Research in Brief

A Missed Opportunity? Making Sense of the Low Adoption Rate of *COVID Alert*, Canada's Contact-Tracing Application

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Abstract

Background: This study reflects on the low adoption rate of *COVID Alert*, the Canadian contact-tracing application, during the COVID-19 pandemic.

Analysis: Using data from two representative surveys conducted in Canada in 2020, this article examines how the application's attributes and citizens' attitudes on the sanitary crisis and on technology may have influenced the low adoption rate of *COVID Alert*.

Conclusions and implications: The results suggest that the application design was socially acceptable, that it was seen as useful, and that it was not perceived as risky or hard to use. Contrasting this evidence with the unpopularity of *COVID Alert* leads to the suggestion that the barrier to greater uptake may have partly come from the inability of its developers to effectively promote the application.

Keywords: *COVID Alert*, contact tracing, communication strategies, public opinion, COVID-19 pandemic

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Résumé

Contexte : Cette étude porte sur la faible adoption d'*Alerte COVID*, l'application canadienne d'identification des contacts, pendant la pandémie de COVID-19.

Analyse : Par le biais de données provenant de deux sondages représentatifs menés au Canada en 2020, cet article évalue comment les caractéristiques de l'application et les opinions citoyennes sur la crise sanitaire et sur les technologies ont pu avoir un impact sur ce faible taux d'adoption.

Conclusions et implications : Les résultats suggèrent que les caractéristiques d'*Alerte COVID* étaient socialement acceptables, qu'on reconnaissait une certaine utilité à cette application, et qu'on ne percevait pas celle-ci comme étant risquée ou difficile à utiliser. Ces constats nous amènent à suggérer qu'une partie importante du problème résiderait peut-être dans l'incapacité des élites politiques et sanitaires à promouvoir cette application de manière efficace.

Mots clés : *Alerte COVID*, traçage numérique, stratégies de communication, opinion publique, pandémie de COVID-19

Introduction

For the past three years, the first pandemic of the digital era has been raging on. Governments had to deploy appropriate response measures early on, despite having minimal knowledge about the novel coronavirus. Early evidence of widespread pre-symptomatic transmission and short-generation times (Bai, Yao, Wei, Tian, Jin, Chen et al., 2020; He, Lau, Wu, Deng, Wang, Hao et al., 2020) highlighted the need for innovative solutions. Contact-tracing applications (CTAs) were presented by an influential modelling study as a particularly promising solution (Ferretti, Wymant, Kendall, Zhao, Nurtay, Abeler-Dörner, Parker, Bonsall, & Fraser, 2020). Designed to harness the personal data generated by mobile phone users, CTAs were seen as having ground-breaking potential to prevent transmission. However, their effectiveness was dependant on a broad uptake by the public, with a minimal adoption rate estimated at 60 percent (Ferretti et al., 2020; Hinch, Probert, Nurtay et al., 2020). Reaching this threshold requires either coercion or high social acceptance.

The Canadian government, like many others, went with the second option. A Canadian CTA named *COVID Alert*[1] was launched on July 3, 2020, and has since been retired. The opt-in application used Bluetooth to exchange random codes between the user's phone and other nearby phones that had the application installed. When a user tested positive, they had to manually inform the application of the diagnosis. All other users who spent 15 minutes or longer within two metres of the infected user in the past days were then notified that they had been exposed and were given instructions on what to do

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next. The application was designed with privacy in mind, as it did not use GPS, did not track the user's location, and anonymized the users' data.

COVID Alert has since been labelled a "dismal and expensive failure," (e.g., Bonokoski, 2021), having been downloaded by "only" 6.4 million Canadians—roughly a fifth of the country's adult population. The low-adoption rate is disappointing considering results from a recent study show that provinces where the app was more popular showed higher ratios of averted cases and deaths (Sun, Shaw, Moodie, & Ruths, 2022). Recognizing that public acceptance is crucial to the roll-out and continued use of CTAs in terms of ethics (Morley, Cowls, Taddeo, & Floridi, 2020) and effectiveness (Ferretti et al., 2020; Walrave, Waeterloos, & Ponnet, 2021), this article aims to systematically assess the following research questions:

1. Could *COVID Alert*'s low adoption rate be explained by unpopular design choices?
2. Can *COVID Alert*'s low adoption rate be explained by citizens' perceptions of technology and the pandemic?

