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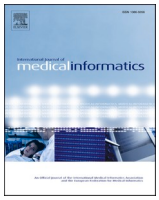

Digital contact tracing during the COVID-19 pandemic in France: Associated factors and reasons for non-use

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ABSTRACT

Objectives: To estimate the proportion of users of the TousAntiCovid app(lication) and identify factors associated with its non-use for contact tracing.
Methods: We conducted an online survey of a quota sample of French adults between 8 and 18 January 2021. Three categories of TousAntiCovid use were considered: contact tracing, other or temporary usage, and no use. A weighted multiple logistic regression was performed to analyze the factors associated with these different uses.
Results: Among the 1 000 respondents, 63.3% declared they had never downloaded the TousAntiCovid app, 23.5% used it for contact tracing. The remaining 13.2% did not enable contact tracing, mainly because of excessive battery consumption and fear of misuse of personal data. Trust in political representatives, financial deprivation and other factors were associated with never downloading the app.
Conclusion: This study confirms the previously suggested links between trust in political representatives, financial deprivation and the use of contact tracing apps in France.

1. Introduction

France's mobile app(lication) using Bluetooth technology for tracing close contacts in the context of COVID-19 was launched in June 2020. In October 2020, a new version of the app called TousAntiCovid [1] was implemented. It included more features, such as the possibility to store the COVID-19 health pass, health advice given by the COVID-19 scientific council, and information on the pandemic. At the start of 2022, the cumulative number of downloads exceeded 50 million and the French government called it the most successful public app in the country's history [2]. However, since June 2020<7 % of users have received a notification from the app declaring them to be a contact case [2]. This suggests that the app might be often used for purposes other than contact tracing, such as tracking the progress of the outbreak or storing COVID-19 testing or recovery certificates [3]. Moreover a previous study [4] identified a reluctance of the most socioeconomically precarious people to use contact tracing mobile apps that might translate in lower actual use.

In this context, we aimed to assess the rates of the different potential uses of TousAntiCovid app and to identify the main factors associated with those uses.

2. Methods

We used data from the second wave of the French Health Literacy Survey 2019 (HLS_{19}) which was conducted online between 8 and 18 January 2021 [5]. The study sample comprised persons aged 18 to 75 years old, drawn from an access panel (Ipsos iSay), representative of the

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Table 1
Description of the sample and factors associated with the use of the TousAntiCovid mobile app (N = 1 000, January 2021).

