



HAL
open science

Impacts of COVID-19 on population well-being: Results of a web survey conducted in France during the first quarantine in 2020

C. Rotonda, M.J. Brennstuhl, E. Eby, C. Tarquinio

► To cite this version:

C. Rotonda, M.J. Brennstuhl, E. Eby, C. Tarquinio. Impacts of COVID-19 on population well-being: Results of a web survey conducted in France during the first quarantine in 2020. *European Journal of Trauma and Dissociation*, 2021, 5 (2), pp.100218. 10.1016/j.ejtd.2021.100218 . hal-03512890

HAL Id: hal-03512890

<https://hal.univ-lorraine.fr/hal-03512890>

Submitted on 24 Apr 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

Impacts of COVID-19 on population well-being: Results of a web survey conducted in France during the first quarantine in 2020

C. Rotonda ^{a,b*}, MJ Brennstuhl^{a,b}, E. Eby ^a, C. Tarquinio ^{a,b}

^a Université de Lorraine, Centre Pierre Janet, F-57000 Metz, France

^b Université de Lorraine, APEMAC, F-57000 Metz, France

* Corresponding author:

Christine Rotonda, PhD
Centre Pierre Janet - Université de Lorraine
UFR SHS - BP 60228
Ile du Saulcy - 57045 METZ Cedex 01
christine.rotonda@univ-lorraine.fr
Phone: +33 3 72 74 82 26

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

Abstract :

This study aimed to evaluate the impact of COVID-19 pandemic on mental well-being observed during the first quarantine implemented in France in 2020. This online survey included 1,876 French volunteer participants who completed data on lifestyle habits during the period of confinement and self-reported levels of resilience, optimism and psychological well-being. We observed that the score of participants' psychological well-being was considerably lower among single participants, students, the unemployed and those facing risk of financial insecurity. The results of the multivariate analysis showed that low levels of psychological well-being were significantly associated with single status and male gender. Higher scores for general peer support, optimism, resilience and confidence in information shared within immediate circles of friends or family were also significantly positively associated with better mental health. Taken together, the results from this study showed that quarantine measures impacted the psychological well-being of the participants in our sample, that the degree of impact was strongly linked with individual levels of resilience and optimism, and that general support together with confidence in one's immediate circle of friends or family also played an important role in overall mental well-being.

Keywords: well-being, COVID-19, quarantine, resilience, optimism, general population

1. Introduction

The coronavirus disease 2019 (COVID-19) was first identified in Wuhan, China in December 2019 and spread internationally to become a major public health concern within weeks (Phelan et al., 2020; Zhu et al., 2020). Although virus mortality rates outside of China were initially quite low, suggesting that the health impact of the disease in other countries could potentially be minor, coronavirus cases grew rapidly. On March 12, 2020, the World Health Organization (WHO) declared the emergence of COVID-19 a public health emergency of international concern, the highest level of alarm under international law, and announced a global pandemic. Beginning on March 15, 2020, unprecedented measures were adopted in France to control COVID-19 virus transmission by limiting contact between individuals. To this end, a national level stay-at-home order was implemented on March 17, 2020 that lasted for a total of 55 days and was lifted on May 11, 2020. The objectives were twofold: to isolate those who tested positive for the virus by providing a context for care in a protected environment, and to reduce transmission of the virus by isolating asymptomatic carriers during the incubation period when the virus is most contagious. The novelty of this approach in a historical context since the 19th century, notably compared to periods when quarantines were implemented during massive population flows, is that it combined citywide quarantine orders aimed at curbing the spread of the virus by restricting movement with additional response strategies such as isolating contagious persons receiving care in public or private designated healthcare facilities and, importantly, enforcing strict stay-at-home orders. The combined initiative that would eventually include regional travel restrictions and international border closures has affected entire populations across numerous countries.