To the best of our knowledge, these questions have yet to be systematically examined in the Canadian context. Most empirical studies interested in the public acceptance of CTA were conducted in Europe and highlight significant variance across cultural contexts (Zetterholm, Lin, & Jokela, 2021). Leaning on insights gleaned from the literature on social acceptability and on the technology acceptance model (TAM), this article seeks to answer these research questions using data from two representative surveys conducted during the summer of 2020 as part of a broader research project on the social acceptability of artificial intelligence. One survey included questions on issues related to the pandemic, technology, and political attitudes. The other featured a conjoint analysis experiment evaluating how a CTA's own attributes might influence its social acceptability.

The results suggest that *COVID Alert*'s attributes were mostly socially acceptable to Canadians and offer no compelling evidence supporting problems pertaining to the utility, risk of use, and ease of use of the application. Hence, they imply that the low adoption rate of *COVID Alert* is attributable to other factors. Looking at key communication metrics for an alternate explanation leads to the suggestion that a part of the problem might have stemmed from an insufficient communication strategy during the deployment of the application,

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which failed to promote a solution that could have become a key part of Canada's fight against the pandemic. Faced with the possibility that new and more contagious viruses may spread in the future, the low penetration of CTA is disappointing considering its demonstrated effectiveness (Sun et al., 2022). With new mutations and the potential of new pathogens to spread globally, continuing research on CTA is of great importance.

Acceptability, acceptance, and diffusion of technologies

In recent decades, public and private projects have been increasingly challenged by civil society actors. This contestation is a result of two opposing "ideals" clashing (Gendron, 2014). On one side is a citizen-driven, horizontal conceptualization of social acceptability, in which the cost–benefit assessments of political decisions and major societal projects must be subjected to legitimate debate among civil society. This perspective assumes that citizens have the wherewithal to solicit an expertise capable of competing with official discourses (Bonneuil, 2006; van der Sluijs, Douguet, O'Connor, Pereira, Quintana, Maxim, & Ravetz, 2008). On the other side of the spectrum resides an elite-driven and vertical interpretation of social acceptance, in which the treatment of risk must rest in the hands of specialists who have the expertise to evaluate risk objectively and to recommend optimal measures to reduce it. Citizens are perceived as being more concerned with the impact a technology is likely to have on their own well-being than by its technical dimensions or collective interest (Krause, Carley, Warren, Rupp, & Graham, 2014). These opposing perceptions are thought to be corrected by communication campaigns designed by political and scientific elites.

Complex questions emerge from the interstitial space between these ideals: who can decide a given risk is worth taking? Which expertise should inform the decision? These questions become more topical regarding COVID-related CTAs, whose usefulness hinges on mass adoption by citizens. From a theoretical perspective—and from a purely top-down approach—the most efficient CTA would be mandatory, would identify the user, and would automatically notify users of positive tests. However, such attributes imply substantial challenges in terms of privacy, personal liberties, and social acceptability. The importance of respecting citizens' preference in designing a CTA becomes even more crucial when the installation and usage is voluntary, as was the case for the *COVID Alert* app.

In a scoping review describing the current knowledge about public acceptance of CTA, My Villius Zetterholm, Yanqing Lin, and Päivi

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Jokela (2021) observe that cultural background is typically associated with a varying acceptance of tracking technologies. Indeed, CTA uptake during the pandemic ranged from over 80 percent in Asian countries to less than 40 percent in European countries (2021). Across the 25 studies included in Zetterholm et al.'s review, none describes the Canadian case—a gap this article is intent on filling. The authors expect social acceptance of CTAs to be fairly low, in line with other Western democracies.

