Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Computers in Human Behavior 131 (2022) 107210

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

The psychological reassurance effect of mobile tracing apps in Covid-19 Era

Fidan Kurtaliqi [a], Mustafeed Zaman [b,*], Romain Sohier [b]

[a] Department of Marketing, Audencia Business School, 8 Route de la Jonelière, 44312, Nantes, France
[b] Department of Marketing, EM Normandie Business School, Métis Lab, 20, Quai Frissard, 76600, Le Havre, France

ARTICLE INFO

Keywords:
Mobile tracing apps
Anxiety
Public health policy
COVID-19
Government trust
Well-being
Trust in the future

ABSTRACT

As part of their public health policies, most countries have launched mobile tracing applications (apps) to reduce the spread of the COVID-19 virus and reassure their citizens. To the best of our knowledge, no study has explored the importance of 'well-being' and 'trust in the future' in the context of digital contact-tracing apps. This is an important gap, especially given the importance of citizens' acceptance of a mobile tracing app and its role in reassuring citizens. Therefore, we study the French government's tracing app—StopCovid—as experienced by a sample of 832 participants from France. The results establish strong links between perceived value and trust in government, well-being, and trust in the future, which are considered the key features of the reassurance effect in a pandemic context. In addition, a multigroup analysis (MGA) allows us to compare the effect of several moderators on the overall model, such as the users versus nonusers of tracking apps or infected versus noninfected with COVID-19. The study provides practical implications by highlighting how governments should deploy mobile tracing apps to contribute to public health and reassure their citizens during the pandemic.

1. Introduction

With COVID-19 creating a worldwide public health crisis (i.e., hospitalisations, deaths) and pushing society into social and cultural crises, along with financial insecurity (Beaunoyer et al., 2020; McKibbin & Fernando, 2020; Rajkumar, 2020; Vo-Thanh et al., 2020), the use of mobile devices is becoming essential in fighting the virus and improving our lives (Brem et al., 2021; Guitton, 2020; Rowe et al., 2020). To 'flatten the curve' and reinforce trust, it is not surprising that numerous countries have decided to launch mobile apps to (1) identify people or contacts who may have encountered infected people, (2) trace the virus transmission chain by collecting data on people's movements and contacts and (3) give information on the pandemic (e.g., new cases, number of people infected, etc.). Indeed, the government's role is to control and manage crises by proposing solutions and informing people to reduce mental health risks, anxiety and stress (Wang et al., 2021), develop a citizenship engagement (Chen et al., 2020) and reduce misinformation that can lead to harmful conspiracy theories (Choudrie et al., 2021; Su et al., 2021).

Today, no one can imagine using a smartphone that lacks mobile applications (apps); apps are now regarded as the inherent features of this technology. Mobile apps are not only easy to use, but they also provide ways to be informed (e.g., about health indicators, such as heartbeat or number of steps taken) and entertained (Hackett et al., 2018). Most of the time that people spend online is spent on mobile screens (e.g., 77% in the United States; ComScore, 2019) because smartphones allow people to access information anywhere, at any time.

Medical and epidemiological research shows that implementing mobile tracing apps is a top-down government intervention (Ferretti et al., 2020; Pan et al., 2020) and crucial in an epidemic crisis (Chan & Saqib, 2021). However, tracking technologies may raise acceptability issues (Georgieva et al., 2021) and, more specifically, privacy concerns that may influence the intention to use the mobile tracing app (Chan & Saqib, 2021). Moreover, there has been no research on the reassurance effect of mobile tracing apps in a pandemic context. Therefore, our aim is to (1) show how the antecedents (cost and benefits) of a mobile tracing app create value; (2) identify the consequences of value creation in terms of trust in the government, trust in the future, well-being and word of mouth (WOM); and (3) determine how various moderators affect the overall perceptions of value (see Fig. 1).

Our results suggest that the success of mobile tracing apps depends on three factors: utility, status and risk perception. Beyond these antecedents, we establish strong links between perceived value and trust in government, well-being and trust in the future, which are considered features of the reassurance effect. Moreover, we highlight the effects of several moderators on the overall perception of the mobile tracing app (e.g., social media usage and COVID-19 symptoms). Finally, our results show that the launch of a tracing app has a psychological reassurance effect on individuals, even if they have not installed it. In the context of a crisis, one solution taken by the government (i.e., the creation of digital tracing app) will positively affect people's future, well-being and trust in

* Corresponding author.
E-mail addresses: fkurtaliqi@audencia.com (F. Kurtaliqi), mzaman@em-normandie.fr (M. Zaman), rsohier@em-normandie.fr (R. Sohier).

https://doi.org/10.1016/j.chb.2022.107210
Received 17 June 2021; Received in revised form 21 December 2021; Accepted 21 January 2022
Available online 25 January 2022

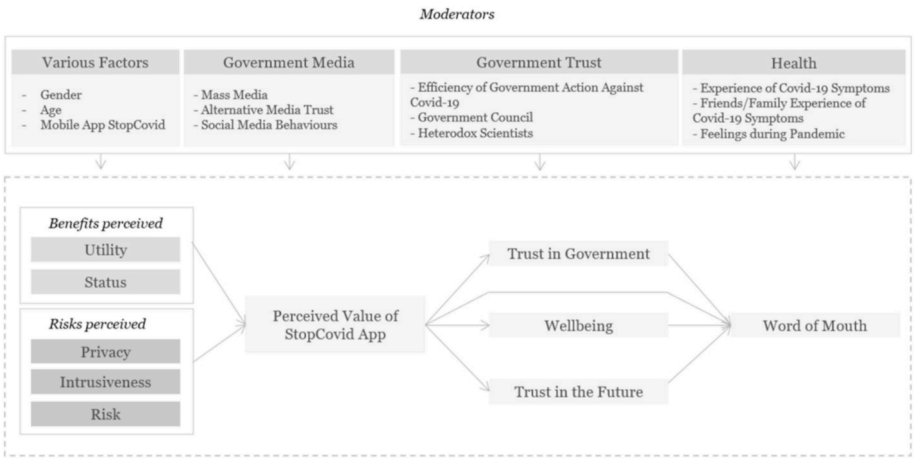

Fig. 1. Theoretical model.

the government.

2. Theoretical framework

In the literature on tracing apps, especially in the context of COVID-19, we have identified three different fields of study: the psychological field (e.g., Chan & Saqib, 2021; Fox et al., 2021), the information system field (e.g., Rowe et al., 2020; Sharma et al., 2020; Trang et al., 2020) and the medical field (e.g., Altmann et al., 2020; Lockey et al., 2021). Table 1 presents the major studies on tracing apps and their key findings.

All these studies have focused on technology adoption and privacy (e.g., UTAUT, social exchange theory, etc.). However, very few articles have considered the psychological aspects of app tracking. Specifically, we lack knowledge of how this type of tool may affect the psychological state of individuals during a pandemic. Drawing on John Dewey's (1939) theory of valuation, we seek to explain how people in a pandemic context can valuate a government-tracing mobile app.

According to Dewey, all human conduct 'that is not simply either blindly impulsive or mechanically routine seems to involve valuations' (1939, p. 3). That being said, valuation encompasses the concept of 'valuing' or '*de facto valuings*', which refers to affective behaviours/activities such as 'prizing' or 'regarding highly', and 'evaluation', which refers to the action of giving value to something or evaluating the means to achieve the end/goal. Valuation involves desiring, and this can occur in a situation of 'lack' or when the need to conserve something is threatened by 'outside conditions' (Dewey, 1939). The pandemic has broken the routine lives of individuals, creating uncertainty and fear. Therefore, in this type of situation, the desire to return to a so-called 'normal' life is stronger. In our case, the desire is the 'end' or objective, here again being a return to a 'normal life'. The launch of tracking applications could be seen by people as a 'means' to end the pandemic. Therefore, we can consider the StopCovid application as a 'means', according to Dewey (1939), to achieve the end (i.e., a normal life). Accordingly, this 'means' (i.e., the tracing app) will be evaluated by people.

For the 'evaluation' step, we used a hybrid approach of value. Indeed, the hybrid value model is an alternative to the unidimensional approach, which offers a limited understanding of the benefits and costs, and is also an alternative to the multidimensional approach, which ignores costs because its primary objective is to highlight sources of value (Zauner et al., 2015). Based on seminal research, our model is composed of a cost-benefit (i.e., antecedents) ratio that leads to a perceived value (i.e., mediating construct) (Kleijnen et al., 2007). According to Kumar and Reinartz, the perceived value is the '*customers' net valuation of the perceived benefits accrued from an offering that is based on the costs they are willing to give up for the needs they are seeking to satisfy*'(2016, p.37). Moreover, the end results that lead to normal life being restored are measured through the concepts of trust in the future and well-being. Because the StopCovid app is a governmental tool, we added the concept of trust in the government to evaluate the propensity of the app and how it may build trust. It is now well established that people have the ability to perceive the benefits and undesirable consequences of a product/service (Gutman, 1982). Regarding the StopCovid mobile app, individuals can evaluate it because they are used to frequently manipulating mobile apps. Therefore, individuals can perceive the value of StopCovid, even without installing it.

2.1. Cost/benefit impacts on value perception

Research on the acceptance of technology has identified certain pragmatic determinants, such as ease of use and utility (Davis, 1989). Regarding mobile apps, the technology acceptance model (TAM) has been widely used to determine usage intentions. Research focused on utility—or the extrinsic and cognitive benefits that enable task accomplishment (Cocosila & Trabelsi, 2016; Kim et al., 2007)—reveals that the perceived utility of mobile apps positively influences satisfaction and intentions to use (Cocosila & Trabelsi, 2016; Kim & Han, 2011; Kim & Oh, 2011). Researchers have also investigated the role of status for mobile app use—that is, the ability of apps to enhance the image users present to others (Holbrook, 2006). In the context of the COVID-19 pandemic, people may use apps such as the French StopCovid app to seek gratification from their social identity and social relationships; here, according to Cocosila and Trabelsi (2016), the status value of mobile apps positively influences perceived value.

Although there are benefits to mobile app use, there are also costs. For example, because mobile apps collect data and send notifications to users (Kim & Chung, 2021), they raise questions about risk, privacy and intrusiveness. Research shows that privacy and intrusiveness concerns related to mobile apps negatively influence their perceived value (Cocosila & Trabelsi, 2016; Wottrich et al., 2018). Moreover, in mobile environments, users may feel more vulnerable to risks—which may also negatively affect a mobile app's perceived value (Kleijnen et al., 2007; Sweeney et al., 1999). Accordingly, we propose the following:

H1. The (a) utility and (b) status benefits of the StopCovid app positively influence its perceived value.

H2. The (a) privacy, (b) intrusiveness and (c) risk costs of the StopCovid app negatively influence its perceived value.

2.2. Effects of value perceptions on the psychological reassurance effect and WOM

The three main consequences we investigate (i.e., *well-being, trust in the future* and *trust in government)* are related to psychological aspects

Table 1
Literature review on tracing apps.

