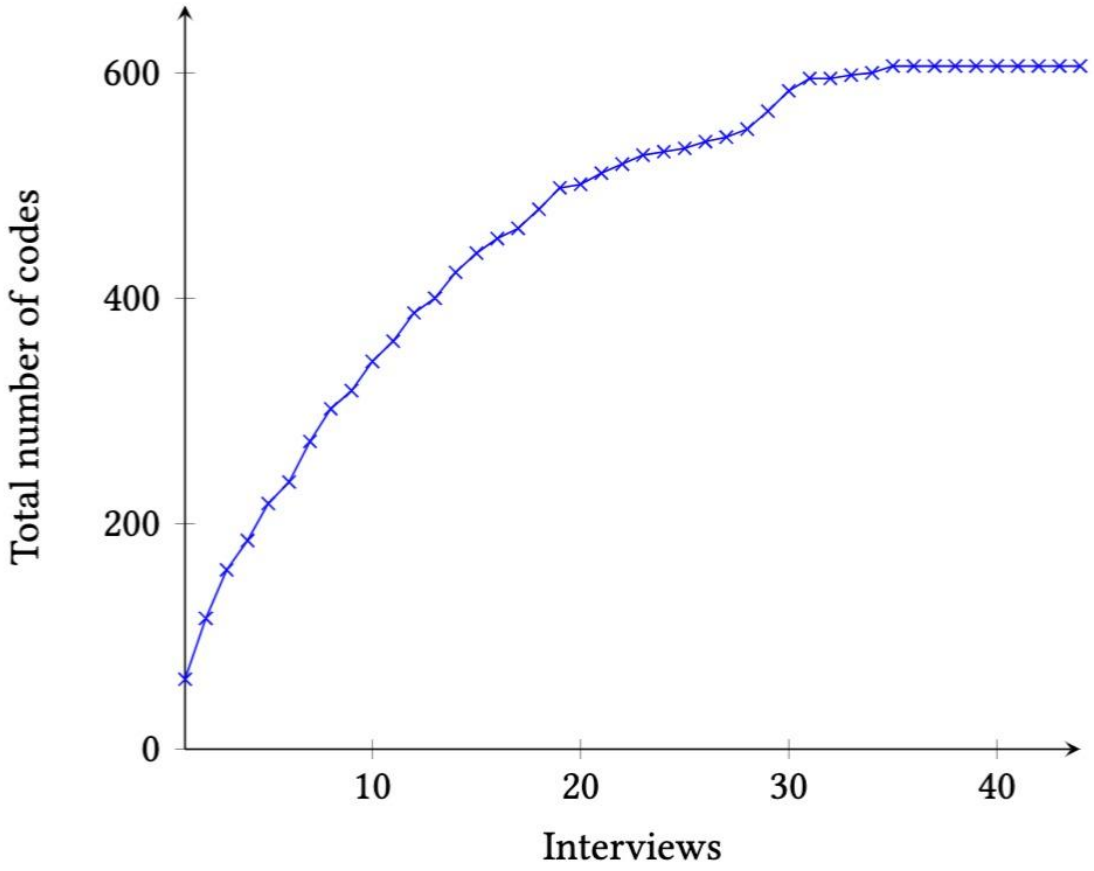
    b. Time slot 2 (Your second priority):

    _____

    c. Time slot 2 (Your second priority):