Conversely, research on the social acceptance of CTAs has revealed similar patterns across countries. Individual sociodemographic characteristics have been shown to influence support for CTAs, with age, education, and income generally being correlated with higher acceptance of CTAs (Abuhammad, Khabour, & Alzoubi, 2020; Kostka & Habich-Sobiegalla, 2022; Munzert, Selb, Gohdes, Stoetzer, & Lowe, 2021; von Wyl, Höglinger, Sieber, Kaufmann, Moser, Serra-Burriel et al., 2021). Eight other categories of factors have also been investigated: (1) trust, (2) privacy concerns, (3) social responsibility, (4) perceived health threat, (5) experience and access to technologies, (6) performance expectancy and perceived benefits, (7) understanding of technology, and (8) the intent-action gap (see Zetterholm et al., 2021).

Many of these factors have conceptual roots in constructs of theoretical models explaining the diffusion and acceptance of innovations. Perceived health threats, performance expectancy, and perceived benefits can be mapped with perceived usefulness found in the technology acceptance model (TAM). Similarly, privacy concerns, experience, and accessibility are all conceptually part of the ease-of-use and risk-of-use constructs of the TAM (see King & He, 2006, for a meta-analysis of previous research).

By now, privacy concerns and related perceptions of data security have been proven to be critical factors in various cultural contexts (Altmann, Milsom, Zillessen, Blasone, Gerdon, Bach et al., 2020; Sharma, Singh, Sharma, Jones, Kraus, & Dwivedi, 2020; Zimmermann, Fiske, Prainsack, Hangel, McLennan, & Buyx, 2021). However, users tend to have difficulties fully understanding how different technical design choices might affect privacy and security (Simko, Chang, Jiang, Calo, Roesner, & Kohno, 2022). They also tend to have misconceptions about the underlying technology or its immediate benefits. For example, Rae Thomas, Zoe Michaleff, Hannah Greenwood, Eman Abukmail, and Paul Glasziou (2020) show that about three-quarters (72%) of their Australian respondents believed that

the CTA could warn them in real time when infected users were nearby. In another study in the United Kingdom, a common misconception posited that CTAs could provide users with a map of active infections in their surroundings (Williams, Armitage, Tampe, & Dienes, 2021). These examples suggest a need to explore more thoroughly how technological competencies and opinions could influence support for CTAs. Some studies have started doing so. Self-efficacy (Walrave, Waeterloos, & Ponnet, 2020; Sharma et al., 2020; Kaspar, 2020), personal capacity (Kostka & Habich-Sobiegalla, 2022), and technology readiness (Li, Cobb, Yang, Baviskar, Agarwal, Li et al., 2021) all tend to be positively linked with support for CTAs. In line with those findings, the authors expect affinity with technologies and digital sophistication to be positively correlated with support for CTAs:

H1: Technophilia will increase support for CTAs.

H2: Digital sophistication will increase support for CTAs.

The literature presents mixed conclusions about how perceptions of the severity of the health risks posed by the coronavirus influence support for CTAs. Some results suggest that people not worried by COVID-19 had a lower intention of using a CTA (Kostka & Habich-Sobiegalla, 2022; Munzert et al., 2021), while others showed no relation between the two variables (Kaspar, 2020). Feelings of anxiety and aversion to information about infections have also been presented as barriers to adoption for some individuals (Altmann et al., 2020; Thomas et al., 2020). Finally, having underlying health issues or personally knowing someone who was infected with COVID-19 (Munzert et al., 2020) are both associated with a lower probability of supporting CTAs. We interpret those results as an invitation to investigate further the linkage between the perceptions of the severity of the pandemic and support for CTAs. As health risks have been minimized by various actors during the pandemic (Tagliabue, Galassi, & Mariani, 2020; Montagni, Ouazzani-Touhami, Mebarki, & Texier, 2021), it is logical to assume that a significant proportion of the population will be dismissive about the severity of the situation and, hence, less likely to perceive CTAs as useful:

H3: Perceiving the pandemic as a threat will increase support for CTAs.