Variables	Key Findings	Study (Alphabetic order)
Xs: Age, gender, country, presence of comorbidities, usage of mobile phone outside the house, frequency of social interactions, ability to work from home during the lockdown, ability to obtain sick pay while working from home, trust in national government, incidence of COVID-19 deaths in a respondent's region of residence Y: Intention to have the app installed on the phone	Combination privacy issues, cybersecurity and trust in government are determinants to have the app installed. The opt-out regime (when Google or Apple automatically install the app on the phone) influences higher effective installation rates.	Altmann et al. (2020) (on French, German, Italian, English, US populations)
Experiment 1: Xs: Autonomy-supportive (vs. controlling) message framing, presence (vs. absence) of information safety Y: Intention to contact tracing uptake, government should support this app, intention to recommend this App Experiment 2: Xs: Autonomy-supportive (vs. controlling) message framing, presence (vs. absence) of information safety, perceived government legitimacy Y: Intention to contact tracing uptake, government should support this app, intention to recommend this app	Data safety may be key in affecting people's intentions to use contact-tracing technology.	Bradshaw et al. (2021) (on Australian and US populations)
Experiment 1: X: Disease concern; Y: Intention to download Stop Covid App Experiment 2: X: Disease concern; M: Social conservatism; Y: Choice to download CovidSafe apps Experiment 3: X: Disease concern; M: Privacy; W: Political ideology; Y: Choice to download Sop Covid Apps	The study finds that greater disease concerns increase support of socially conservative viewpoints that, then, explained people's lower willingness to download, use and adopt the CovidSafe app.	Chan and Saqib (2021) (on French, Australian and US populations)
Xs: Social influence, facilitating condition, effort expectancy, performance expectancy, perceived privacy risk Mediator: Perceived value of information disclosure Y: Adoption intention	The study shows that effort expectancy, perceived value of information disclosure and social influence are critical for adopting contact-tracing apps.	Duan and Deng (2021) (on an Australian population)
Time 1: Xs: Social influence, reciprocal benefits, perceived health benefits, Privacy concerns Ys: Adoption intentions, willingness to rely Time 2: Xs: Social influence, reciprocal benefits, perceived health benefits, privacy concerns Mediators: Adoption intentions, willingness to rely Y: Usage intentions	Reciprocal benefits positively influence technology acceptance. Time is an important factor during a crisis, and it will influence citizen acceptance of the app.	Fox et al. (2021) (on an Irish population)
N/A	The societal acceptability is conceptualised by four key elements: transparency, sociocultural determinants, security and reversibility.	Georgieva et al. (2021)
X: Internet user's information privacy concerns Moderators: Relative advantage, perceived ease of use, compatibility Mediators: Risk belief, trusting belief, intention to use Y: Use of CovidSafe app	The results show that relative advantage, compatibility and trusting beliefs increase adoption intentions.	(Lin et al., 2021)(on an Australian population)
X: Profiles (age, education, political ideology, income, dispositional privacy, trust in government, download behaviour) Mediator: Trust in government Y: Download behaviour	High income and highly educated people have the best chance to download the app. Trust in government is a mediator.	(Lockey et al., 2021)(on an Australian population)
X: Pervasive messages (social benefit vs privacy assurance) Mediators: Privacy risks, expected value for society, personal health benefits Y: Intention to use tracing app	The results show that the persuasive messages that focus on privacy assurance, which are more individualistic, will lead individuals to think about their own potential gains and loss.	(Matt, 2021)(on a German population)
N/A	Collective responsibility, personal benefit, coproduction and perception of the system as efficient foster the adoption, while privacy concern, mistrust, unmet need for more information and support; fear of stigmatisation; logistical challenge; and technical difficulties discourage the adoption.	Megnin-Viggars et al. (2020)
N/A	There are no globally ideal approaches but only locally contextualised ones that depend on immediate health risk, prior experience with pandemics, societal values and national culture, role of government, trust in government and trust in technology in each society.	Riemer et al. (2020)
N/A	The lack of transparency of the French government and lack of effectiveness of the communication were responsible for low adoption.	(Rowe et al., 2020) (analysing the media coverage in France)
Xs: Demographic data, pandemic severity (the total number of cases in Singapore to date, whether the nation was in a lockdown at the time of participation, self-reported measure of confidence the government could control COVID-19 spread), behavioural change. Y: Use of TraceTogether	The results find that people who were using hand sanitisers, avoiding public transport and preferring outdoor over indoor venues during the pandemic are the early adopters of Tracing app.	(Saw et al., 2021)(on a Singaporean population)
Xs: Perceived effectiveness of privacy policy, perceived effectiveness of industry self-regulation, perceived severity, perceived vulnerability, subjective norm Moderators: Collectivism, uncertainty avoidance, privacy self-efficacy Mediators: Expected personal outcomes of sharing information, Expected community-related outcomes of sharing information, privacy concerns, attitude Y: Adoption intention	Results provide several variables that should be taken into consideration by policymakers when they design (and will implement) a tracing app. The collective level is very important for app adoption.	Sharma et al. (2020)
Xs: sociodemographic characteristics, health literacy data, information on participants' communication with caregivers, trust in institutions, COVID-19 knowledge, preventive behaviours Y: Acceptability of a mobile app for contact tracing	Most precarious people are the more reluctant to use the app. Attitudes towards institutions and trust in politicians and doctors influence the adoption of contact-tracing mobile apps.	Touzani et al. (2021) (on a French population)

(*continued on next page*)

Table 1 (*continued*)

Variables	Key Findings	Study (Alphabetic order)
Xs: 3 benefit appeal: self vs. societal vs. self and societal; 2 privacy design: low vs. high; 2 convenience design: low vs. high Y: Installation intention	The results suggest that the combination of prosocial behaviour, privacy and usability positively influence adoption.	Trang et al. (2020) (on a German population)
Income variable: Tweet's topic (privacy concern, conspiracy theories), linguistic style (complexity, certainty vs tentative), emotions (positive and negative emotions) Outcome variable: Virality (number of retweets)	The results suggest that consumers' privacy concerns and conspiracy theories belong to different domains and exert different effects on the virality of tweets. Furthermore, the characteristics of the text (namely, complexity, certainty and emotions) cue different Twitter users' behaviours.	Visentin et al. (2021) (Tweets on Italian tracing App)
Xs: Prosociality, national identification, endorsement of liberty Moderators: Perceived efficacy of tracking technologies, perceived threat of future technological surveillance Y: Acceptance of surveillance technology	Prosocial attitude will positively impact the acceptance of contact-tracing app. The endorsement of liberty negatively predicts attitude on contact-tracing apps Time is an important factor during the pandemic, and acceptance will differ depending on situations (the acceptance of tracing apps decreased after eight months but increased when infections and fatalities increased).	Wnuk et al. (2021) (on a Polish population)

and, overall, to the reassurance construct. Reassurance is a process by which people provide information to others to remove fears or doubts and comfort the other (Linton et al., 2008). Reassurance is needed when the situation of an individual changes in such a way that it affects their psychological state and behaviour. With the pandemic increasing anxiety, it has created an undesired context in which people seek to be reassured. In these situations, reassurance can generate mechanisms, such as seeking the presence of others, to reduce anxiety (Spector & Sistrunk, 2010). Beyond presence, a key factor to reassure people is the information provided by various actors (e.g., government, mass media). Because the government must fight the virus, those actions taken by the government have a great impact on reassuring people. Therefore, the aspects of reassurance we measure in the current paper deal with trust (in the government and in the future) and well-being. Indeed, from an institutional point of view, people can be reassured by the government and the decisions made during the pandemic. Moreover, because of the information provided by the government, people may look forward to the future and the potential end of the crisis, hence developing potential trust in the future. Finally, because people are living in a stressful environment, the fact that the government tries to diminish the consequences of the crisis is a solution that may positively impact their overall well-being.

Because the StopCovid app was launched by the French government (on June 2, 2020), trust in the government is an important variable to consider (Ye & Lyu, 2020). From the perspective of public health policy, if people do not trust the government, their intentions to use a tracing app may be affected, even if the perceived value of the app is high. Trust in government is strongly associated with adherence to health guidelines (Sibley et al., 2020) and is vital for implementing social policies that require people to take action (Davis et al., 2011). Moreover, in a crisis context, trust in the government leads to cooperative, responsible and altruistic behaviours and a tendency to follow government recommendations (e.g., lockdown rules) (Chanley et al., 2000; Hetherington, 1998). By addressing those actions by the government to develop this app, we propose the following:

H3. High levels of perceived value of the StopCovid app positively influence trust in the government.

Disasters (e.g., war, hurricanes, viruses) cause harm to mental and physical health (Huang & Zhao, 2020; Zhang & Ma, 2020). In these contexts, people may have negative feelings because their well-being is affected. Sibley et al. (2020) note that healthiness includes the presence of positive well-being. In addition, in a report on digital contact-tracing apps in Scotland, Buchanan et al. (2020) underline that secure, transparent, participatory and privacy-respecting contact-tracing apps could help authorities ensure public health and well-being. The World Health Organisation (WHO) also considers mental and social well-being a part of public health (Buchanan et al., 2020). In a recent study on contact-tracing apps, Gerli et al. (2021) highlight the different factors that may help policymakers ensure well-being via health apps. However, none of these studies have examined the link between the level of perceived value and the well-being of the population. In the context of the StopCovid app, the perceived value of the app because of its utility and status benefits may have a positive influence on the well-being of the population. Therefore, we propose the following:

H4. High levels of perceived value of the StopCovid app positively influence well-being.

Trust is considered an important component for the smooth functioning of any society, and it is a prerequisite for the development, maintenance and sustainability of the social quality of people's lives (Meyer & Ward, 2008; Ward & Meyer, 2009). Here, trust has gained significant attention from researchers and policymakers because of its importance to the well-being of society (e.g., Ward & Meyer, 2009). In addition, Sibley et al. (2020) note that one dimension of well-being relates to trust in the future, which can be linked to feelings of security and satisfaction with one's standard of living (i.e., not having to wear masks outside, going to restaurants). Accordingly, we propose the following:

H5. High levels of perceived value of the StopCovid app positively influence trust in the future.

Word of mouth (WOM) has major influence on what people know, feel and do (Buttle, 1998; Taheri et al., 2021). WOM is defined as "*informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services and/or their sellers*" (Westbrook, 1987, p. 261). In our context, WOM could be considered as the informal communication directed at other citizens about the usage of the StopCovid app. For many years, researchers have studied the concept of WOM, especially regarding mobile apps (Bond et al., 2019; S.; Kim et al., 2016; Rajaobelina et al., 2021). Researchers suggest that entertainment, subjective norms and satisfaction are the key antecedents of positive WOM for mobile apps (San-Martín et al., 2015; Verkijika & De Wet, 2019). In addition, positive WOM may help both the app providers (i.e., in our case, WOM may help French government to have a higher apps adoption) and the users (i.e. help citizens to stay aware of the situation) (Bond et al., 2019). Although most researches on this topic take into consideration either the antecedents of WOM (e.g., Kang & Johnson, 2015; San-Martín et al., 2015; Verkijika & De Wet, 2019) or the impact of WOM on brand image and performance (e.g., Handi et al., 2018; Rajaobelina et al., 2021), to the best of our knowledge, there has been no study of the connections between WOM and trust in the future, trust in the government, well-being and perceived value. In the context of the COVID-19 pandemic and its associated level of anxiety, we propose that regarding mobile tracing apps, these four concepts positively influence WOM:

H6. High levels of (a) perceived value, (b) trust in government, (c) well-being and (d) trust in the future positively influence WOM.