A literature review conducted this year showed that extended stay-at-home quarantine measures could potentially have long-term consequences on psychological health (Brooks et al., 2020). This review involved 24 studies conducted in ten countries on the psychological effects of quarantine during previous epidemics, and showed that extended periods of quarantine can trigger multiple psychological reactions including hyper-responsiveness to stress (Yoon et al., 2016), irritability and insomnia (Reynolds et al., 2008). Three of the included studies showed a correlation between longer duration of quarantine and poorer mental health, specifically an increase of negative emotions (such as

fear and anger), misuse of psychoactive substances and post-traumatic stress symptoms (Brooks et al., 2020; Hawryluck et al., 2004).

The primary objective of this article is to study the effect of variables most significantly associated with psychological well-being as measured during the first quarantine in France implemented in the spring and early summer of 2020. Indeed, the range of psychological repercussions of home confinement appear to be conditioned by the multiple ways home confinement is experienced: voluntary or imposed, brief or prolonged duration, confinement to the home environment or elsewhere, experienced alone or in a small group or family setting, and the presence of associated stress and/or traumatic factors, etc. (Auxéméry & Tarquinio, 2020). Our initial hypothesis was that home confinement, its impact on financial security and inciting feelings of insecurity, would increase levels of stress experienced by the French population, perhaps more so than fear of the virus itself. We also theorized that individuals' optimism and resilience would correlate with levels of psychological well-being.

The Great East (Grand Est) region in France was one of the first in France to be strongly impacted by the COVID-19 pandemic. Several indicators included in the National Public Health Agency's report showed that the epidemic reached a peak in this region during the week of March 23 to 29, 2020, and had passed by April 10, 2020 (*GrandEst_PER_COVID19_20200409.Pdf*, n.d.). We therefore decided it was worth investigating possible differences in subjective measurements as compared to other regions of France during the same period.

2. Method

2.1. Study design and population

This cross-sectional observational study relied principally on an online questionnaire made available from April 3, 2020 to the evening of May 10, 2020 by the project leader, the Pierre Janet Center of the University of Lorraine, who posted it on their website and relayed it to social networks. All participants received detailed information describing the purpose of the study prior to completing the questionnaire. The survey was purposefully designed to be anonymous to ensure confidentiality and reliability of the data. All procedures were carried out in accordance with the French General Data Protection Regulation (GDPR).

2.2. Data collection

The questionnaire consisted of five parts:

- Part 1 : Questions about socio-demographics to collect data on respondent age, gender, marital status, with or without children, number of dependents per household, type of occupation, and occupational status during quarantine.
- Part 2: Questions concerning activities and immediate surroundings related to the quarantine environment, region of residence, potential number of occupants during quarantine, means of communication used during quarantine (telephone, social networks, phone messaging, video conferencing, etc.).
- Part 3: Questions about specific areas of concern such as virus contamination and lack of protection (masks, hydro-alcoholic gels, social distancing) for both oneself and one's immediate circle of family and/or peers (relatives, spouse, parents, children, friends, neighbors, colleagues, caregivers or support staff), occurrence of COVID-19 contamination and/or death related to COVID-19 within the immediate family or peer environment, risk of insecurity induced by the quarantine situation, perceived levels of support measured on a 10-point visual analog scale (VAS), trust in information provided by the government related to advances in research against spread of the COVID-19 virus, trust in information transmitted by social networks, by the press or circulated within the immediate circle of family and peers. A final set of questions included in this part pertain to general feelings of stress levels before and during quarantine.

Several variables in this section were aggregated to obtain the following scores:

- An insecurity score: this score is composed of 8 items. It was obtained by summing up the scores for general stress respondents felt before the quarantine was declared (a 10-point scale ranging from 0-*none* to 10-*extreme*), the 4 scores pertaining to levels of concern about lacking adequate protection, and the 10 scores related to general levels of concern (based on the general population). This provided us with a score ranging from 0 (*not at all concerned*) to 150 (*extremely concerned*).
- A press confidence score which is the average of the 3 confidence scores (a 10-point scale ranging from 0-*none* to 10-*extreme*) related to information made available by printed press, television and radio.

- A confidence score related to information from family and friends which is the average of the 2 confidence scores (a 10-point scale ranging from 0=*none* to 10=*extreme*) in information from family and friends.