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Data collection

The data used to examine the social acceptability of contact-tracing applications comes from two internet surveys collected during the summer of 2020 by the Canadian firm Synopsis. Each wave includes a representative sample of 2,500 Canadians adults, weighted on age, province of residence, and household size. The first survey, which was conducted online between May 28 and June 4, 2020, includes various questions tapping attitudes on the pandemic, CTAs, artificial intelligence, and digital literacy. The aim of this first survey was exploratory and general as it was trying to uncover the underlying ideological and attitudinal cleavages structuring views on different pandemic-related issues and, more broadly, on the social acceptance of artificial intelligence. The results from the preliminary analyses of this first survey allowed the authors of this article to narrow the research scope and launch a second internet survey with the same firm and the same number of respondents (n = 2,500). This second survey was conducted online between July 15 and 20, 2020, and coincided with a period in which Canadian political elites were debating the appropriateness of contact-tracing applications to address the imminent second wave of the pandemic. The shorter questionnaire and the saliency of the CTA issue prompted the inclusion of a conjoint experiment design to explore more thoroughly the independent impact of each CTA's attributes on citizens' attitudes.

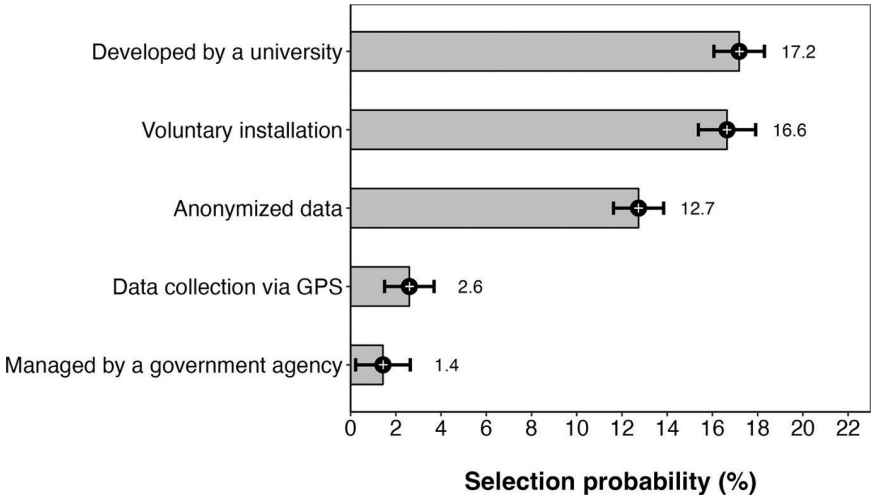
Assessing *COVID Alert* design choices

First, this article examines how CTAs' intrinsic attributes influence their social acceptability using a conjoint analysis, a technique that breaks a product or concept down into its attributes, and then tests different combinations to identify the respondents' preferences. Five broad categories were investigated:

1. Development: private enterprise or university
2. Data: anonymous or non-anonymous
3. Collection: via Bluetooth or via GPS
4. Installation: mandatory or voluntary
5. Management: government agency or non-profit organization

From this list, 32 profiles can be built. Each includes one attribute per category (five in total) and differs from the other options by at least one attribute. Two profiles, randomly selected from the 32 options,

Figure 1: Marginal effect of CTAs' attributes on preference



Data: Synopsis, collected between July 15 and 20, 2020. n = 2,500.
Note: The values in this figure are from a conjoint experiment and reveal the estimated effect of attributes randomly presented to respondents on the likelihood of preferring either of the two CTAs. The estimates are based on regression estimators with grouped standard errors. Error bars were calculated at a 95% confidence interval. The resulting coefficients can be interpreted in terms of probability (Hainmueller, Hopkins, & Yamamoto, 2014).

were presented to each respondent in relation to the following question: "Please carefully read the descriptions of two cellular applications presented to you. In your opinion, which of these two applications is the most acceptable?"

Figure 1 illustrates the marginal effect for all categories. In other words, they display the probability of selecting a CTA in every way similar, except for the category in question. The upper band reveals that an application developed by a university team is more socially acceptable (by 17.18 percentage points) than one developed by a private enterprise. The finding is original, but its real-world utility is limited by the fact that most CTAs were developed by governmental agencies rather than by private enterprise.

Figure 1 also shows that a CTA's social acceptability jumps by 16.6 percentage points if its installation is voluntary rather than mandatory. This result matches findings from previous studies that identify fears of government surveillance as a hindrance to the support of a COVID-related CTA (Altman et al., 2020; O'Callaghan, Buckley, Fitzgerald, Johnson, Laffey, McNicholas et al., 2020). Support for CTA also jumps by 12.7 percentage points if the data extracted is anonymous, a result aligned with numerous results showing that privacy is a major driver of COVID-related CTAs' social acceptance (Hassandoust,

Akhlaghpour, & Johnston, 2021; Kaspar, 2020; Sharma et al., 2020; Thomas et al., 2020; von Wyl et al., 2021; Walrave et al., 2020).