2.3. Pandemic moderators

The perception of a product's value depends on the context in which it is used. A mobile app used in one context can generate more value than in another one (Kleijnen et al., 2007; Wang et al., 2013)—that is, it has conditional value (Sheth et al., 1991; Woodruff, 1997). Perceptions of the costs and benefits of the StopCovid mobile app may vary significantly in the context of COVID-19. During the pandemic—especially during lockdowns—people have been exposed to daily media information, government announcements and health concerns related to themselves and their families. In this study, we identify the key moderators that affect the overall perception of the mobile app: age and technology factors, trust in media, trust in government and health factors.

First, we consider the moderating effects of general factors such as gender and age. There is a significant difference between men and women in terms of deaths from COVID-19; in both the United States and France, for example, the gender breakdown of deaths is 54% male and 46% female (CDC, 2020; Santé Publique France, 2021). Even though men seem to be more vulnerable to the virus, no evidence exists to support hypotheses about this difference. In contrast, when it comes to age, research has shown clearly—and the media has communicated widely—that older people are far more vulnerable to the disease (e.g., in the United States, from March 2019 to January 2021, 20.8% of COVID-19 patients were in the 65–74 year age group vs. 0.5% in the 5–17 year age group) (CDC, 2020). However, when it comes to technology factors as moderators, there may be differences in terms of value perceptions between the users and nonusers of the StopCovid app. Although users might have a more positive perception of the app's value because they have the opportunity to test it in real time, there is no evidence leading us to formulate any hypotheses in terms of negative or positive effects for the entire model. Rather, we postulate the following:

H7. Compared with those younger than 55 years of age, those 55 years of age and older perceive the value of the StopCovid app as greater.

Second, we investigate the moderating effect of trust in media by noting the differences in the perceived value of the mobile app between groups: high versus low trust in government media, high versus low trust in mass media and high versus low trust in alternative media. Because these are related to the same topic, we include the social media behaviours with two groups for both moderators (high and low usage of social media and YouTube). During a crisis, people obtain information from television, the internet and their social networks (Garfin et al., 2020). The media context plays an essential role in shaping institutional trust and attitudes towards nations and governments. However, some populations may disbelieve the government and mass media information. In France, only 23% of the population trusts the news media (Statista, 2020). Moreover, trust in the government can decline over time, even if it is initially high, because perceptions of risk increase over time, and conspiracy theories develop (e.g., the 'antimask' movement). The COVID-19 pandemic has provided alternative channels (e.g., YouTube influencers, Twitter users) with opportunities to expand their visibility by communicating (dis)information that opposes official information (i.e., mass and government media). In pandemic situations, people seek accurate information to protect themselves and their families, and those who trust mass and government media may be more likely than others to perceive the StopCovid app as valuable. Conversely, those who trust alternative media (more than they trust official information channels) and are exposed to fake news disseminated by influencers on social media and express defiance towards decisions by governments may be less likely to perceive the StopCovid app as valuable:

H8. Compared with those who trust alternative media (including influencers who communicate fake news) more than government and mass media, those who trust government and mass media more than alternative media perceive the value of the StopCovid app to be greater.

Third, we evaluate the moderating effect of trust in government and how it moderates the other model effects. As previously mentioned, regarding COVID-19, trust in the government can decline over time (Sibley et al., 2020), especially following the imposition of government actions to fight the virus (e.g., mask mandates, confinement). People judge the effectiveness of government actions—or at least form opinions about those actions—abased on the actions implemented by the government and number of deaths or infections. Similar to other countries, France has set up a scientific council to fight the virus. However, some medical scientists hold opposing views on the pandemic situation and promote alternative treatments (e.g., hydroxychloroquine). This situation has led to the formation of two sides, which the mass media refers to as the 'reassuring' (*rassuriste*) side and the 'alarmist' side, generating even more confusion in the population (Mansour & Maad, 2020). Therefore, we hypothesise the following:

H9. Compared with those who evaluate the government's actions negatively and trust the government council less (i.e., the 'reassuring' side), those who evaluate the actions of the government positively and trust the government council (i.e., the 'alarmist' side) perceive the value of the StopCovid app as greater.

Fourth, we investigate the moderating effect of health, specifically how people's health situations and the situations of those around them moderate the model effects. The COVID-19 crisis has generated feelings of stress, depression, fear and loneliness (Jungmann & Witthöft, 2020; Liu et al., 2020). During a viral epidemic, most people develop health anxiety (Zhang & Ma, 2020), including unwarranted fears of the perceived health threat (Abramowitz & Braddock, 2008), on a continuum that ranges from an absence of health awareness to pathologic anxiety (Abramowitz & Braddock, 2008). When anxiety arises, people often develop safety behaviours, such as checking for symptoms, fever or signs of illness, avoiding risky activities, seeking confirmation of good health and reading information on the crisis (Brown et al., 2020). Those who perceive themselves as being in poor health suffer greater anxiety. A survey in China shows that more than half of the respondents had concerns about COVID-19 or the potential infections of their families (Zhang & Ma, 2020). Those affected by quarantine (i.e., themselves or someone they knew) suffer from more anxiety (Jungmann & Witthöft, 2020), and their perceptions change when they (or their families/friends) have had the virus or were identified as contact cases. Finally, the constant flow of COVID-19 information uses emotional language to capture people's attention (Garfin et al., 2020), such that their thoughts become focused on the pandemic. This excessive absorption (Jungmann et al., 2020) and hyperconsumption of news can lead people to develop 'cyberchondria' (i.e., obsession with self-health autoevaluation), which correlates positively with anxiety (Jungmann & Witthöft, 2020). Therefore, in line with the research on conditional value and the psychological and health effects of COVID-19, we hypothesise the following:

H10. Compared with those who have not personally experienced COVID-19 symptoms, whose friends/families have not experienced COVID-19 symptoms and who have not felt anxious during the pandemic, those who have personally experienced COVID-19 symptoms, whose families/friends have experienced COVID-19 symptoms and who have felt anxious during the pandemic perceive the value of the StopCovid app as greater.

3. Methods

3.1. Data collection and sample

We conducted our study in the context of the COVID-19 pandemic. We designed a questionnaire consisting of 82 items that had a time duration of 10 min. At the beginning of the survey, we introduced a brief description of the StopCovid mobile app launched by the French government. We informed all respondents of the presence of sensitive questions and asked them to accept the conditions, which were in line with the

European Union's General Data Protection Regulation (GDPR) rules. The survey started online one week before the launch of the app and ended one week after the app had launched. A survey agency administered the questionnaire online. The respondents were selected rigorously (i.e. representative of the population in terms of gender, age and education) and received gifts rather than payments. Our data collection represents the ratio of the actual use of the mobile app (i.e., the ratio of 10% having installed the StopCovid mobile application versus 90% not having installed it). A total of 832 French mobile app users responded to our questionnaire; we discarded 12 respondents because they failed to answer a verification question introduced in the middle of the questionnaire. Table 2 presents the main characteristics of our sample.

Table 2
Characteristics of the sample.

Gender	Female: 47.58% Male: 52.42%
Age	18 to 34: 30.75% 35 to 54: 34.26% 55 to 64: 14.89% 65+: 20.10%
Education	Other: 1% BTEC: 13.43% A level: 20.94% **Undergraduate** - BTEC higher national diploma: 24.81% - Bachelor: 17.19% **Graduate** - Master's: 16.34% - Doctorate: 6.05%
Installation of StopCovid mobile app	Yes: 13.19% No: 86.81%

3.2. Measurements

We began by using partial least squares structural equation modelling (PLS-SEM) to test our hypotheses in Smart PLS 3.3.2 (Ringle et al., 2015). We used the path scheme (Henseler, 2010) with the consistent PLS algorithm, which can correct reflective constructs' correlations and ensure the results are consistent with a factor model (Dijkstra & Henseler, 2015). Next, to test the significance of the relationships between variables and estimate predictive validity (Q^2 values), we used bootstrapping and blindfolding procedures (Geisser, 1975; Stone, 1974).

Table 3
Measurement model.

Items	Loadings	α	rhoA	CR	AVE	Source of item (Adapted from)
Utility		.92	.93	.92	.73	Cocosila and Trabelsi (2016)
Using the StopCovid application would allow me to easily report if I have been in contact with the virus.	.70					
The use of the StopCovid application would be convenient.	.88					
Using the StopCovid application would help me to communicate important information.	.83					
I think the StopCovid application would be helpful.	.99					
Status/Social		**.91**	**.92**	**.91**	**.72**	Nysveen et al. (2005)
Using the StopCovid application would make a good impression on those around me.	.90					
Using the StopCovid application would reassure my family and friends.	.91					
Not using the StopCovid application would question the people around me.	.71					
Using the StopCovid application would improve the way I am perceived by those around me (personal and professional).	.85					
Privacy		**.92**	**.93**	**.92**	**.86**	Miltgen et al. (2019)
Use of the StopCovid application would weaken the respect for privacy.	.88					
Registering and using the StopCovid application would compromise my privacy as my personal information could be used without my consent.	.97					
Intrusiveness		**.89**	**.90**	**.90**	**.69**	Li et al. (2002)
I think the notifications from the StopCovid application will be:						
Low Disturbing - High Disturbing.	.75					
Least invasive -Very invasive.	.88					
Not very indiscreet - Very indiscreet.	.78					
Little intrusive - Very intrusive.	.90					
Risk		**.90**	**.91**	**.91**	**.83**	Chellappa and Pavlou (2002)
I believe that the information I would communicate via the StopCovid application will not be manipulated for any other purpose than that of Covid 19.	.86					
I believe that the information that I would communicate via the StopCovid application will not be exposed/disclosed.	.96					
Perceived Value		**.93**	**.93**	**.93**	**.82**	(B. Kim & Oh, 2011)
Despite its drawbacks (e.g., disclosure of personal data), the use of this StopCovid application is worthwhile.	.91					
Overall, I consider the costs of using the StopCovid application to be worth the effort.	.90					
Compared to the risks I have to take, I think that using the StopCovid application helps to stop the epidemic.	.91					
Trust in Government		**.93**	**.93**	**.93**	**.82**	Verhoef et al. (2002)
This application shows that the government is honest with its citizens.	.90					
By proposing an application, the government is responding to my concerns about Covid-19.	.93					
By proposing this application, it increases my confidence in the government.	.89					
Well-being		**.95**	**.95**	**.95**	**.90**	Falter and Hadwich (2020)
I think this StopCovid application will help me feel good again.	.96					
I think this StopCovid app will help me get my joy back.	.94					
Trust in the Future		**.94**	**.94**	**.94**	**.89**	Grewal et al. (2004)
Thanks to this application, I think we'll be able to return to a normal life.	.94					
This application will help us get out of this epidemic crisis.	.94					
Word of Mouth		**.91**	**.91**	**.91**	**.83**	Goyette et al. (2010)
I'd be proud to tell my friends and family that I use the StopCovid application …	.93					
I would say mostly positive things about the StopCovid application to those around me.	.90					

Notes: α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted.

Finally, we ran a multigroup analysis (MGA) to determine whether the data groups (e.g., installation of app vs. noninstallation of app) exhibited significant differences in their group-specific parameter estimates (e.g., outer weights, outer loadings and path coefficients). We first tested the overall model without differentiating between the data groups and then ran the MGA to test for any differences between the data groups.