- Part 4: Three self-reported questionnaires validated in French measuring respondents' levels of optimism, well-being and resilience were administered:

1) The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), developed by Tennant et al. (2007) and translated by Trousselart et al. (2016). This self-administered questionnaire, first developed in the United Kingdom for assessing a population's mental well-being, is comprised of 14 positively worded items covering hedonic and eudaimonic aspects of mental health. It uses 5 response categories for measuring the frequency of different states (0=*never*, 5=*all the time*) that are summed to provide a single score. The theoretical range of scores for WEMWBS is 14-70, with higher scores indicating a higher level of mental well-being.

2) The Life Orientation Test-Revised (LOT-R), validated in French, was used to measure optimism (Trottier et al., 2008). Optimists approach life differently than pessimists in that they have positive expectations regarding the future (Scheier et al., 1994; Scheier & Carver, 1985). Pessimists, on the other hand, will expect negative experiences in the future. The LOT-R was developed to assess individual differences in generalized optimism versus pessimism. It consists of 6 items, each scored on a 4-point Likert scale from "*strongly disagree*" to "*strongly agree*" and four filler items. Half of the coded items are phrased in an optimistic way to focus on an individual's expectations of positive outcomes, while the other half are phrased in a pessimistic way and focus on expectations of negative outcomes. Total scores can range from 0 to 24 indicating a maximum level of optimism.

3) Finally, the Brief Resilience Scale (BRS), developed by Smith et al. (2008) is a 6-item questionnaire designed to assess resilience as the self-perceived ability to bounce back or recover quickly from stress. It was translated and validated in French by Jacobs & Horsch (2019). Each item is measured on a 5-point Likert scale (1=*strongly disagree*, 5=*strongly agree*). The three negatively worded items 2, 4 and 6 were recoded such that a high score indicates a high degree of resilience. Calculating the BRS score is therefore carried out by assigning the value (from 1 to 5) to the responses for the 6 items. This sum ranging from 6 to 30 and then divided by the total number of completed

items provides the final score. This score ranges from 1 to 5 and is interpreted as follows: a score of 1.00 to 2.99 indicates resilience; a score of 3.00 to 4.30 indicates normal resilience and a score of 4.31 to 5.00 indicates high resilience.

2.3. Analyses

As a first step, we conducted a descriptive analysis of the collected data using means and standard deviation for numeric variables and percentages for categorical variables. The internal consistency of the insecurity score composed of 8 aggregated items was then verified by calculating Cronbach's Alpha coefficient.

A variable corresponding to the regional department of residence (regions outside of the Great East Region versus those within the Great East Region) and a comparison of the collected variables was made according to this new variable.

Our main objective was to give specific focus to studying psychological well-being of our respondents during this first quarantine period in France. To do this, we compared each mental well-being score against each variable and a bivariate, and performed multivariate regression to explain this score. Variables with $p \leq 0.3$ in bivariate analysis were integrated in to the multivariate model following a stepwise procedure. The scores were nevertheless presented in their raw format to interpret the strength of association of scores corresponding to optimism, resilience and insecurity, confidence and overall levels of mental well-being, for which the latter we linearized from 0 to 100 exclusively for results of the bivariate and multivariate linear regressions. Variables with $p < 0.05$ were considered significantly associated with mental well-being.

Statistical analyses were performed using R Statistical Software.

3. Results

3.1. Sample Characteristics (Table 1)

A total of 1,876 individuals responded to our online questionnaire. These respondents were mainly women (82.3%), the average age among participants was 40 years, 64.9% of the participants were in a relationship, and 54% were parents. Concerning professional occupation, 75% reported being actively employed, 41.7% worked remotely during the quarantine period and 63% lived in the Great East

region. Also included in our sample were medical and paramedical professionals (14%). Concerning the conditions of quarantine measures, 18% of the participants experienced stay-at-home orders alone in their homes and 15% had no access to an outside environment. While participants in our sample reported few COVID-19 related deaths among immediate friends and family (4.3%), cases of the COVID-19 virus among the immediate circle was relatively high (58.5%), of which 5% of participants described impacted them personally. Finally, 16% of the participants indicated that they felt the quarantine would very likely threaten their financial security. A comparison of these characteristics related to place of residence (Non-Great East region vs. Great East region) showed several significant differences such as higher number of COVID-19 related deaths in the the Great East region (2.7% vs. 5.2%, $p=0.021$) and a higher proportion of participants indicating a risk of financial insecurity related to the quarantine in the Non-Great East region ($p<0.001$), but we also noted that a higher percentage of participants in the Non-Great East region were independently active professionals ($p<0.001$).