More generally, these results allow a tentative answer to the first research question: *COVID Alert*'s low adoption rate is probably not attributable to major problems stemming from the application's attributes. All *COVID Alert*'s major design choices were socially acceptable to Canadians.

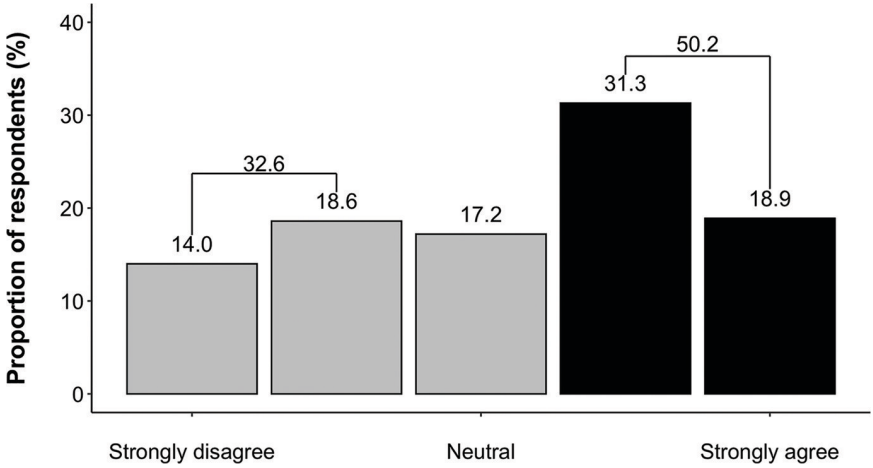
Assessing perceived usefulness

This section examines some of the factors that may explain individuals' disposition to support the imperative for people infected with COVID-19 to report their infection using CTAs. This support is measured by the adherence to the following statement, asked to respondents during the first wave of the survey: "All people infected with COVID-19 should use a tracking device to help authorities track the progress of the pandemic." While by no means a perfect indicator of the *personal* inclination to install a CTA, the indicator is useful to examine two crucial aspects of CTAs' social acceptance: its perceived usefulness and its mandatory nature. The statement is indeed reminiscent of classic questions about whether at-risk groups should be required to report their condition or undergo certain tests or treatments (see Price & Hsu's 1992 work on people living with AIDS). If people are unwilling to force a CTA on those infected by COVID-19, it is safe to assume they think the application is not useful and that it should not be forced on people—and especially not on themselves.

As shown in Figure 2, half of Canadians (50.2%) believe that people infected with COVID-19 should use a CTA to help authorities track the progress of the pandemic. About a third disagree (32.6%). To test the hypotheses, the scale is binarized to distinguish between the respondents supporting mandatory CTA (1) and those who do not, including the middle category (0).[2]

The three main independent variables are operationalized as multi-item scales. Expecting people with negative views toward technology to be less supportive of CTAs (H1), the authors measured technophobia—a wariness toward technology—using a nine-item scale[3] (see Figure 7 in the online appendix). Expecting technological sophistication to correlate with more supportive views of CTAs (H2), the authors measured digital sophistication through a five-item scale (see Figure 8 in the online appendix). Finally, the authors expect people disregarding the severity of the pandemic to find CTAs useless and, consequently, to be less supportive of mandatory CTAs for infected people (H3). Perceptions of the severity of the sanitary crisis

Figure 2: Distribution of respondents regarding mandatory CTAs for those infected