    _____

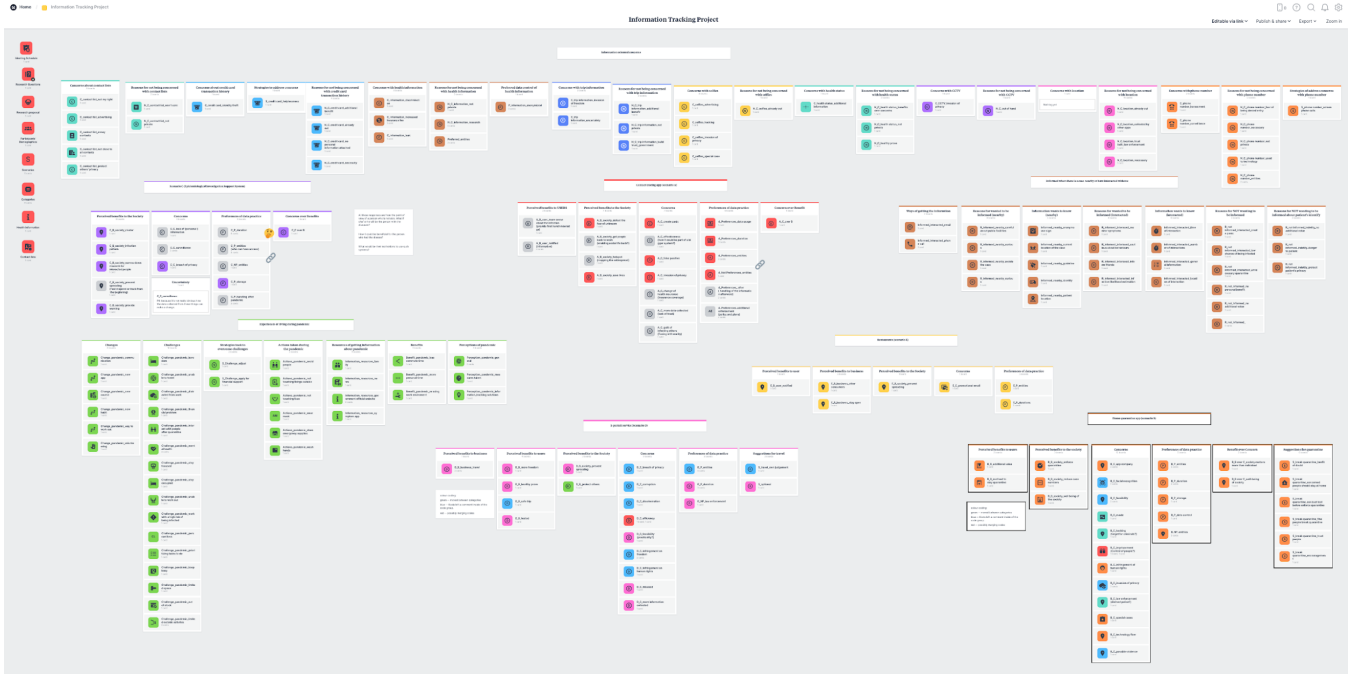
Theoretical saturation in data analysis



The total number of codes after each interview.

Codes diagram

Researchers worked online to relate codes to each other, generate categories, and select main categories.



Perceived benefits of presented solutions

Perceived main benefits	Solution Name	Perceived individual benefits	Perceived societal benefits
Provide more benefits to individual	E-permit service (*EP-svc*)	Enable traveling	Prevent the virus from spreading Enable the business stay open
	Information tracking of dine-in customers (*DineIn-sol*)	Enjoy dine-in service	
Provide benefits to both individual and society	Centralized contact tracing app (*CCT-app*) Decentralized contact tracing app (*DCT-app*)	Receive exposure notifications	Let people know of possible exposures Reducing the burden on tracers
Provide more benefits to society	Home quarantine app (*HQ-app*)	Motivate people to follow quarantine order	Prevent the virus from further spreading
	Epidemiological Investigation Support System (*EIS-sys*)	Help C-positive person recall their past activities	Offering accurate and detailed information about a C-positive person

Participants' perceived benefits of information-tracking solutions.