	Total N (%)	Univariate analysis			Multivariate analysis	
		Contact tracing N = 235 (23.5 %)	Other or temporary usage N = 132 (13.2 %)	No use N = 633 (63.3 %)	Other or temporary use *OR [95 % CI]*	No use *OR [95 % CI]*
Age (years)			***p = 0.002***			
18 – 35	303 (30.6)	64 (27.2)	59 (45.1)	180 (28.8)	**2.62 [1.50 – 4.58]**	1.23 [0.82 – 1.84]
36 – 55	381 (38.4)	86 (37.4)	43 (32.7)	252 (40.0)	1.47 [0.83 – 2.60]	1.28 [0.87 – 1.87]
56 – 75	316 (31.0)	85 (35.4)	30 (22.2)	201 (31.2)	1	
Gender			***p = 0.004***			
Women	511 (51.4)	98 (42.0)	70 (53.6)	343 (54.4)	1.49 [0.96 – 2.34]	**1.62 [1.17 – 2.23]**
Men	489 (48.6)	137 (58.0)	62 (45.4)	290 (45.6)	1	
Education level			***p = 0.010***			
Less than upper secondary school certificate	186 (18.4)	41 (17.4)	16 (12.0)	129 (20.2)		
Upper secondary school certificate	197 (19.7)	32 (13.6)	29 (22.0)	136 (21.4)		
Third level education	617 (61.9)	162 (69.0)	87 (66.0)	368 (58.4)		
Area of residence			*p = 0.860*			
Rural	211 (22.4)	52 (23.7)	27 (21.7)	132 (22.1)		
Urban	789 (77.6)	183 (76.3)	105 (78.3)	501 (77.9)		
Financial deprivation			***P < 0.001***			
No	155 (15.5)	54 (23.3)	21 (15.7)	80 (12.6)	1	
Yes	845 (84.5)	181 (76.7)	111 (84.3)	553 (87.4)	1.28 [0.71 – 2.30]	**1.64 [1.08 – 2.50]**
Health literacy score (HLS_{19}-Q12) [0–100] *M(SD)*			***P = 0.014***			
	75.9 (23.0)	79.9 (21.4)	74.6 (22.6)	74.7 (23.5)		
Trust in political representatives			***p < 0.001***			
Yes	153 (15.2)	64 (27.2)	27 (20.3)	62 (9.7)	1	
No	847 (84.8)	171 (72.8)	105 (79.7)	571 (90.3)	1.39 [0.80 – 2.39]	**3.01 [1.97 – 4.59]**
Trust in scientists			***P = 0.021***			
Yes	870 (87.0)	217 (92.3)	113 (85.9)	540 (85.3)		
No	130 (13.0)	18 (7.7)	19 (14.1)	93 (14.7)		
Mobile apps for scheduling medical appointments and reminders are useful			***P = 0.001***			
Yes	827 (82.7)	211 (89.6)	114 (86.6)	502 (79.4)	1	
No	173 (17.3)	24 (10.4)	18 (13.4)	131 (20.6)	1.36 [0.69 – 2.71]	**2.10 [1.29 – 3.44]**
Previously infected with COVID-19			*p = 0.082*			
Yes	78 (7.9)	24 (10.4)	15 (11.4)	39 (6.2)		
No	886 (88.6)	200 (85.0)	114 (86.4)	572 (90.4)		
I don't know	36 (3.5)	11 (4.6)	3 (2.2)	22 (3.4)		
Especially concerned about the situation caused by COVID-19			***p < 0.001***			
Yes	315 (31.6)	97 (41.6)	44 (33.2)	174 (27.5)	1	
No	685 (68.4)	138 (58.4)	88 (66.8)	459 (72.5)	1.32 [0.83 – 2.11]	**1.88 [1.34 – 2.63]**
Knowledge of COVID-19 transmission modes [a]			***p < 0.001***			
Perfect	325 (32.2)	102 (43.1)	33 (24.6)	190 (29.8)	1	
Imperfect	675 (67.8)	133 (56.9)	99 (75.4)	443 (70.2)	**2.08 [1.28 – 3.40]**	**1.48 [1.06 – 2.07]**

[a] The level of knowledge on COVID-19 transmission modes was measured by combining the answers to two questions on the transmission of COVID-19 through asymptomatic individuals and on the effectiveness of personal COVID-19 prevention measures. A perfect level of knowledge corresponded to a correct answer to both questions.

French population by the quota sampling method according to sex, age, region, and area of residence (rural or urban). Selected members of the panel received an email invitation from Ipsos to participate in the anonymous survey. Invitations were sent until 1 000 quota-sampled participants were recruited. Use of TousAntiCovid was measured by asking: "Have you ever downloaded an app for tracing close contacts between people during the coronavirus pandemic?" The four response options were grouped into three modalities: 1/ Contact tracing use ("Yes, and I activate Bluetooth to use it"), 2/ Other or temporary use (combining the two options "Yes, but I do not activate Bluetooth to use it" or "Yes, but I uninstalled it") and 3/ No use ("No, I never downloaded it").

We also collected socio-demographic variables (age, gender, and education level), data related to the COVID-19 health crisis (previous infection, concerns about the health situation, and knowledge about transmission), trust in scientists and political representatives, and perceived usefulness of mobile apps for medical monitoring [4].

Financial deprivation was defined by reporting difficulties in at least one of the three following questions on respondents' ability: (1) to pay all their bills at the end of the month, (2) to buy medications if needed, and (3) to pay for medical examinations and treatments not covered by health insurance (0: very easy/easy and 1: difficult/very difficult).

Health literacy level was calculated using the HLS_{19}-Q12 questionnaire [6]. The answer modalities of the 12 items were dichotomized by merging the "very easy" and "easy" categories, and the "difficult" and "very difficult" categories. The sum score was then standardized (0–100), a higher score representing a higher level of health literacy.

Chi-square tests and analysis of variance (ANOVA) were used for comparative analyses. A multinomial logistic model was used to identify the factors associated with TousAntiCovid's different potential uses. The significance threshold was set at 5 %. All weighted analyses were performed using STATA (version 17.0; StataCorp LLC).