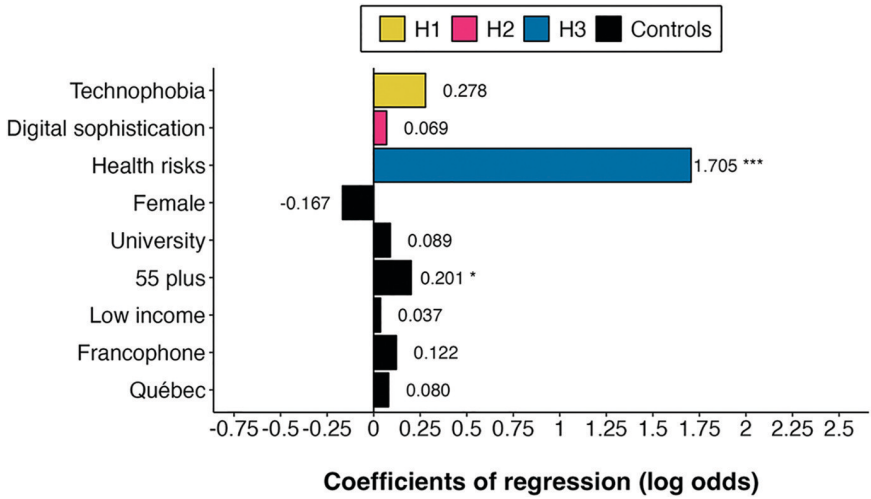
Data: Synopsis, collected between May 28 and June 4, 2020. n = 2,500.
Question formulation: All those infected by COVID-19 should be forced to use a tracking device to help authorities monitor the spread of the outbreak.

is measured through a five-item scale, where a high score indicates being fearful of the pandemic (see Figure 6 in the online appendix).

All hypotheses were tested through a binomial logistic model that includes control variables such as gender, education, age, income, language, and province of residence. Results are summarized in Figure 3, but full models can be consulted in Table 1 (online appendix). They reveal that neither the technophobia scale nor the digital sophistication scale has a significant influence on support for mandatory CTAs for those infected with COVID-19.[4] Hence, we must reject the first two hypotheses. These findings run contrary to that of similar studies conducted outside of the Canadian context (Walrave et al., 2020; Sharma et al., 2020; Kaspar, 2020; Kostka & Habich-Sobiegalla, 2022; Li et al., 2021) and call for a more thorough examination of the linkage between perceptions of technology and support for CTAs. Hence, and while recognizing that the indicators are somewhat imperfect, the authors conclude that the data does not support the idea that people were especially worried about the risk of use or the ease of use of CTAs.

However, the evidence demonstrates, in accordance with the third hypothesis and with many previous studies (Altmann et al., 2020; Kostka & Habich-Sobiegalla, 2022; Munzert et al., 2021; Walrave et al., 2020; Riillo, Peroni, & Sarracino, 2020), that citizens' perceptions of the health risks associated with COVID-19 are strongly correlated with the likelihood of supporting a mandatory CTA for

Figure 3: Influence of technophobia, digital sophistication, and health risks on support for CTAs



Data: Synopsis, collected between May 28 and June 4, 2020. n = 2,500.
Method: Binomial logistic regression.
Note: 300 respondents are excluded from the analysis because of missing answers to some of the questions.

citizens infected with COVID-19. Individuals who believe that the pandemic is out of control are much more likely to express support for a mandatory CTA. The predicted probability of supporting CTAs for the infected jumps by 38 percent compared with someone with the opposite view, all other characteristics being equal. This is a sign that a significant portion of the population recognized the usefulness of CTAs in limiting the spread of COVID-19.

Searching for an alternative explanation

Hence, the evidence leads to a conundrum. Results from the conjoint analysis show that *COVID Alert* was almost optimally designed to maximize its social acceptability: administered by a credible actor, respectful of its users' privacy, and optional. Results from the first wave of the survey offer no compelling argument to support the idea that *COVID Alert* was perceived as risky, difficult to use, or unhelpful in fighting the pandemic. As the fault seems to lie neither in the application itself nor in citizens' perceptions, the authors suggest that a likely culprit could be deficient governmental discourse. While conclusively demonstrating this claim would require a different evidence apparatus, some indirect evidence supports this interpretation. A search on *Google Trends* reveals that searches for *COVID Alert* in Canada were rare, when compared with other sanitary measures such as lockdown and face masks (Figure 4).[5]