Remote means of communication during the quarantine period were also used with greater frequency (see Table 2). We noted that face-to-face contact with others was completely suspended for 61% of the participants. Use of remote means of communication (telephone, sms messaging, communication via social networks and video conferencing) increased significantly during the quarantine for all types of communication with the most significant evolution observed for video conferencing, for which use went from 18% daily or weekly before the quarantine to 64% during the quarantine. People with no social contact or less than one contact per week, regardless of the means of communication, represented less than 2% of our sample ($n=23$), 50 participants (2.7%) had only 1 contact per week and 78% of participants reported several contacts per week or even every day.

3.2. Description of scores (Table 3)

The raw scores for psychological well-being, optimism, resilience, insecurity, and confidence are described in Table 3, and our comparison of the raw psychological well-being scores for categorical variables is presented in Table 4.

We observed that the mean psychological well-being score across the sample was 49.6 ($SD=7.8$). As shown in Table 4, this score was lower among single participants (48.2; $p<1.001$), those confined to their homes alone (47.6; $p<1.001$), without access to the outdoors (47.7; $p<0.0001$), and among

students and those with no professional activity (46.3 and 46.4 respectively; $p < 0.001$) and people who indicated a risk of financial insecurity (47.9; $p < 0.001$).

The level of psychological well-being was also significantly different ($p < 0.0001$) according to the frequency of social contact, for all means of communication combined (telephone, sms messaging, video conferencing, social media, etc.): the mean score for those with no social contact or less than one time per week was 35.9 (SD=12), the mean score for those with one social contact per week was 47.0 (SD=7) and the average score for psychological well-being for those with several social contacts per week or every day was 49.9 (SD=7.5).

For the other scores, the average level for optimism across our sample was 12.8 (SD=4.5), the average score for resilience was 3.1 (SD=0.8), indicating normal resilience, and the average VAS score for overall perceived support was 5.4 (SD=2.4). The score for insecurity showed good internal consistency (Cronbach's $\alpha = 0.77$). The mean insecurity score across our sample was 89.7 (SD=29.2). Finally, regarding confidence levels and corresponding scores, 54.5% of the participants expressed confidence in information provided by the government and 68.3% expressed confidence in scientific research and researchers working towards understanding the COVID-19 virus and finding a vaccine. With regard to confidence levels measured on a scale of 0 to 10, the average confidence score for among participants was 2.5 (SD=2.2) for information found on social networks, the average score for confidence in information provided by the immediate circle of friends/relatives was 4.5 (SD=2.2), and the average score for confidence in the press was 5.0 (SD=2.2). A comparison of all scores by region of residence showed that only the security score was significantly different. Indeed, this score was significantly higher among people living in the Great East region (8.4 vs. 92.7; $p < 1.001$).

3.3. Variables associated with levels of psychological well-being during quarantine (Table 4)

The results of the multivariate analysis showed that low psychological well-being during the quarantine period was significantly associated with single marital status (OR=-1.6; $p = 0.04$) and male gender (OR=-2.2; $p < 0.02$). High scores for perceived general support ($\beta = 0.6$; $p < 0.001$), optimism ($\beta = 0.27$; $p < 0.001$), resilience ($\beta = 0.21$; $p < 0.001$), and confidence in information from the immediate circle ($\beta = 0.04$; $p = 0.004$) were also positively associated with better mental well-being. Other variables

for which we observed strong bivariate correlation with improved mental well-being (see Table 3) such as older age ($r=0.14$; $p<0.001$), having children ($OR=3.9$; $p<0.001$) and trust in government and research ($OR=2.7$; $p<0.001$ and $OR=3.9$; $p<0.001$ respectively) no longer appeared as multivariate model. Similarly, several variables that were strongly associated with lower levels of psychological well-being during bivariate quarantine also stopped being multivariate model, such as student status ($OR=-6.9$; $p<0.001$) and retired status ($OR=-6.8$; $p<0.001$) compared to actively employed status, experiencing quarantine alone at home ($OR=-3.9$; $p<0.001$) or expressing an expected risk of financial insecurity due to the quarantine measures ($OR=-3.0$; $p<0.001$).