To check the reliabilities and validities of the constructs, we used Cronbach's alpha (α), composite reliability (CR) and average variance extracted (AVE) indicators. For all measures, the α value was greater than .70 (Hair et al., 2016; Nunnally & Bernstein, 1994), the CR was above 0.70 (Fornell & Larcker, 1981; Hair et al., 2016), and the AVE exceeded 0.50 (Bagozzi & Yi, 1988; Barclay et al., 1995; Fornell & Larcker, 1981; Hair et al., 2016) (see Table 3). To limit common effect bias, our questionnaire was built in a way that did not follow the order of the model construct. Moreover, in the middle of the questionnaire we put a verification question to make sure that respondents were taking the questionnaire correctly. Moreover, we used CFA and multicollinearity to check that there were no issues with common method bias (Kock, 2015). We used the heterotrait–monotrait ratio (HTMT) method to assess and confirm the discriminant validity of the measures as an alternative to the Fornell-Larcker criterion (Henseler et al., 2015). Convergent validity and variance inflation factor (VIF) did not show issues in terms of multicollinearity (VIF scores below 10) and the validity of the model (Fox et al., 2021). Finally, we evaluated R-square, Q-square and model fit using the standardised root mean square residual (SRMR) and normed fit index (NFI) indicators. Perceived value showed a high predictive value ($R^2 = 0.790$; $Q^2 = 0.622$), as did trust in government v ($R^2 = 0.754$; $Q^2 = 0.572$), well-being ($R^2 = 0.620$; $Q^2 = 0.519$), trust in the future ($R^2 = 0.749$; $Q^2 = 0.616$) and WOM ($R^2 = 0.873$; $Q^2 = 0.78$). The SRMR values were below 0.08 (0.056), and the NFI (0.917) also confirmed a good fit (Hu & Bentler, 1998).

4. Results

4.1. Overall results

Regarding H1, which was related to the effects of benefits on perceived value, we found significant effects of the benefits of utility ($\gamma = 0.360$, $t = 7.475$, $p < .000$) and status ($\gamma = 0.227$, $t = 5.142$, $p < .000$), supporting H1a and H1b. That is, both benefits were found to have significant effects on perceived value, though the utility effect is greater. In support of H2a–c, we also observed significant negative effects of privacy ($\gamma = -0.096$, $t = 2.590$, $p < .05$), intrusiveness ($\gamma = -0.107$, $t = 2.689$, $p < .05$) and risk ($\gamma = -0.276$, $t = 4.958$, $p < .000$). Risk had the most significant negative effect on perceived value. The second part of the model showed significant effects of perceived value on trust in government ($\beta = 0.868$, $t = 59.399$, $p < .000$), well-being ($\beta = 0.787$, $t = 43.481$, $p < .000$) and trust in the future ($\beta = 0.865$, $t = 59.919$, $p < .000$), supporting H3–H5. Then, in the third part of the model, we tested the relationships of four variables (i.e., perceived value, trust in government, well-being and trust in the future) with WOM. The relationship between trust in government and WOM was not significant ($\beta = .089$, $t = 1.231$, $p > .05$), so we had to reject H6b. However, we found a significant effect of perceived value ($\beta = 0.400$, $t = 5.541$, $p < .000$), well-being ($\beta = 0.355$, $t = 6.059$, $p < .000$) and trust in the future ($\beta = 0.149$, $t = 1.904$, $p < .05$) on WOM, as predicted by H4a, H4c and H4d (see Fig. 2) (see Table 4).

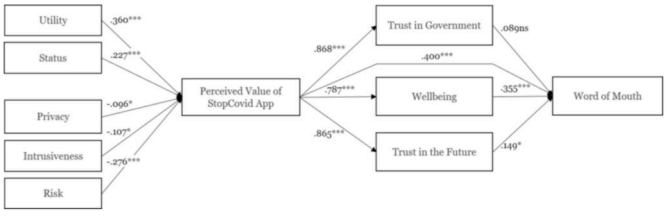

Fig. 2. Model with path results. *p < .05. **p < .01. ***p < .00.

Table 4
Bootstrapping path coefficients.

	M	SD	*t*-value	*p*-value	*H*	*Sig.*
Utility - > Perceived Value	.360	.048	7.475	.000	H1a	***
Status - > Perceived Value	.227	.044	5.142	.000	H1b	***
Privacy - > Perceived Value	-.096	.037	2.590	.005	H2a	*
Intrusiveness - > Perceived Value	-.107	.040	2.689	.004	H2b	*
Risk - > Perceived Value	-.276	.056	4.958	.000	H2c	***
Perceived Value - > Trust in Government	.868	.015	59.399	.000	H3	***
Perceived Value - > Well-being	.787	.018	43.481	.000	H4	***
Perceived Value - > Trust in the Future	.865	.014	59.919	.000	H5	***
Perceived Value - > Word of Mouth	.400	.072	5.541	.000	H6a	***
Trust in Government - > Word of Mouth	.089	.073	1.231	.109	H6b	ns
Well-being - > Word of Mouth	.355	.059	6.059	.000	H6c	***
Trust in the Future - > Word of Mouth	.149	.078	1.904	.028	H6d	*

Notes: M = mean; H = hypothesis; SD = standard deviation.
*p < .05. **p < .01. ***p < .001.

4.2. MGA results

We ran several MGAs to test the moderating effects of the various factors related to the pandemic situation. Our first MGA analysis consisted of testing the moderating effects of gender and age (see Table 5). Regarding gender, we observed two differences: privacy concerns had a greater effect on perceived value for men (γ diff = 0.151, $p < .05$), and perceived value had a greater effect on WOM for women (β diff = 0.243, $p < .05$). We found four differences regarding age: The status effect on perceived value was greater for those aged 18–54 years (γ diff = 0.146, $p < .05$); the effects of perceived value on trust in the future (β diff = −0.63, $p < .05$) and well-being (β diff = −0.72, $p < .05$) were greater for those older than 55 years; and the effect of trust in government on WOM was also greater among this older category (β diff = −0.363, $p < .05$).

Regarding the moderating effect of mobile app installation, we found that those who installed and used the mobile app indicated greater effects of perceived value on WOM (β diff = .370, $p < .05$), of trust in the future on WOM (β diff = −0.779, $p < .05$) and of well-being on WOM (β diff = 0.297, $p < .05$). The effect of perceived value on well-being was greater for the group that did not install the app (β diff = −0.292, $p < .000$).

The second part of the MGA, which was related to media trust, showed one difference regarding trust in government media, two differences regarding trust in mass media and three differences regarding trust in alternative media (see Table 5). First, only the effect of the perceived value effect on well-being was greater for those with low levels of trust in government media (β diff = −0.150, $p < .05$). In this group, we found a greater effect of perceived value on well-being (β diff = −.135, $p < .05$) and a weaker effect of trust in government media on

Table 5
Multi-group comparison test results.

	Various Moderators			Trust in Media					Trust in Government			Health		
	Gender	Age	*Mobile App*	Gov.	Mass Media	Alternative	Social Media	YouTube	Gov. Efficiency	Gov. Council	Heterodox scientists	Personal Covid-19 Symptoms	Friend/Family Covid-19 Symptoms	Feelings during Covid
Intrusiveness - > Perceived Value	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.
Perceived Value - > Trust in Government	ns.	ns.	ns.	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.
Perceived Value - > Trust in the Future	ns.	***sig.***	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.
Perceived Value - > Well-being	ns.	***sig.***	***sig.***	***sig.***	***sig.***	***sig.***		ns.	***sig.***	***sig.***	ns.	ns.	***sig.***	ns.
Perceived Value - > Word of Mouth	***sig.***	ns.	***sig.***	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.
Privacy - > Perceived Value	***sig.***	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.	ns.	ns.	***sig.***
Risk - > Perceived Value	ns.	ns.	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	***sig.***	***sig.***
Status - > Perceived Value	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.
Trust in Government - > Word of Mouth	ns.	***sig.***	ns.	ns.	***sig.***	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.
Trust in the Future - > Word of Mouth	ns.	ns.	***sig.***	ns.	ns.	ns.	***sig.***	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.
Utility - > Perceived Value	ns.	ns.	ns.	ns.	ns.	ns.	ns.	ns.	ns.	ns.	ns.	ns.	***sig.***	ns.
Well-being - > Word of Mouth	ns.	ns.	***sig.***	ns.	ns.	ns.	***sig.***	ns.	ns.	ns.	ns.	ns.	ns.	ns.

WOM (β diff = 0.264, $p < .05$). Second, the group with high levels of trust in alternative media showed a greater effect of intrusiveness on perceived value (γ diff = −.241, $p < .05$) and of perceived value on well-being (β diff = 0.072, $p < .05$). However, for the group with low levels of trust, we observed a greater effect of privacy on perceived value (γ diff = .126, $p < .05$).

Regarding social media behaviour as moderators, such as YouTube use, we observed a difference as well: low levels of use were related to the effect of risk on perceived value (γ diff = 0.290, $p < .05$). For those with low levels of social media use, we found greater effects of perceived value on trust in the future (β diff = −0.077, $p < .05$), of trust in the government on WOM (β diff = −0.181, $p < .05$) and of trust in the future on WOM (β diff = −0.371, $p < .05$). Those with high levels of social media use showed greater effects of perceived value on WOM (β diff = 0.368, $p < .05$) and of well-being on WOM (β diff = 0.189, $p < .05$).

Regarding trust, we tested the moderating effects of (1) the efficiency of government action against COVID-19, (2) trust in the government council and (3) trust in heterodox (nonconforming) scientists (see Table 4). We found few differences regarding trust in the government council and trust in heterodox scientists; only the moderator of a low level of trust in the government council showed a greater effect of perceived value on well-being (β diff = −0.069, $p < .05$), whereas a high level of trust in heterodox scientists showed greater effects of intrusiveness on perceived value (γ diff = −0.167, $p < .05$) and of perceived value on trust in the future (β diff = 0.069, $p < .05$). In addition, the group evaluating the French government's action against COVID-19 as efficient noted greater effects of status on perceived value (γ diff = −0.085, $p < .05$) and of perceived value on trust in government (β diff = −0.196, $p < .05$). Conversely, those who evaluated the French government's actions as inefficient indicated greater effects of perceived value on well-being (β diff = −0.102, $p < .05$) and of trust in the future on WOM (β diff = 0.304, $p < .05$).

The fourth part of our MGA focused on health factors. We tested the moderating effects of having experienced COVID-19 symptoms oneself, of having friends/family experience COVID-19 symptoms and of feelings experienced during the pandemic. For those moderating effects dealing with COVID-19 symptoms, we divided the two groups each time by taking yes or no responses. For the feelings experienced, we focused on the overall measure of feeling by 'good' or 'bad' feeling using Osgood et al.'s (1957) 10-item semantic differential scale. We formed one group of people with scores from 1 to 5 (bad) and a second group with scores from 6 to 10 (good). We found no effects for the moderator 'having experienced COVID-19 symptoms' and two differences for the moderator 'feelings experienced during the pandemic'. Feeling good during the pandemic led to a greater negative effect of privacy on perceived value (γ diff = −0.190, $p < .05$), whereas feeling bad during the pandemic indicated a greater negative effect of risk on perceived value (γ diff = 0.186, $p < .05$). The moderator of whether friends/family had experienced COVID-19 symptoms showed greater effects for the 'non-experience of symptoms' group, including the effects of risk on perceived value (γ diff = .214, $p < .05$), of perceived value on well-being (β diff = −0.121, $p < .05$) and of perceived value on WOM (β diff = −0.402, $p < .05$). However, for the 'experienced symptoms' group, we observed greater effects of utility on perceived value (γ diff = .298, $p < .001$) and of trust in government on WOM (β diff = 0.469, $p < .05$). Therefore, all the effects were at least partially validated (Table 5).