Participants' demographic information

P#	Age	Gender	Occupation	Education level	Experience with *DCT-app*	Experience with *DineIn-sol*	Location of the participants
1	26	M	Production assistant in film	Bachelor			Toronto, Ontario
2	20	F	Part-time at a law firm & full-time college student	High school		✓	Vancouver, British Columbia
3	43	F	Pilot	Bachelor			Dawson Creek, British Columbia
4	25	F	Digital marketing strategist	Bachelor			Victoria, British Columbia
5	29	M	Communications advisor	Bachelor	✓		Calgary, Alberta
6	26	M	General service	Bachelor			Waterloo, Ontario
7	29	M	Construction worker	Master			Burnaby, British Columbia
8	27	F	Business development advisor	PhD			Vancouver, British Columbia
9	41	Transgender M	PhD student	Master			Whitehorse, Yukon
10	24	F	Volunteer coordinator for a student's association	Bachelor			Pittsburgh, Ontario
11	30	M	Truck driver	High school			Kimberley, British Columbia
12	44	F	Charity administrator	Master			Kelowna, British Columbia
13	41	F	Stay-at-home mom	Bachelor			Lethbridge, Alberta
14	71	F	Retired textile artist	Bachelor			Calgary, Alberta
15	59	M	Project manager	Bachelor			Chilliwack, British Columbia
16	52	M	University instructor	PhD			Calgary, Alberta
17	41	M	Researcher	Community college			Victoria, British Columbia
18	45	M	IT systems administrator	Community college			Vancouver, British Columbia
19	43	F	Communications advisor	Bachelor			Montreal, Quebec
20	48	F	Nurse	Bachelor			Victoria, British Columbia
21	55	F	Human resources director	Bachelor	✓		Edmonton, Alberta
22	54	M	Worker at Canada Post	Community college			Squamish, British Columbia
23	54	M	Executive director	Master	✓		Camrose, Alberta
24	61	M	Certified financial planner	Community college			Burlington, Ontario
25	39	F	News editor	Community college	✓		Edmonton, Alberta
26	37	F	Uber driver	High school			Duncan, British Columbia
27	32	M	Business owner of a shipping company	Bachelor		✓	Vancouver, British Columbia
28	36	F	Office manager	High school			Vancouver, British Columbia
29	28	F	Actress	Community college	✓		Buffalo, Ontario
30	29	F	Accountant	Bachelor	✓		Newmarket, Ontario
31	39	M	Customer service representative	High school	✓		Quebec, Quebec
32	57	M	COVID compliance officer	Bachelor	✓		Toronto, Ontario
33	26	M	Project associate	Master	✓		Colchester County, Nova Scotia
34	62	F	Retired	Bachelor	✓		Montreal, Quebec
35	66	F	Retired	Bachelor	✓		New Maryland Parish, New Brunswick
36	19	M	Full-time university student and part-time event planner	High school	✓		London, Ontario
37	36	M	English tutor	Bachelor	✓		Montreal, Quebec
38	32	M	Administrative assistant	High school	✓		Kitchener, Ontario
39	50	F	Nurse	Bachelor	✓	✓	Kingston, Ontario
40	30	F	Unemployed	High school	✓		Winnipeg, Manitoba
41	57	M	Chief financial officer	Master	✓		Montreal, Quebec
42	30	M	Technical support	Bachelor	✓		Mono, Ontario
43	45	M	Environmental analyst	Bachelor	✓		Toronto, Ontario
44	40	M	Project manager	Bachelor	✓		Ottawa, Ontario

Summary of the participants' demographics. Symbols: ✓indicates that the participant was using a decentralized contact-tracing app when the interview was conducted/the participant had experiences with DineIn-sol before the interview.