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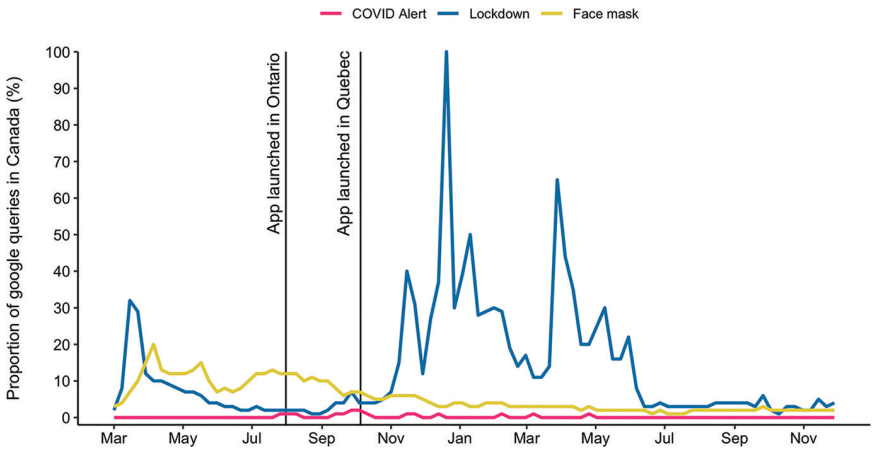
Figure 4: Google search volumes in Canada for selected sanitary measures concerning COVID-19



Data: Data collected on *Google Trends*.
Method: The results reflect the proportion of searches on a given keyword in a specific region and period, compared with the region with the highest rate of use of that keyword (value of 100). Thus, a value of 50 means that the keyword was used half as often in the region concerned, and a value of 0 means that the data for this keyword are insufficient.

Similarly, a keyword search on all articles published in the *Globe and Mail* between June 1, 2020, and October 1, 2021, reveals how little media attention *COVID Alert* was generating, with a monthly mean of four articles. In August 2020, 1,321 articles published by the newspaper mentioned COVID-19. During the same month, only 17 articles (about 1% of all articles on COVID) included a reference to *COVID Alert*. It was the peak of the media attention given to the application.

Any government monitoring public and media attention to its CTA could have concluded, based on this data, that more would have to be done to reach the 60 percent threshold needed to insure the application's effectiveness. Therefore, the authors believe that future conditions for a more widespread use of CTA include either making the application mandatory (and accepting the cost in terms of social acceptability) or investing heavily in communicating to the public how simple, safe, and useful it is and, more importantly, how it will be effective only if it is widely installed.

The second path seems even more tempting considering the results in Figure 5. Respondents were asked to rate how informed they were about digital tracing applications on a scale of 0 to 10, where 0 means not at all informed and 10 means very informed. The distribution of the responses is revealing (Figure 5). Only 6 percent of respondents felt very well informed about CTAs (scores of 9 or 10) whereas four times as many respondents (24%) felt very uninformed (scores of 0 or 1). The results of a regression analysis including this

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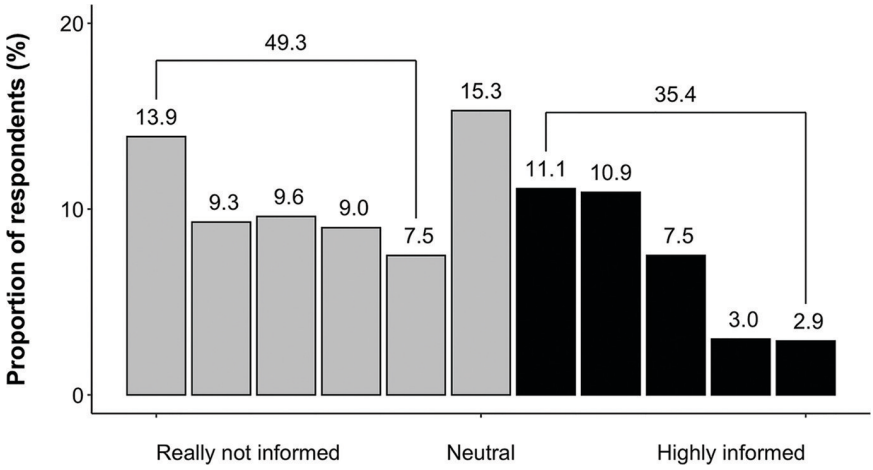
Figure 5: Self-assessed level of information about CTAs