4. Discussion

This cross-sectional study, launched 15 days after the first nationwide quarantine measures were implemented in France and completed at the end of the quarantine period, is based on data collected from 1,148 individuals to ascertain how the experience of this unprecedented quarantine situation impacted psychological well-being. Concerning specific conditions of this initial phase of home confinement, 42% of participants in our study remained gainfully employed and worked remotely, 18% experienced home confinement alone at home, 15% had no outdoor access during the quarantine, and 63% lived in the Great East region, which compared to other regions in France showed the highest scores for insecurity. At the time of this study, the Great East region was one of the most severely impacted by the epidemic in terms of active COVID-19 cases, which strained public health services. Protection of health care workers, paramedics and first responders, both in circulation and in hospitals, was rapidly recognized as the highest priority. Hospital teams and practitioners working in more isolated clinical settings played an integral part in the response effort, often working beyond normal working conditions to uphold values of protecting human health and dignity; they exhibited unflinching courage and dedication to the community as a whole, oftentimes to the detriment of their own well-being. An added dynamic for many of these workers was the necessity to stay employed during this period, despite the risks involved with continuing to work in potentially unsafe environments. The stress factors for many health workers were significant and centered essentially on three major dynamics: societal pressure surrounding the increasing anxiety-provoking nature of events

unfolding worldwide coupled with an intense focus on recovery from the crisis through a commitment to providing critical patients with quality care, professional pressure marked by unprecedented workload and other predictable coping mechanisms, and pressure associated with personal life through either fear of contaminating one's family or returning to solitary conditions during confinement after a full day or night of work. Available data on the psychological consequences on health workers during this global health situation show, for example, a prevalence of 14.5% anxiety, 8.9% depression and 7.7% posttraumatic stress disorder (Tan et al., 2020). Similar data were observed in the population of nearly 1,000 frontline health professionals in Wuhan, China (initial focus of the pandemic).

In France, on average and excluding specific events, the score for psychological well-being of individuals measured by the same questionnaire we used in this study has previously been reported as 53 (Franck, 2020), whereas we observed in our own study a lower average score of 3.4 points. This score was found to be even lower for single individuals, those who experienced quarantine home alone, those without access to the outdoors during quarantine, students, the unemployed and participants who indicated potential risk of financial insecurity. A large survey conducted in France in the spring of 2020 that involved 20,000 people reported similar results using the same questionnaire on psychological well-being (Franck, 2020). Social support was perceived to be strongly associated with mental well-being, where our own sample showed that 78% of the participants had some form of daily social contact, mainly by telephone, social networks and sms messaging.

Similarly, our results show lower optimism levels than other studies conducted on the general population (Schou-Bredal et al., 2017). Finally, the resilience score considered as the ability to "cope" with a difficult or stressful situation, often traumatic, indicated that participants in our study exhibited adequate resilience capacity. These two scores, optimism and resilience, were found to be strongly associated with levels of psychological well-being across our sample. Individuals with higher levels of optimism are more inclined to believe that the goals they set are achievable and, as a result, they invest more effort in achieving their goals than pessimists, and most of them succeed (Chang et al., 1997; Grover et al., 2019). Individuals with higher levels of optimism appear more inclined to use effective coping mechanisms when faced with difficulties. They seek operational solutions and engage themselves both cognitively and emotionally in finding solutions, whereas pessimists are more