The study methodology was reviewed and approved by the Ethics Evaluation Committee of the French National Health and Medical Research Institute (CEEI, IRB 00003888).

3. Results

The 1 000 respondents is described in Table 1. Early 2021, 63.3 % of participants said they had never downloaded TousAntiCovid, while 23.5 % used it activating Bluetooth. The most reported reasons for 'other or temporary use' (Bluetooth deactivation [n = 76] and uninstallation [n = 56]) were battery overconsumption (48.3 %) and fear of misuse of personal data (26.5 %). There were no significant differences between the stated reasons for uninstallation and Bluetooth deactivation (Fig. 1). Privacy fears were also widely reported as a reason for never downloading the app (40.6 %). In addition, just over half of the respondents doubted its usefulness (51.5 %) (Fig. 2).

All the variables presented in Table 1 were statistically associated with the use of TousAntiCovid in univariate analysis, except for area of

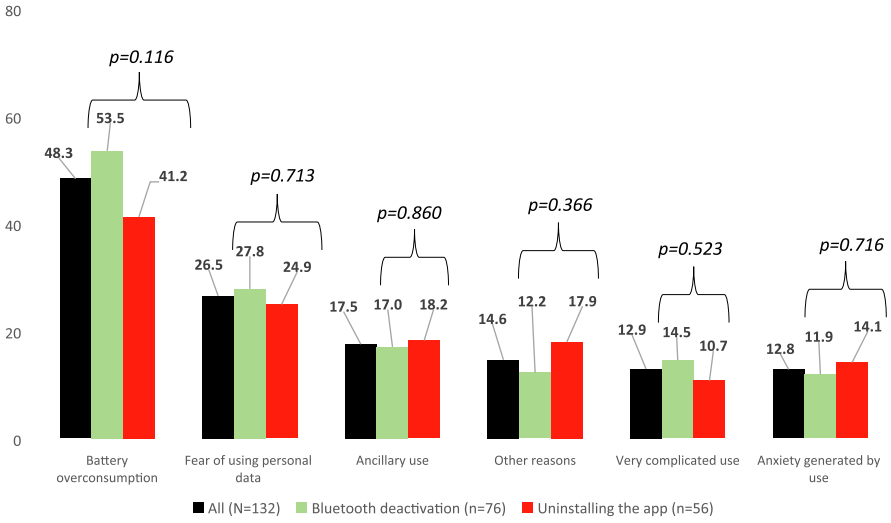

Fig. 1. Reasons for Bluetooth deactivation or uninstalling the tracing mobile app.

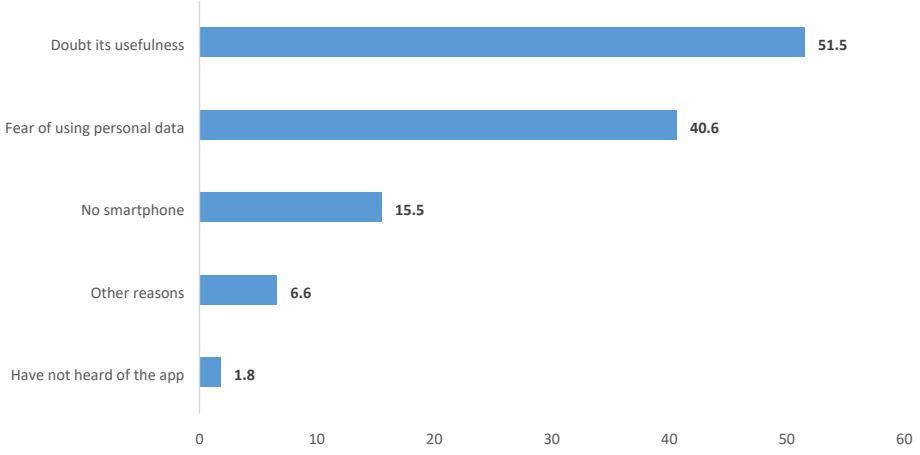

Fig. 2. Reasons for never downloading the tracing mobile app (N = 633).

residence and previous COVID-19 infection. In multivariate analysis, the probability of having never used the app was higher in women, in respondents with financial deprivation, in those who did not feel concerned about the situation caused by COVID-19, in persons who did not trust political representatives, and in those who did not find it useful to use other medical follow-up mobile apps. 'Other or temporary use' of TousAntiCovid was significantly associated with younger age (18–35 years). Finally, contact-tracing use was associated with knowledge of COVID-19′s transmission modes.