5. Discussion

5.1. Theoretical contributions

In a pandemic context, the utility of a mobile tracing app is an important benefit, and risk is an important cost. These results are in line with previous research (Cocosila & Trabelsi, 2016; Kleijnen et al., 2007). However, our findings highlight that people are concerned about the risk that their personal information will be used for nonpandemic

purposes; in the pandemic, privacy costs have a very low effect on perceived value. Here, users (i.e., citizens) are more willing to provide personal data to help fight the virus than they would be to disclose it in traditional contexts, such as to private companies (Wottrich et al., 2018). This is in line with the idea of reversibility, which leads to the social acceptance of tracing apps (Georgieva et al., 2021). If personal data are only used in a specific context, citizens will accept sharing their personal information. This is in line with the research of Matt (2021) and Wnuk et al. (2021) showing the importance of prosocial behaviours and social benefits. Our research has considered both the risks and benefits of studying app adoption or intent to download the tracing app, which is in line with previous studies (e.g., Fox et al., 2021; Trang et al., 2020). Therefore, we argue that the concept of perceived value is central to understanding psychological meanings in the specific case of contact-tracing apps.

Our research has three main contributions. First, we establish strong links between perceived value and trust in government, well-being and trust in the future. We contribute to the literature on perceived value, here applied in the context of digital contact-tracing apps. To the best of our knowledge, no study has been conducted on well-being and trust in the future in the context of digital contact-tracing apps. In this context, citizens want the pandemic to end and return to life before the pandemic started. Theoretically, this completely new finding shows how a tool such as a mobile app can significantly reassure people. In our study, we call the combination of these three variables 'psychological reassurance', which is linked to 'thinking about the future'. If citizens trust their government, perceive themselves to be in good physical and mental health and are optimists regarding the future, they will be reassured. The government is essential during a crisis because politicians take measures that impact the overall population, so they must be able to develop trust (Hamm et al., 2019), which relies on politicians' capacity to divulgate accurate information (Rowe et al., 2020) and not to be contradictory (Touzani et al., 2021). The less a society trusts its government, the less successful government-led approaches will be and the less the citizens will be reassured. In the context of contact-tracing apps, if citizens perceive benefits from governmental surveillance technologies (Nam, 2018) and if they perceive the legitimacy of the government (Bradshaw et al., 2021), the app could be accepted (Altmann et al., 2020; Thompson et al., 2020). Our study demonstrates that the perceived value of the app positively affects trust in government, even if privacy exists. This means that people will be in a good mental state when the government develops (or tries to develop) tools that have the objective of 'flattening the curve'.

Well-being is associated with quality of life, happiness and a sense of self-esteem (Diener et al., 2010). During the COVID-19 crisis, well-being was affected because of lockdowns, anxiety, deaths and physical distance from family and friends (Xu et al., 2021). Our study shows a positive impact of perceived value on well-being. This means that the app has the potential to develop the psychological perception of 'the return of normality'. In addition, in the context of the contact-tracing app, the notion of time has been explored by two longitudinal studies (Fox et al., 2021; Wnuk et al., 2021); these studies highlight that the acceptance of an app or trust (over the time) in digital contact-tracing apps will vary based on the situation (i.e., lockdown, early period of crisis, mandated approach by governments, return to normalcy, etc.). Our results show that app perceived value positively affect trust in the future and can help people develop a form of optimism regarding when the crisis will end. The strong link between the perceived value of the app and three variables related to psychological reassurance is a good thing (from a human point of view) because people, even if the crisis is long and trying, have good intentions and hope for the future. From a theoretical point of view, this means that the implementation of a tool developed by the government during a crisis—when it is recognised as a solution to help citizens—is appreciated. In our study, the MGA analysis shows that psychological reassurance not only exists for people who have downloaded the app, but also for people who did not. This is an interesting theoretical contribution. Therefore, the originality of the present study consists of showing the reassurance effect of a mobile app in a pandemic context. Indeed, even though most people do not have the StopCovid app installed, the results show that people are greatly reassured by the launch of the mobile app. The indirect information given by the government to the people is that 'we are doing something to fight the pandemic'. This information seems to be enough to reassure people. This idea of psychological reassurance could be used in research on decision making or technology adoption when governments take action in specific contexts (natural disaster, epidemics, war, attacks, etc.). If the service/tool/actions provided by the government are not used or applied, this could lead to misinterpretation that people do not like or are rejecting it. However, this also could lead to an interpretation that suggests that people have in mind the actions taken by their politicians and are experiencing a psychological reassurance effect.

Second, we used the MGA to compare our variables on two groups of French citizens and analyse the impact of various moderators. First, those who installed the mobile app expressed stronger links regarding WOM. In this group, perceived value, trust in the future and well-being strongly affect WOM, such that people who use the StopCovid app are more likely to encourage their friends and families to use it. This result is in line with Lockey et al. (2021), who show that, depending on demographics, the rate of adoption will change. People have different behaviours, and it is important to consider all people when an app is designed because doing so will influence perceived value, psychological meanings or intention to recommend the app. Second—and not surprisingly—those who rate the government's virus-fighting efficiency as high show stronger effects of status on perceived value and, in turn, of perceived value on trust in the government. In contrast, those who give the government a low efficiency rating show stronger effects of perceived value on well-being and of trust in the future on WOM. That is, for the former group, the StopCovid app reinforces status and trust in the government, whereas for the latter group, it fosters well-being and WOM. Third, our study shows that those whose friends/families have experienced COVID-19 symptoms show a greater effect of utility on perceived value and trust in the government on WOM, whereas those whose friends/families have not experienced COVID-19 symptoms are more oriented to well-being and concerned by the risks of using the StopCovid app. This is in line with studies on prosocialism (Trang et al., 2020; Wnuk et al., 2021) and disease concerns (Chan & Saqib, 2021). During a crisis, the social view predominates individual behaviours. People tend to be more social by bypassing their individual needs for the well-being of society and think 'We' instead of 'I'.

Third, our results show that psychological reassurance is an important factor in influencing WOM. By projecting into the future, people can potentially diffuse their perceptions to other people, leading to a more social view. During a crisis, there are discussions, fake news, critics and conspiracy theories against actions taken by governments, which can lead to disproportional privacy concerns (Visentin et al., 2021). In our study, we show that privacy is important to consider but will not negatively influence the perceived value of the app. Hence, the diffusion about the benefits of the app, especially psychological reassurance, would be expected, even if the app has been downloaded (or not).

5.2. Practical contributions

The StopCovid app, which was launched after the first wave of the virus, was considered less appealing than its second version, TousAntiCovid[1] (2.5 million downloads of StopCovid vs. 10 million downloads of TousAntiCovid). However, even the second version of the app has achieved limited success. Based on our results, we argue that the success of this type of mobile app depends on its usefulness and risks. It is essential to be transparent about the privacy, usage of the data and source code

[1] English translation: 'All Against Covid'.

used. Therefore, governments should demonstrate the app's usefulness more clearly and reassure people regarding any risks by reinforcing security or reversibility (Georgieva et al., 2021). Furthermore, we suggest that one way to increase the number of downloads is to communicate how the app will help people fight the virus and look forward to a better future. With this type of communication, which is both individual and social, the government can attempt to develop a meaning of prosocialism, contributing to a better life and 'taking care of others'. Finally, the current study highlights the fact that in a pandemic context, it is crucial to reassure people through concrete actions, such as the launch of the StopCovid app. Indeed, people will not focus on the efficiency of the mobile app, but rather, they will look at the fact that the government is doing its best to stop the pandemic. We should add that the rate of app downloads is *crucial* but not *essential*. It is true that a contact-tracing app helps ease the pandemic (Ferretti et al., 2020). However, reassuring people is a good starting point for the government, and the low adoption rate should not be interpreted binarily as a failure. Reluctance can exist at the beginning and over time (and different situations) should diminish, with increasing downloads if people perceive that the app is valuable for them.

5.3. Limitations and implications for research

We conducted the current study during the first wave of the COVID-19 pandemic, when the virus was not as well-known as at the beginning of 2021. We did not consider people's levels of fear because we were not comparing the two periods. Therefore, our results reflect a sample in which a large number of people had not yet installed the app, so its perceived value could be specific to that period. Further research should investigate whether the evolution of the virus has moderated perceptions of the app's value and, more specifically, whether it can still positively affect trust in the future, trust in the government and well-being. We could also extend our research by investigating the impact of vaccination campaigns on the reassurance effect. Because the vaccine could affect health, the results could be quite different on the reassurance effect. Our work shows that in health contexts, people are less concerned with privacy; it would be interesting to know whether it is the context or the government source of the app that better explains this lack of concern.

6. Conclusion

Our study investigates the role of a government-issued mobile tracing app in a pandemic context. The results show that this kind of tool can help reassure people by giving them hope, building their trust in the government and making them feel that the government is doing its best to end the pandemic. In a context in which some groups have lost faith in the government, our results show that mobile apps, such as StopCovid, can help people regain their trust in the government and in the future.

Appendix 1

Multi-group comparison test results (general factors).

	General Factors														
	Gender (Female vs. Male)					Age (18/54 vs. 55+)					Installation of StopCovid Mobile App				
	β Female	β Male	β diff	*p*-value diff	*Sig*	β 18/54	β 55+	B diff	*p*-value diff	*Sig*	β Yes	β No	β diff	*p*-value diff	*Sig*
Intrusiveness - > Perceived Value	-.162	-.079	-.083	.156	*No*	-.106	-.098	-.007	.461	*No*	-.011	-.115	.103	.196	*No*
Perceived Value - > Trust in Government	.866	.872	-.006	.415	*No*	.869	.864	.005	.437	*No*	.816	.853	-.037	.240	*No*
Perceived Value - > Trust in the Future	.848	.880	-.032	.134	*No*	.840	.903	-.063	.007	***Yes***	.740	.855	-.115	.091	*No*
Perceived Value - > Well-being	.759	.815	-.056	.057	*No*	.759	.831	-.072	.020	***Yes***	.494	.786	-.292	.000	***Yes***
Perceived Value - > Word of Mouth	.518	.275	.243	.049	***Yes***	.485	.276	.209	.076	*No*	.714	.344	.370	.038	***Yes***
Privacy - > Perceived Value	-.007	-.158	.151	.031	***Yes***	-.123	-.032	-.091	.128	*No*	-.277	-.069	-.208	.082	*No*
Risk - > Perceived Value	-.273	-.281	.008	.463	*No*	-.222	-.409	.187	.061	*No*	-.183	-.290	.107	.283	*No*
Status - > Perceived Value	.219	.235	-.017	.411	*No*	.268	.122	.146	.049	***Yes***	.313	.211	.102	.300	*No*
Trust in Government - > Word of Mouth	.046	.123	-.077	.305	*No*	-.062	.301	-.363	.005	***Yes***	.177	.078	.099	.433	*No*
Trust in the Future - > Word of Mouth	.151	.128	.023	.453	*No*	.183	.098	.086	.310	*No*	-.540	.239	-.779	.007	***Yes***
Utility - > Perceived Value	.396	.314	.082	.197	*No*	.360	.383	-.023	.407	*No*	.434	.367	.067	.439	*No*
Well-being - > Word of Mouth	.281	.467	-.186	.063	*No*	.378	.343	.034	.380	*No*	.632	.335	.297	.028	***Yes***

Appendix 2

Multi-group comparison test results (media trust).