inclined to use coping strategies that involve withdrawal, either mentally or behaviorally, from the given situation. It is therefore not surprising that in the context of the present global health situation, individuals with higher levels of optimism are better able to take care of themselves and implement more appropriate preservation and prevention strategies. This would also suggest that they are less inclined let themselves become overwhelmed by the situation for the fact that they take a proactive approach and responsibility for their own self care without waiting for outside help. Conversely, people with higher levels of pessimism can quickly become overwhelmed with feelings of powerlessness faced with persistent and omnipresent bad news in the media as the pandemic unfolds. Resilience can be defined as the ability to adapt in the face of adversity and trauma or other significant stressors (Norris et al., 2009). It is the ability to succeed, to live and develop positively and in a socially acceptable way despite stress or adversity normally associated with risk of negative outcome. Numerous studies have shown that psychological resilience can be seen as an intermediary between environmental stress and an individual's psychological state (Hao et al., 2015; Howell et al., 2020) that can mitigate the negative effects of the former (Poole et al., 2017; Sheerin et al., 2018). Thus, resilience acts as an interface that allows people to protect themselves, including against psychological distress. In the limited number of studies that have examined the effect of resilience on mental health in the context of a global health crisis, resilience was found to be negatively correlated with both depression and anxiety in exposed individuals (Osofsky et al., 2011). Based on our own results, it appears that the combination of optimism and good resilience facilitates maintaining a certain level of well-being among the general population, which to our knowledge is rarely pointed out in studies on the effects of health crises on psychological health at the population level.

Although 80% of our sample was female, our multivariate analysis showed that the men's psychological well-being was significantly impacted. This result may be related to two contingent phenomena. The first being that it has been suggested that men are more at risk for contracting the virus than women, which may have contributed to levels of reported concern (Rozenberg et al., 2020). Secondly, an important aspect is that the quarantine measures imposed a situation men may, to some degree, experience differently than women; it consisted of staying at home and no longer working in a professional setting that is often linked to identity. It is worth noting here that our study was conducted

during the first quarantine period in France when working remotely was a relatively new concept. Many found themselves in situations of temporary unemployment due to a total loss of professional activity. Interestingly, we also noted a protective effect in the context of couples and, in a bivariate way, age. Indeed, young people and particularly students, often living away from their families and with limited financial means, experienced the most pronounced impacts in terms of psychological well-being, as shown in both our study and the literature (Bourion-Bédès et al., 2021). This study showed that the global health situation during the first quarantine in France led 15.2% to perceive themselves as moderately anxious and 9.8% as strongly anxious. Another study carried out among Chinese students revealed that 24.9% experienced anxiety as a result of the COVID-19 pandemic (Cao et al., 2020). Similarly, a study involving Greek students during periods of quarantine reported an increase in anxiety scores, depression and suicidal thoughts, a general deterioration in quality of life and poorer sleep quality (Kaparounaki et al., 2020).

It was generally noted that the elderly felt well protected by the health measures put in place and experienced the first quarantine in relative comfort. Age did not emerge as significantly associated in multivariate analyses: the average age of our sample was 40 years. In addition, retirees, who represented only 6% of our sample, reported psychological well-being scores similar to younger, working people.

During the first quarantine, 68% of participants reported feeling reassured by scientific knowledge and expressed that they felt confident that research would lead to solutions for overcoming the pandemic. This confidence was significantly associated with improved mental well-being but only in bivariate analyses. We noted that trust in information from immediate family and friends played a greater protective role in terms of psychological well-being, while this score remained average.

The main strength of this study is the sample size. Additionally, tools that were validated in French with good psychometric properties were used for describing individuals' mental health status. Clearly, it would have been informative to recontact the participants during the second quarantine which was experienced differently by the population, and indeed, a useful line of questioning would have been what these differences were exactly. Were the individuals able to benefit from their first quarantine experience, or conversely, did the negative phenomena observed in terms of malaise,