4. Discussion

This study highlighted poor use (23.5 %) of the French contact tracing app TousAntiCovid several months after its launch, and confirmed a previously identified link between financial deprivation and this use [4].

In France, the contact tracing mobile app provided by the government had a very low percentage of users at its launch [7]. A survey conducted before the launch showed that half of the respondents were reluctant to download it, including 21.5 % who declared that they absolutely did not accept its use [4]. Towards the end of 2020, a new version of the app was promoted, with a new name TousAntiCovid, with a view to changing public opinion and attracting new users. However, a survey in January 2021 found that the percentage of non-users (i.e., respondents who had never downloaded TousAntiCovid) (63.3 %) was still much higher than the initial estimate of 50 % reluctance [4]. The rate of non-users was higher in November 2020 (76.4 %) [8], but then declined until December 2021 (41.0 %) according to the most recent results available [3].

The arrival of the vaccine pass in July 2021 led to an increase in downloads, but only for features other than contact tracing [3]. Given the limited use of contact tracing, the question of the cost-benefit ratio arises. The cost of implementing the digital contact tracing system was estimated at 6.5 million euros [9] for a relatively low tracing result compared to human contact tracing [2]. Changes in government strategies in the management of the health crisis have meant that TousAntiCovid has become mainly useful for storing health and vaccination pass. Indeed, very recently (December 2021) when France saw greatly increased rates of COVID-19 contamination by the Omicron variant, government communications no longer mentioned the benefits of using TousAntiCovid contact tracing to combat the spread of the virus [10].

Our study highlighted that the factors previously associated with the willingness to use a contact tracing app [4] were also associated with actual reported use of TousAntiCovid. Socioeconomic factors (age, gender and financial deprivation), trust, interest in other mHealth apps, as well as factors related to the COVID-19 health crisis (feeling concerned by the situation and knowledge of transmission) were all significantly associated with using the contact tracing feature. These results are also similar to other international studies [8,11–13]. In terms of non-use of this feature, the lack of trust in the French government and its strategies seems to have had a negative impact on the use of TousAntiCovid [3,8,14]. This finding is also reflected in the reasons declared for not downloading the app (51.5 % doubted its usefulness). Other possible factors for not using contact tracing are concern about having to self-isolate and not being able to work after being identified as a close contact [15] the latter being particularly important for people with financial difficulties. Furthermore, in our study, the security and confidentiality of private data was a real concern for non-users (Figs. 1 and 2). A similar figure was observed in Iranian citizens not interested in using a mHealth app (30.6 %) [16]. Privacy concerns are also often identified (45 %) in various studies about contact tracing apps [17]. In terms of the TousAntiCovid's ease of use, 12.9 % of those who deactivated or uninstalled the contact tracing app found it very complicated to use. This sub-group was probably not very familiar with the use of technology in general and/or with health-related information. However, after adjustment for specific knowledge of COVID-19 transmission modes and for financial deprivation, health literacy was no longer significant.

Our results also confirm findings in other studies that financial deprivation is associated with non-use of contact tracing apps [3,11]. Precarious people are also the more reluctant to embrace the other strategies to fight against COVID-19 (tests, vaccines) [18]. It is possible that part of this problem lies is the difficulty to access new digital technologies. Despite precarious people can afford cheap smartphone and subscription, they might lack digital skills or interest. In our study, 15.5 % of non-users declared they did not have a smartphone, and the most cited reason for deactivating or uninstalling TousAntiCovid was excessive battery consumption (48.3 %), probably due to outdated phones. The digital transformation of public health strategies can therefore further accentuate health inequalities.

Digital contact tracing strategies cannot succeed without communication campaigns which target the most skeptical, tackle transparency and privacy concerns, and more generally, which address all ethical, legal and social issues related to contact tracing. Inequalities in access to technology also needs to be addressed before digital public health strategies can be effectively implemented.

5. Summary points:

- In France, at the start of 2021, the proportion of those who declare that they have never downloaded the TousAntiCovid application remains quite high (63.3 %).
- Financial deprivation is associated with never downloading the app.
- The fear of using personal data is one of the reasons for not using contact tracing

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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