	Trust in Media														
	Government Media	Mass Media	Alternative Media												
	β High	β Low	β diff	*p*-value diff	*Sig*	β High	β Low	β diff	*p*-value diff	*Sig*	β High	β Low	β diff	*p*-value diff	*Sig*
Intrusiveness - > Perceived Value	-.125	-.101	-.025	.384	*No*	-.086	-.115	.029	.351	*No*	-.272	-.031	-.241	.008	***Yes***
Perceived Value - > Trust in Government	.844	.832	.013	.353	*No*	.834	.854	-.020	.324	*No*	.893	.855	.039	.094	*No*
Perceived Value - > Trust in the Future	.822	.842	-.019	.294	*No*	.813	.864	-.051	.078	*No*	.874	.859	.015	.310	*No*
Perceived Value - > Well-being	.658	.809	-.150	.001	***Yes***	.674	.809	-.135	.002	***Yes***	.836	.764	.072	.022	***Yes***
Perceived Value - > Word of Mouth	.473	.374	.099	.256	*No*	.306	.439	-.133	.176	*No*	.382	.399	-.016	.441	*No*
Privacy - > Perceived Value	-.153	-.073	-.080	.162	*No*	-.109	-.087	-.022	.404	*No*	-.013	-.138	.126	.032	***Yes***
Risk - > Perceived Value	-.190	-.292	.102	.210	*No*	-.368	-.236	-.131	.137	*No*	-.252	-.274	.022	.448	*No*
Status - > Perceived Value	.256	.209	.047	.325	*No*	.216	.233	-.017	.431	*No*	.264	.213	.050	.301	*No*
Trust in Government - > Word of Mouth	.040	.030	.011	.473	*No*	.247	-.017	.264	.035	***Yes***	.254	.036	.218	.089	*No*
Trust in the Future - > Word of Mouth	.074	.191	-.117	.237	*No*	.169	.112	.056	.348	*No*	.058	.197	-.139	.183	*No*
Utility - > Perceived Value	.363	.385	-.022	.409	*No*	.275	.398	-.124	.115	*No*	.249	.412	-.163	.084	*No*
Well-being - > Word of Mouth	.432	.371	.061	.323	*No*	.297	.439	-.142	.109	*No*	.310	.354	-.043	.372	*No*

Appendix 3

Multi-group comparison test results (Social Media Behaviors).

	Social Media Behaviors									
	Social Media Usage	YouTube Usage								
	β High	β Low	β diff	*p*-value diff	*Sig*	β High	β Low	β diff	*p*-value diff	*Sig*
Intrusiveness - > Perceived Value	-.118	.008	-.126	.136	*No*	-.128	-.040	-.088	.173	*No*
Perceived Value - > Trust in Government	.861	.899	-.038	.134	*No*	.887	.869	.018	.274	*No*
Perceived Value - > Trust in the Future	.853	.930	-.077	.017	***Yes***	.860	.860	.001	.494	*No*
Perceived Value - > Well-being	.784	.794	-.010	.386	*No*	.812	.766	.047	.139	*No*
Perceived Value - > Word of Mouth	.442	.074	.368	.003	***Yes***	.430	.359	.071	.343	*No*
Privacy - > Perceived Value	-.091	-.207	.116	.107	*No*	-.109	-.044	-.065	.238	*No*
Risk - > Perceived Value	-.250	-.384	.134	.154	*No*	-.190	-.480	.290	.012	***Yes***
Status - > Perceived Value	.244	.271	-.027	.408	*No*	.260	.151	.109	.125	*No*
Trust in Government - > Word of Mouth	.052	.233	-.181	.003	***Yes***	.050	.072	-.022	.450	*No*
Trust in the Future - > Word of Mouth	.117	.488	-.371	.003	***Yes***	.082	.210	-.128	.255	*No*
Utility - > Perceived Value	.361	.244	.116	.181	*No*	.386	.320	.066	.251	*No*
Well-being - > Word of Mouth	.384	.196	.189	.003	***Yes***	.423	.359	.064	.307	*No*

Appendix 4

Multi-group comparison test results (Government Trust).

	Trust in Government														
	Efficiency of Government Action Against COVID-19					Government Council					Heterodox Scientists				
	β Low	β High	β diff	*p*-value diff	*Sig*	β High	β Low	β diff	*p*-value diff	*Sig*	β High	β Low	β diff	*p*-value diff	*Sig*
Intrusiveness - > Perceived Value	-.135	-.066	-.069	.193	*No*	-.108	-.089	-.018	.416	*No*	-.199	-.032	-.167	.018	***Yes***
Perceived Value - > Trust in Government	.808	.894	-.085	.004	***Yes***	.858	.824	.034	.177	*No*	.869	.868	.000	.495	*No*
Perceived Value - > Trust in the Future	.845	.832	.012	.369	*No*	.859	.820	.039	.133	*No*	.904	.835	.069	.008	***Yes***
Perceived Value - > Well-being	.801	.698	.102	.008	***Yes***	.727	.797	-.069	.049	***Yes***	.817	.773	.043	.113	*No*
Perceived Value - > Word of Mouth	.365	.421	-.057	.366	*No*	.461	.376	.084	.284	*No*	.416	.383	.033	.426	*No*
Privacy - > Perceived Value	-.098	-.134	.036	.320	*No*	-.142	-.078	-.064	.215	*No*	-.030	-.138	.108	.071	*No*
Risk - > Perceived Value	-.272	-.242	-.031	.404	*No*	-.222	-.304	.082	.231	*No*	-.256	-.285	.029	.402	*No*
Status - > Perceived Value	.133	.329	-.196	.017	***Yes***	.262	.187	.075	.221	*No*	.288	.182	.106	.121	*No*
Trust in Government - > Word of Mouth	-.039	.194	-.233	.100	*No*	.109	-.077	.185	.111	*No*	.064	.123	-.059	.353	*No*
Trust in the Future - > Word of Mouth	.288	-.017	.304	.026	***Yes***	.054	.212	-.158	.170	*No*	.184	.114	.070	.335	*No*
Utility - > Perceived Value	.423	.322	.101	.154	*No*	.364	.380	-.016	.434	*No*	.284	.421	-.138	.085	*No*
Well-being - > Word of Mouth	.344	.426	-.082	.284	*No*	.381	.454	-.072	.293	*No*	.324	.373	-.048	.350	*No*

Appendix 5

Multi-group comparison test results (Health).

	Health														
	Personal Experience of Covid-19 Symptoms	Friends/Family Experience of Covid-19 Symptoms	Feelings during Pandemic												
	β Yes	β No	β diff	*p*-value diff	*Sig*	β Yes	β No	β diff	*p*-value diff	*Sig*	β Good	β Bad	β diff	*p*-value diff	*Sig*
Intrusiveness - > Perceived Value	-.234	-.105	-.129	.209	*No*	.019	-.136	.155	.065	*No*	-.083	-.132	.048	.269	*No*
Perceived Value - > Trust in Government	.897	.865	.032	.271	*No*	.832	.879	-.048	.115	*No*	.863	.878	-.015	.296	*No*
Perceived Value - > Trust in the Future	.823	.871	-.048	.263	*No*	.823	.876	-.053	.091	*No*	.873	.857	.015	.303	*No*
Perceived Value - > Well-being	.781	.788	-.007	.468	*No*	.695	.816	-.121	.006	***Yes***	.766	.817	-.051	.064	*No*
Perceived Value - > Word of Mouth	.259	.412	-.153	.269	*No*	.129	.531	-.402	.004	***Yes***	.413	.381	.033	.414	*No*
Privacy - > Perceived Value	-.225	-.080	-.146	.165	*No*	-.165	-.078	-.087	.199	*No*	-.197	-.008	-.190	.007	***Yes***
Risk - > Perceived Value	-.129	-.287	.159	.203	*No*	-.126	-.339	.214	.049	***Yes***	-.180	-.365	.186	.049	***Yes***
Status - > Perceived Value	.146	.234	-.088	.289	*No*	.200	.239	-.039	.340	*No*	.276	.184	.091	.151	*No*
Trust in Government - > Word of Mouth	.206	.080	.126	.399	*No*	.423	-.046	.469	.007	***Yes***	.069	.110	-.041	.379	*No*

(*continued on next page*)

(*continued*)

	Health														
	Personal Experience of Covid-19 Symptoms	Friends/Family Experience of Covid-19 Symptoms	Feelings during Pandemic												
	β Yes	β No	β diff	*p*-value diff	*Sig*	β Yes	β No	β diff	*p*-value diff	*Sig*	β Good	β Bad	β diff	*p*-value diff	*Sig*
Trust in the Future - > Word of Mouth	.159	.150	.009	.476	*No*	.118	.135	-.017	.433	*No*	.189	.059	.130	.211	*No*
Utility - > Perceived Value	.308	.360	-.052	.368	*No*	.577	.279	.298	.001	***Yes***	.352	.355	-.002	.498	*No*
Well-being - > Word of Mouth	.367	.350	.017	.416	*No*	.331	.369	-.038	.409	*No*	.335	.428	-.093	.249	*No*

References

Abramowitz, J. S., & Braddock, A. E. (2008). *Psychological Treatment of health Anxiety and hypochondriasis: A biopsychosocial approach (1er édition)*. Hogrefe & Huber.

Altmann, S., Milsom, L., Zillessen, H., Blasone, R., Gerdon, F., Bach, R., Kreuter, F., Nosenzo, D., Toussaert, S., & Abeler, J. (2020). Acceptability of app-based contact tracing for COVID-19: Cross-country survey study. *JMIR MHealth and UHealth, 8*(8), Article e19857. https://doi.org/10.2196/19857

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science, 16*(1), 74–94. https://doi.org/10.1007/BF02723327

Barclay, D. W., Thompson, R., & Higgins, C. (1995). The partial least squares (PLS) approach to causal modeling: Personal computer use as an illustration. *Technology Studies, 2*(2), 285–309.

Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior, 111*, 106424. https://doi.org/10.1016/j.chb.2020.106424

Bond, S. D., He, S. X., & Wen, W. (2019). Speaking for "free": Word of mouth in free- and paid-product settings. *Journal of Marketing Research, 56*(2), 276–290. https://doi.org/10.1177/0022243718821957

Bradshaw, E. L., Ryan, R. M., Noetel, M., Saeri, A. K., Slattery, P., Grundy, E., & Calvo, R. (2021). Information safety assurances increase intentions to use COVID-19 contact tracing applications, regardless of autonomy-supportive or controlling message framing. *Frontiers in Psychology, 11*, 3772. https://doi.org/10.3389/fpsyg.2020.591638

Brem, A., Viardot, E., & Nylund, P. A. (2021). Implications of the coronavirus (COVID-19) outbreak for innovation: Which technologies will improve our lives? *Technological Forecasting and Social Change, 163*, 120451. https://doi.org/10.1016/j.techfore.2020.120451

Brown, R. J., Skelly, N., & Chew-Graham, C. A. (2020). Online health research and health anxiety: A systematic review and conceptual integration. *Clinical Psychology: Science and Practice, 27*(2), Article e12299. https://doi.org/10.1111/cpsp.12299

Buchanan, W., Imran, M., Pagliari, C., Pell, J., & Rimpiläinen, S. (2020). *Use of participatory apps in contact tracing – options and implications for public health, privacy and trust*. University of Strathclyde. https://doi.org/10.17868/73197

Buttle, F. A. (1998). Word of mouth: Understanding and managing referral marketing. *Journal of Strategic Marketing, 6*(3), 241–254.