depressive or anxiety disorders increase? The question is equally pertinent for those subjects with higher scores related to psychological well-being. There is nothing to suggest that such parameters would persist over the long term. Importantly, it was widely understood by everyone that the first quarantine period would eventually end and that the total duration would be a matter of weeks, possibly months. Virtually no one expected the possibility of being faced with a second or third quarantine or prolonged enforced stay-at-home orders. The consequences in terms of psychological health, family, social and professional life combined with economic impacts associated with such an abrupt shut-down of society for the greater good of public health come with a host of secondary effects, the dimension and scope of which no one could have anticipated; the challenge is that we cannot fully understand how the different parameters evaluated in this study will or could evolve in the medium, long or even very long term and what the impacts will be on the general public. The fact that our study was transversal but also completely anonymous prevents us from being able to contact participants for follow up evaluations; indeed, we felt anonymity of participants would serve the overall integrity of the data but we also did not anticipate a second quarantine. However, a cluster analysis would make it possible to identify risk profiles and rather protective profiles. This analysis will be carried out soon by our team. A second limitation is the mode in which the questionnaire in our study was diffused to potential respondents, which was primarily through social networks and direct online responses. Despite advantages that come with using these methods (lower cost, speed of data collection, reduced data entry errors, greater freedom for the respondent) (Ganassali, 2008; Stephenson & Crête, 2011), certain drawbacks nonetheless emerged from this approach. First and foremost, this type of data collection requires a certain familiarity with computers and the Internet, as well as access to social networks from which we disseminated the survey. Several authors mention that respondents to online surveys are generally regular, even expert, Internet users, a factor that can potentially impact the type of sample (generally more affluent, more educated and younger, for example) (Bosnjak et al., 2013). Importantly, this aspect of our study design could call into question the representativeness of our sample.

5. Conclusion

This study allowed us to observe that the psychological well-being of participants was impacted during this quarantine period, that it was strongly associated with levels of both optimism and resilience, and that support in general together with trust in the environment also played an important role in levels of mental well-being. Our results are fairly consistent with what has been reported in the literature in recent months, notably that quarantine measures have long-term consequences on the population's psychological well-being (Brooks et al., 2020). This presents a constraint that governments and policy-makers have not fully acknowledged, despite the fact that a deeper understanding of this key dimension being the mental health of the general population could potentially act as a lever to helping or hindering society in efforts to forge paths to recovery and envision new ways of functioning to overcome this current global health crisis. If the emotional state of the population remains negatively affected and the health situation persists over longer periods, potentially several months as we are currently experiencing, it will be imperative to question the long-term effects of psychological health on physical health. It is indeed essential that we build on what has thus far been revealed by the current pandemic situation and its emotional impacts to establish a link between mental and physical states, particularly given that we now know that the negative emotional state is associated with chronic stress and chronic anxiety, both known to weaken the immune system, the body's primary defense against infection and disease (Powell et al., 2013).