Solution descriptions

Soln Name	Solution Description	Existing Soln that ours are based on
Home Quarantine App (*HQ-app*)	The home quarantine app is intended for people who quarantine for 14 days. Once downloaded, the app asks the user to add her phone numbers, remain in the quarantine location, and follow the instructions for uploading selfies. The app uses geolocation and facial recognition technology to verify that users remain in quarantine. The app periodically randomly requests a selfie, and the user has 20 minutes to upload one after receiving the request. Otherwise, the police pay the user a visit.	Home quarantine apps implemented in Poland [60], Moscow [88], India [97], and India [32]
Epidemiological Investig. Support System (*EIS-sys*)	The epidemiological investigation support system is designed to support tracers in quickly identifying where people diagnosed with coronavirus have traveled and what places they visited with a real-time analysis of the data such as mobile GPS information, CCTV recordings, and credit card transaction histories.	Epidemiological investigation support system used in South Korea [122] and China [67]
E-permit Service (*EP-svc*)	The e-permit service allows users to travel within the country (or abroad) through recommended routes. Users who wish to travel can send a request to the health service with their credentials to obtain health tokens. Health tokens certify users' health status, such as whether they are under quarantine or have tested positive for COVID-19. Users are required to provide the trip information, including the destination and expected date and time of the trip. Users' health tokens and trip information are used to determine whether it is safe for them to travel. If the trip is considered safe, the user is issued an electronic permit. The electronic permit can be provided to a law enforcement officer electronically to prove that the user is permitted to travel.	Digital travel permits used in Russia [8] and immunity/vaccine passport proposed by WHO [19]
Info-tracking of dine-in customers (*DineIn-sol*)	Restaurants are reopening worldwide to provide dine-in services. To enjoy meals at restaurants, customers need to provide their names, contact information, check-in and check-out times and the date that they visited a restaurant. If someone diagnosed with COVID-19 visits the restaurant, customers in the restaurant at the same time as the diagnosed person will be notified.	Check-in solutions that are implemented in Canada [47], France [64], and United States [18]
Centralized Contact-Tracing App (*CCT-app*)	A centralized contact-tracing app can let users know if they have been exposed to COVID-19. The app exchanges Bluetooth proximity data with nearby phones running the same app, which allows users to be informed if they were in physical proximity to another application user who has become infected with COVID-19. The app neither collects users' location information nor reveals users' identities. During the app setup, the only personal data collected are users' mobile numbers. If a user of this app is diagnosed with COVID-19, she will have the option to voluntarily upload the data from the app to the central server (which is usually administered by or on behalf of a public health authority). The health authorities are then responsible for matching contact details, ascertaining potential contact, and ultimately warning users of potential contact. If a user of this app has recently been in close proximity to diagnosed users, then she will be notified of the exposure via mobile phone by a tracer who works for the health services. If a user of this app is neither diagnosed with COVID-19 nor exposed to diagnosed users, then the only personal information collected is the user's mobile number upon setting up the app.	Centralized contact-tracing apps used in Alberta (ABTrace Together [44]), Singapore (TraceTogether [1]), India (Aarogya Setu [30]), United States (e.g., Crush COVID RI [92]), and Turkey (Hayat Eve Sığar [140])
Decentralized Contact-Tracing App (*DCT-app*)	A decentralized contact-tracing app can inform users if they have been exposed to COVID-19. The app exchanges Bluetooth proximity data with nearby phones running the same app, which allows users to be informed if they were in physical proximity to another application user who has become infected with COVID-19. The app neither collects users' location information nor reveals users' identities. If a user of this app is diagnosed with COVID-19, she will have the option to voluntarily supply her data from the app to a central server. Meanwhile, other users' phones continue to download the diagnosed users' data from the central server on their phones. If there is a match between diagnosed users' data (downloaded from the server) and users' locally stored data, then the user will receive an exposure notification indicating that they were had been in close contact with a diagnosed user. The notification also includes guidelines. If a user of this app is neither diagnosed with COVID-19 nor exposed to diagnosed users, the app will indicate that no exposure has been detected.	Decentralized contact-tracing apps used in Canada (COVID Alert [45]), Germany (Corona-Warn-App [130]), Switzerland (SwissCovid [29]), the United States (e.g., CA Notify [22], and Japan (COCOA [21]))

Description of information-tracking solutions.