CDC. (2020). *March 28). COVID-19 cases, deaths, and Trends in the US | CDC COVID data tracker*. Centers for Disease Control and Prevention. https://covid.cdc.gov/covid-data-tracker.

Chanley, V. A., Rudolph, T. J., & Rahn, W. M. (2000). The origins and consequences of public trust in government: A time series analysis. *The Public Opinion Quarterly, 64*(3), 239–256.

Chan, E. Y., & Saqib, N. U. (2021). Privacy concerns can explain unwillingness to download and use contact tracing apps when COVID-19 concerns are high. *Computers in Human Behavior, 119*, 106718. https://doi.org/10.1016/j.chb.2021.106718

Chellappa, R., & Pavlou, P. (2002). *Perceived information security, financial liability and consumer trust in electronic commerce transactions*. https://doi.org/10.1108/09576050210447046

Chen, Q., Min, C., Zhang, W., Wang, G., Ma, X., & Evans, R. (2020). Unpacking the black box: How to promote citizen engagement through government social media during the COVID-19 crisis. *Computers in Human Behavior, 110*, 106380. https://doi.org/10.1016/j.chb.2020.106380

Choudrie, J., Banerjee, S., Kotecha, K., Walambe, R., Karende, H., & Ameta, J. (2021). Machine learning techniques and older adults processing of online information and misinformation: A covid 19 study. *Computers in Human Behavior, 119*, 106716. https://doi.org/10.1016/j.chb.2021.106716

Cocosila, M., & Trabelsi, H. (2016). An integrated value-risk investigation of contactless mobile payments adoption. *Electronic Commerce Research and Applications, 20*, 159–170. https://doi.org/10.1016/j.elerap.2016.10.006

ComScore. (2019). *Global state of mobile (2019 report* (p. 53).

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

Davis, M., Stephenson, N., & Flowers, P. (2011). Compliant, complacent or panicked? Investigating the problematisation of the Australian general public in pandemic influenza control. *Social Science & Medicine, 72*(6), 912–918. https://doi.org/10.1016/j.socscimed.2011.01.016

Dewey, J. (1939). *Theory of valuation vol Ii*. http://archive.org/details/in.ernet.dli.2015.204950.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D. W., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research, 97*(2), 143–156.

Dijkstra, T. K., & Henseler, J. (2015). Consistent partial least squares path modeling. *MIS Quarterly, 39*(2), 297–316. https://doi.org/10.25300/MISQ/2015/39.2.02

Duan, S. X., & Deng, H. (2021). Hybrid analysis for understanding contact tracing apps adoption. *Industrial Management & Data Systems, 121*(7), 1599–1616. https://doi.org/10.1108/IMDS-12-2020-0697

Falter, M., & Hadwich, K. (2020). Customer service well-being: Scale development and validation. *The Service Industries Journal, 40*(1–2), 181–202. https://doi.org/10.1080/02642069.2019.1652599

Ferretti, L., Wymant, C., Kendall, M., Zhao, L., Nurtay, A., Abeler-Dörner, L., Parker, M., Bonsall, D., & Fraser, C. (2020). Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing. *Science, 368*(6491). https://doi.org/10.1126/science.abb6936

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39. https://doi.org/10.2307/3151312

Fox, G., Clohessy, T., van der Werff, L., Rosati, P., & Lynn, T. (2021). Exploring the competing influences of privacy concerns and positive beliefs on citizen acceptance of contact tracing mobile applications. *Computers in Human Behavior, 121*, 106806. https://doi.org/10.1016/j.chb.2021.106806

Garfin, D. R., Silver, R. C., & Holman, E. A. (2020). The novel coronavirus (COVID-2019) outbreak: Amplification of public health consequences by media exposure. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association, 39*(5), 355–357. https://doi.org/10.1037/hea0000875

Geisser, S. (1975). The predictive sample reuse method with applications. *Journal of the American Statistical Association, 70*(350), 320–328. https://doi.org/10.2307/2285815

Georgieva, I., Beaunoyer, E., & Guitton, M. J. (2021). Ensuring social acceptability of technological tracking in the COVID-19 context. *Computers in Human Behavior, 116*, 106639. https://doi.org/10.1016/j.chb.2020.106639

Gerli, P., Arakpogun, E. O., Elsahn, Z., Olan, F., & Prime, K. S. (2021). Beyond contact-tracing: The public value of eHealth application in a pandemic. *Government Information Quarterly, 38*(3), 101581. https://doi.org/10.1016/j.giq.2021.101581

Goyette, I., Ricard, L., Bergeron, J., & Marticotte, F. (2010). e-WOM Scale: Word-of-mouth measurement scale for e-services context. *Canadian Journal of Administrative Sciences- Revue Canadienne des Sciences de l Administration, 27*(1), 5–23. https://doi.org/10.1002/cjas.129

Grewal, R., Mehta, R., & Kardes, F. R. (2004). The timing of repeat purchases of consumer durable goods: The role of functional bases of consumer attitudes. *Journal of Marketing Research, 41*(1), 101–115.

Guitton, M. J. (2020). Cyberpsychology research and COVID-19. *Computers in Human Behavior, 111*, 106357. https://doi.org/10.1016/j.chb.2020.106357

Gutman, J. (1982). A means-end chain model based on consumer categorization processes. *Journal of Marketing, 46*, 60–72.

Hackett, K. M., Kazemi, M., & Sellen, D. W. (2018). Keeping secrets in the cloud: Mobile phones, data security and privacy within the context of pregnancy and childbirth in Tanzania. *Social Science & Medicine, 211*, 190–197. https://doi.org/10.1016/j.socscimed.2018.06.014

Hair, J., Anderson, R., Black, B., & Babin, B. (2016). *Multivariate data analysis*. Pearson Education.

Hamm, J. A., Smidt, C., & Mayer, R. C. (2019). Understanding the psychological nature and mechanisms of political trust. *PloS one, 14*(5), Article e0215835. https://doi.org/10.1371/journal.pone.0215835

Handi, H., Hendratono, T., Purwanto, E., & Ihalauw, J. J. O. I. (2018). The effect of E-WOM and perceived value on the purchase decision of foods by using the go-food application as mediated by trust. *Quality Innovation Prosperity, 22*(2), 112. https://doi.org/10.12776/qip.v22i2.1062

Henseler, J. (2010). On the convergence of the partial least squares path modeling algorithm. *Computational Statistics, 25*(1), 107–120. https://doi.org/10.1007/s00180-009-0164-x

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hetherington, M. J. (1998). The political relevance of political trust. *The American Political Science Review, 92*(4), 791–808. https://doi.org/10.2307/2586304

Holbrook, M. B. (2006). Consumption experience, customer value, and subjective personal introspection: An illustrative photographic essay. *Journal of Business Research, 59*(6), 714–725. https://doi.org/10.1016/j.jbusres.2006.01.008

Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: A web-based cross-sectional survey. *Psychiatry Research, 288*, 112954. https://doi.org/10.1016/j.psychres.2020.112954

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*(4), 424–453.

Jungmann, S. M., Brand, S., Kolb, J., & Witthöft, M. (2020). Do Dr. Google and health apps have (comparable) side effects? An experimental study. *Clinical Psychological Science, 8*(2), 306–317.

Jungmann, S. M., & Witthöft, M. (2020). Health anxiety, cyberchondria, and coping in the current COVID-19 pandemic: Which factors are related to coronavirus anxiety? *Journal of Anxiety Disorders, 73*, 102239. https://doi.org/10.1016/j.janxdis.2020.102239

Kang, J.-Y. M., & Johnson, K. K. P. (2015). Positive word-of-mouth for mobile location-based service retail apps usage. *International Journal of Mobile Communications, 13*(6), 599–618. https://doi.org/10.1504/IJMC.2015.072055

Kim, S., Baek, T. H., Kim, Y.-K., & Yoo, K. (2016). Factors affecting stickiness and word of mouth in mobile applications. *Journal of Research in Interactive Marketing, 10*(3), 177–192. https://doi.org/10.1108/JRIM-06-2015-0046

Kim, H.-W., Chan, H. C., & Gupta, S. (2007). Value-based adoption of mobile internet: An empirical investigation. *Decision Support Systems, 43*(1), 111–126. https://doi.org/10.1016/j.dss.2005.05.009

Kim, E.-S., & Chung, J.-B. (2021). Korean mothers' morality in the wake of COVID-19 contact-tracing surveillance. *Social Science & Medicine, 270*, 113673. https://doi.org/10.1016/j.socscimed.2021.113673

Kim, B., & Han, I. (2011). The role of utilitarian and hedonic values and their antecedents in a mobile data service environment. *Expert Systems with Applications, 38*(3), 2311–2318. https://doi.org/10.1016/j.eswa.2010.08.019

Kim, B., & Oh, J. (2011). The difference of determinants of acceptance and continuance of mobile data services: A value perspective. *Expert Systems with Applications, 38*(3), 1798–1804. https://doi.org/10.1016/j.eswa.2010.07.107

Kleijnen, M., de Ruyter, K., & Wetzels, M. (2007). An assessment of value creation in mobile service delivery and the moderating role of time consciousness. *Journal of Retailing, 83*(1), 33–46. https://doi.org/10.1016/j.jretai.2006.10.004

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration, 11*, 1–10. https://doi.org/10.4018/ijec.2015100101

Li, H., Edwards, S. M., & Lee, J.-H. (2002). Measuring the intrusiveness of advertisements: Scale development and validation. *Journal of Advertising, 31*(2), 37–47.

Lin, J., Carter, L., & Liu, D. (2021). Privacy concerns and digital government: Exploring citizen willingness to adopt the COVIDSafe app. *European Journal of Information Systems, 30*(4), 389–402. https://doi.org/10.1080/0960085X.2021.1920857

Linton, S. J., McCracken, L. M., & Vlaeyen, J. W. S. (2008). Reassurance: Help or hinder in the treatment of pain. *Pain, 134*(1), 5–8. https://doi.org/10.1016/j.pain.2007.10.002

Liu, S., Yang, L., Zhang, C., Xiang, Y.-T., Liu, Z., Hu, S., & Zhang, B. (2020). Online mental health services in China during the COVID-19 outbreak. *The Lancet Psychiatry, 7*(4), e17–e18. https://doi.org/10.1016/S2215-0366(20)30077-8

Lockey, S., Edwards, M. R., Hornsey, M. J., Gillespie, N., Akhlaghpour, S., & Colville, S. (2021). Profiling adopters (and non-adopters) of a contact tracing mobile application: Insights from Australia. *International Journal of Medical Informatics, 149*, 104414. https://doi.org/10.1016/j.ijmedinf.2021.104414

Mansour, & Maad. (2020). *Du rejet des masques à la « prétendue » deuxième vague comment le discours des médecins « rassuristes » a émergé*. Le Monde. https://www.lemonde.fr/les-decodeurs/article/2020/11/09/covid-19-du-rejet-des-masques-a-la-remise-en-cause-de-la-deuxieme-vague-comment-le-discours-des-medecins-rassuristes-a-emerge_6059095_4355770.html.