Data: Synopsis, collected between May 28 and June 4, 2020. n = 2,500.
Question formulation: How informed about digital tracing applications would you consider yourself?

variable (see the last column of Table 1 in the online appendix) suggest that this low level of information could explain the low rate of use of the *COVID Alert* application. The results show a positive and significant relationship between the respondents' perception of their level of information about the tracking applications and their willingness to support their use. This significant coefficient, combined with the widespread feeling among respondents that they were uninformed about tracking applications, strengthen the interpretation that the low use of the *COVID Alert* application could be attributable to the deficiencies of a communication strategy that failed to publicize its safety and utility.

Conclusion

As with medical research on COVID-19, scientific work on public opinion about the pandemic faces major issues related to the immediacy of an object of study that emerged without warning. Several contextual elements may therefore influence the external validity of the results. Each week that passes offers new knowledge on the virus, its consequences, and the evolution of the global and local situations. In this sense, the first limitation of this research project is contextual and, more specifically, temporal.

The data used in this paper were collected in the summer of 2020, two weeks after the end of the spring containment in Canada. Since then, Canada has experienced more waves of infection and a fall containment that stretched into 2021. Although both surveys took place

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at a time when the issue of a contact-tracing application was taking off in the media and in the discourse of public policymakers, one cannot assume the stability of public opinion measured at a different time. One thing is certain: *COVID Alert*'s popularity never came close to the 60 percent threshold required for optimal efficiency.

The fact that the data were collected as part of a larger project on the social acceptance of artificial intelligence also constitutes a limitation of this research, because the indicators used are sometimes suboptimal. Nevertheless, the article offers notable contributions to the literature devoted to the public acceptance of CTAs: first, by offering empirical evidence on the question from the Canadian context; second, by conclusively demonstrating that the Canadian application's attributes were mostly socially acceptable to a representative survey of Canadian citizens; and third, by corroborating previous studies on the linkage between support for CTAs and citizens' perceptions of the severity of the pandemic. As political ideology has since been shown to be highly correlated with perceptions of the threat of COVID-19 in Western democracies (Calvillo, Ross, Garcia, Smelter, & Rutchick, 2020; Pennycook, McPhetres, Bago, & Rand, 2021; Clarke, Klas, & Dyos, 2021), there are certainly other factors at work, most notably media consumption habits, partisan attachments, and political extremism. However, this article's survey data did not include questions to control for those factors. Finally, this article contributes to the literature by highlighting how much more research needs to be done on the complicated intersections between support for CTAs and technological opinions and competencies. The absence of significant effect found here is in direct contradiction with previous studies on the question (Walrave et al., 2020; Sharma et al., 2020; Kaspar, 2020; Kostka & Habich-Sobiegalla, 2022; Li et al., 2021) and should therefore be investigated more thoroughly. In that regard, one could question the quality of the indicators used. Indeed, it seems possible that a more refined measure, designed specifically to explore this topic, would lead to clearer results. This would be an interesting path to explore for anyone willing to build on these results.

Launched amid the worst sanitary crisis in generations, the first of the digital era, this article offers insights about the ways in which innovative digital solutions are facing hurdles that can threaten their very utility. It is therefore crucial to learn from previous experiences to understand how to better harness the power of artificial intelligence, as the new century is all but certain to bring challenges that will require creativity to address.

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Notes

1. See the official *COVID Alert* website for more details about the application: https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19/covid-alert.html.
2. The direction, amplitude, and significance of the effects presented in the models stays consistent if we use the full range of answers and ordinary least squares (OLS) regressions.
3. Multi-item scales have been shown to be effective tools for limiting measurement errors, especially with respect to measuring public attitudes on issues (Ansolabehere, Rodden, & Snyder, 2008). Individual wording and details related to scales' reliability are presented in the appendix.
4. We tested for an interaction effect between digital sophistication and technophobia, to no avail.
5. The comparison in the intensity of Google searches is even more unfavourable if we include more polarizing elements such as vaccines. We have chosen not to do so as we feel that the debate about vaccines should be treated separately from other measures.

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