Matt, C. (2021). Campaigning for the greater good? – how persuasive messages affect the evaluation of contact tracing apps. *Journal of Decision Systems*, 1–18. https://doi.org/10.1080/12460125.2021.1873493, 0(0.

McKibbin, W. J., & Fernando, R. (2020). The global macroeconomic impacts of COVID-19: Seven scenarios. *CAMA Working*. https://doi.org/10.2139/ssrn.3547729. Paper No.19.

Megnin-Viggars, O., Carter, P., Melendez-Torres, G. J., Weston, D., & Rubin, G. J. (2020). Facilitators and barriers to engagement with contact tracing during infectious disease outbreaks: A rapid review of the evidence. *PLoS One, 15*(10), Article e0241473. https://doi.org/10.1371/journal.pone.0241473

Meyer, S. B., & Ward, P. R. (2008). Do your patients trust you? A sociological understanding of the implications of patient mistrust in healthcare professionals. *Australasian Medical Journal, 1*. https://dspace.flinders.edu.au/xmlui/handle/2328/26516.

Miltgen, C. L., Cases, A.-S., & Russell, C. A. (2019). Consumers' responses to facebook advertising across PCs and mobile phones: A model for assessing the drivers of approach and avoidance of facebook ads. *Journal of Advertising Research, 59*(4), 414–432. https://doi.org/10.2501/JAR-2019-029

Nam, T. (2018). Untangling the relationship between surveillance concerns and acceptability. *International Journal of Information Management, 38*(1), 262–269. https://doi.org/10.1016/j.ijinfomgt.2017.10.007

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Nysveen, H., Pedersen, P. E., & Thorbjørnsen, H. (2005). Intentions to use mobile services: Antecedents and cross-service comparisons. *Journal of the Academy of Marketing Science, 33*(3), 330. https://doi.org/10.1177/0092070305276149

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning* (p. 342). Univer. Illinois Press.

Pan, A., Liu, L., Wang, C., Guo, H., Hao, X., Wang, Q., Huang, J., He, N., Yu, H., Lin, X., Wei, S., & Wu, T. (2020). Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. *JAMA, 323*(19), 1915–1923. https://doi.org/10.1001/jama.2020.6130

Rajaobelina, L., Prom Tep, S., Arcand, M., & Ricard, L. (2021). The relationship of brand attachment and mobile banking service quality with positive word-of-mouth. *The Journal of Product and Brand Management, 30*(8), 1162–1175. https://doi.org/10.1108/JPBM-02-2020-2747

Rajkumar, R. P. (2020). COVID-19 and mental health: A review of the existing literature. *Asian Journal of Psychiatry, 52*, 102066. https://doi.org/10.1016/j.ajp.2020.102066

Riemer, K., Ciriello, R., Peter, S., & Schlagwein, D. (2020). Digital contact-tracing adoption in the COVID-19 pandemic: IT governance for collective action at the societal level. *European Journal of Information Systems, 29*(6), 731–745. https://doi.org/10.1080/0960085X.2020.1819898

Ringle, C. M., Wende, S., & Becker, J.-M. (2015). *SmartPLS 3. Boenningstedt: SmartPLS Gmbh. Http://Www.Smartpls.Com*.

Rowe, F., Ngwenyama, O., & Richet, J.-L. (2020). Contact-tracing apps and alienation in the age of COVID-19. *European Journal of Information Systems, 1–18*. https://doi.org/10.1080/0960085X.2020.1803155

San-Martín, S., Prodanova, J., & Jiménez, N. (2015). The impact of age in the generation of satisfaction and WOM in mobile shopping. *Journal of Retailing and Consumer Services, 23*, 1–8. https://doi.org/10.1016/j.jretconser.2014.11.001

Santé Publique France. (2021). *COVID-19: Point épidémiologique du 14 janvier 2021*. https://www.santepubliquefrance.fr/maladies-et-traumatismes/maladies-et-infections-respiratoires/infection-a-coronavirus/documents/bulletin-national/covid-19-point-epidemiologique-du-14-janvier-2021.

Saw, Y. E., Tan, E. Y.-Q., Liu, J. S., & Liu, J. C. (2021). Predicting public uptake of digital contact tracing during the COVID-19 pandemic: Results from a nationwide survey in Singapore. *Journal of Medical Internet Research, 23*(2), Article e24730. https://doi.org/10.2196/24730

Sharma, S., Singh, G., Sharma, R., Jones, P. D. A., Kraus, S., & Dwivedi, Y. K. (2020). Digital health innovation: Exploring adoption of COVID-19 digital contact tracing apps. In *IEEE transactions on engineering management*. https://doi.org/10.1109/TEM.2020.3019033

Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research, 22*(2), 159–170. https://doi.org/10.1016/0148-2963(91)90050-8

Sibley, C. G., Greaves, L. M., Satherley, N., Wilson, M. S., Overall, N. C., Lee, C. H. J., Milojev, P., Bulbulia, J., Osborne, D., Milfont, T. L., Houkamau, C. A., Duck, I. M., Vickers-Jones, R., & Barlow, F. K. (2020). Effects of the COVID-19 pandemic and nationwide lockdown on trust, attitudes toward government, and well-being. *American Psychologist, 75*(5), 618. https://doi.org/10.1037/amp0000662

Spector, P. E., & Sistrunk, F. (2010). Reassurance: A mechanism by which the presence of others reduces anxiety. *The Journal of Social Psychology*. http://www.tandfonline.com/doi/abs/10.1080/00224545.1979.9933645.

Statista. (2020). *Trust in news media worldwide 2020*. Statista https://www.statista.com/statistics/308468/importance-brand-journalist-creating-trust-news/.

Stone, M. (1974). Cross-validatory choice and assessment of statistical predictions. *Journal of the Royal Statistical Society: Series B, 36*(2). http://www.jstor.org/stable/2984809.

Su, Y., Lee, D. K. L., Xiao, X., Li, W., & Shu, W. (2021). Who endorses conspiracy theories? A moderated mediation model of Chinese and international social media use, media skepticism, need for cognition, and COVID-19 conspiracy theory endorsement in China. *Computers in Human Behavior, 120*, 106760. https://doi.org/10.1016/j.chb.2021.106760

Sweeney, J. C., Soutar, G. N., & Johnson, L. W. (1999). The role of perceived risk in the quality-value relationship: A study in a retail environment. *Journal of Retailing, 75*(1), 77–105. https://doi.org/10.1016/S0022-4359(99)80005-0

Taheri, B., Chalmers, D., Wilson, J., & Arshed, N. (2021). Would you really recommend it? Antecedents of word-of-mouth in medical tourism. *Tourism Management, 83*, 104209. https://doi.org/10.1016/j.tourman.2020.104209

Thompson, N., McGill, T., Bunn, A., & Alexander, R. (2020). Cultural factors and the role of privacy concerns in acceptance of government surveillance. *Journal of the Association for Information Science and Technology, 71*(9), 1129–1142. https://doi.org/10.1002/asi.24372

Touzani, R., Schultz, E., Holmes, S. M., Vandentorren, S., Arwidson, P., Guillemin, F., Rey, D., Rouquette, A., Bouhnik, A.-D., & Mancini, J. (2021). Early acceptability of a mobile app for contact tracing during the COVID-19 pandemic in France: National web-based survey. *JMIR MHealth and UHealth, 9*(7), Article e27768. https://doi.org/10.2196/27768

Trang, S., Trenz, M., Weiger, W. H., Tarafdar, M., & Cheung, C. M. K. (2020). One app to trace them all? Examining app specifications for mass acceptance of contact-tracing apps. *European Journal of Information Systems, 29*(4), 415–428. https://doi.org/10.1080/0960085X.2020.1784046

Verhoef, P. C., Franses, P. H., & Hoekstra, J. C. (2002). The effect of relational constructs on customer referrals and number of services purchased from a multiservice provider: Does age of relationship matter? *Journal of the Academy of Marketing Science, 30*(3), 202. https://doi.org/10.1177/0092070302303002

Verkijika, S. F., & De Wet, L. (2019). Understanding word-of-mouth (WOM) intentions of mobile app users: The role of simplicity and emotions during the first interaction. *Telematics and Informatics, 41*, 218–228. https://doi.org/10.1016/j.tele.2019.05.003

Visentin, M., Tuan, A., & Di Domenico, G. (2021). Words matter: How privacy concerns and conspiracy theories spread on twitter. *Psychology and Marketing, 38*(10), 1828–1846. https://doi.org/10.1002/mar.21542

Vo-Thanh, T., Vu, T.-V., Nguyen, N. P., Nguyen, D. V., Zaman, M., & Chi, H. (2020). How does hotel employees' satisfaction with the organization's COVID-19 responses affect job insecurity and job performance? *Journal of Sustainable Tourism*, 1–19. https://doi.org/10.1080/09669582.2020.1850750, 0(0.

Wang, Y., Hao, H., & Platt, L. S. (2021). Examining risk and crisis communications of government agencies and stakeholders during early-stages of COVID-19 on Twitter. *Computers in Human Behavior, 114*, 106568. https://doi.org/10.1016/j.chb.2020.106568

Wang, H.-Y., Liao, C., & Yang, L.-H. (2013). What affects mobile application use? The roles of consumption values. *International Journal of Marketing Studies, 5*(2). https://doi.org/10.5539/ijms.v5n2p11

Ward, P., & Meyer, S. (2009). Trust, social quality and wellbeing: A sociological exegesis. *Development and Society, 38*(2), 339–363.

Westbrook, R. A. (1987). Product/consumption-based affective responses and postpurchase processes. *Journal of Marketing Research, 24*(3), 258–270.

Wnuk, A., Oleksy, T., & Domaradzka, A. (2021). Prosociality and endorsement of liberty: Communal and individual predictors of attitudes towards surveillance technologies. *Computers in Human Behavior, 125*, 106938. https://doi.org/10.1016/j.chb.2021.106938

Woodruff, R. B. (1997). Customer value: The next source for competitive advantage. *Journal of the Academy of Marketing Science, 25*(2), 139.

Wottrich, V. M., van Reijmersdal, E. A., & Smit, E. G. (2018). The privacy trade-off for mobile app downloads: The roles of app value, intrusiveness, and privacy concerns. *Decision Support Systems, 106*, 44–52. https://doi.org/10.1016/j.dss.2017.12.003

Xu, S., Li, W., Zhang, W., & Cho, J. (2021). The dynamics of social support and affective well-being before and during COVID: An experience sampling study. *Computers in Human Behavior, 121*, 106776. https://doi.org/10.1016/j.chb.2021.106776

Ye, M., & Lyu, Z. (2020). Trust, risk perception, and COVID-19 infections: Evidence from multilevel analyses of combined original dataset in China. *Social Science & Medicine, 265*, 113517. https://doi.org/10.1016/j.socscimed.2020.113517

Zauner, A., Koller, M., & Hatak, I. (2015). Customer perceived value—conceptualization and avenues for future research. *Cogent Psychology, 2*(1). https://doi.org/10.1080/23311908.2015.1061782

Zhang, Y., & Ma, Z. F. (2020). Impact of the COVID-19 pandemic on mental health and quality of life among local residents in Liaoning province, China: A cross-sectional study. *International Journal of Environmental Research and Public Health, 17*(7). https://doi.org/10.3390/ijerph17072381