Declarations of Competing Interest

None

References

- Auxéméry, Y., & Tarquinio, C. (2020). Le confinement généralisé pendant l'épidémie de Coronavirus: Conséquences médico-psychologiques en populations générales, soignantes, et de sujets souffrant antérieurement de troubles psychiques. *Annales Médico-psychologiques, revue psychiatrique*, 178(7), 699–710.
<https://doi.org/10.1016/j.amp.2020.06.001>
- Bosnjak, M., Haas, I., Galesic, M., Kaczmirek, L., Bandilla, W., & Couper, M. P. (2013). Sample composition discrepancies in different stages of a probability-based online panel. *Field Methods*, 25(4), 339–360.
<https://doi.org/10.1177/1525822X12472951>
- Bourion-Bédès, S., Tarquinio, C., Batt, M., et al. (2021). Psychological impact of the COVID-19 outbreak on students in a French region severely affected by the disease: Results of the PIMS-CoV 19 study. *Psychiatry Research*, 295, 113559.
<https://doi.org/10.1016/j.psychres.2020.113559>
- Brooks, S. K., Webster, R. K., Smith, L. E. et al. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *Lancet (London, England)*, 395(10227), 912–920.
[https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Cao, W., Fang, Z., Hou, et al. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Chang, E. C., Maydeu-Olivares, A., & D'Zurilla, T. J. (1997). Optimism and pessimism as partially independent constructs: Relationship to positive and negative affectivity and psychological well-being. *Personality and Individual Differences*, 23(3), 433–440.
[https://doi.org/10.1016/S0191-8869\(97\)80009-8](https://doi.org/10.1016/S0191-8869(97)80009-8)
- Franck, N. (2020). *Covid-19 et détresse psychologique*. Odile Jacob.
- Ganassali, S. (2008). The Influence of the Design of Web Survey Questionnaires on the Quality of Responses. *Survey Research Methods*, 2(1), 21–32.
<https://doi.org/10.18148/srm/2008.v2i1.598>
- GrandEst_PER_COVID19_20200409.pdf*. (n.d.). Retrieved 6 January 2021, from https://www.grand-est.ars.sante.fr/system/files/2020-04/GrandEst_PER_COVID19_20200409.pdf
- Grover, S. L., Hyde, A., Lux, A. A., O'Kane, P., & Walton, S. (2019). Optimism and attribution about uncertain events: What happened to missing flight MH370? *Personality and Individual Differences*, 147, 8–11.
<https://doi.org/10.1016/j.paid.2019.04.017>
- Hao, S., Hong, W., Xu, H., Zhou, L., & Xie, Z. (2015). Relationship between resilience, stress and burnout among civil servants in Beijing, China: Mediating and moderating effect analysis. *Personality and Individual Differences*, 83, 65–71.
<https://doi.org/10.1016/j.paid.2015.03.048>
- Hawryluck, L., Gold, W. L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases*, 10(7), 1206–1212. <https://doi.org/10.3201/eid1007.030703>
- Howell, K. H., Miller-Graff, L. E., Schaefer, L. M., & Scrafford, K. E. (2020). Relational resilience as a potential mediator between adverse childhood experiences and prenatal depression. *Journal of Health Psychology*, 25(4), 545–557.
<https://doi.org/10.1177/1359105317723450>
- Jacobs, I., & Horsch, A. (2019). Psychometric properties of the French Brief Resilience Scale. *European Journal of Health Psychology*, 26(1), 1–9.
<https://doi.org/10.1027/2512-8442/a000022>
- Kaparounaki, C. K., Patsali, M. E., Mousa, D.-P. V., Papadopoulou, E. V. K., Papadopoulou, K. K. K., & Fountoulakis, K. N. (2020). University students' mental health amidst the COVID-19 quarantine in Greece. *Psychiatry Research*, 290, 113111.
<https://doi.org/10.1016/j.psychres.2020.113111>
- Norris, F. H., Tracy, M., & Galea, S. (2009). Looking for resilience: Understanding the longitudinal trajectories of responses to stress. *Social Science & Medicine*, 68(12), 2190–2198.
<https://doi.org/10.1016/j.socscimed.2009.03.043>
- Osofsky, H. J., Osofsky, J. D., & Hansel, T. C. (2011). Deepwater horizon oil spill: Mental health effects on residents in heavily affected areas. *Disaster Medicine and Public Health Preparedness*, 5(4), 280–286. <https://doi.org/10.1001/dmp.2011.85>
- Phelan, A. L., Katz, R., & Gostin, L. O. (2020). The Novel Coronavirus Originating in Wuhan, China: Challenges for Global Health Governance. *JAMA*, 323(8), 709–710.
<https://doi.org/10.1001/jama.2020.1097>

- Poole, J. C., Dobson, K. S., & Pusch, D. (2017). Childhood adversity and adult depression: The protective role of psychological resilience. *Child Abuse & Neglect*, *64*, 89–100.
<https://doi.org/10.1016/j.chiabu.2016.12.012>
- Powell, N. D., Sloan, E. K., Bailey, M. T, et al. (2013). Social stress up-regulates inflammatory gene expression in the leukocyte transcriptome via β -adrenergic induction of myelopoiesis. *Proceedings of the National Academy of Sciences*, *110*(41), 16574–16579.
<https://doi.org/10.1073/pnas.1310655110>
- Reynolds, D. L., Garay, J. R., Deamond, S. L., Moran, M. K., Gold, W., & Styra, R. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiology and Infection*, *136*(7), 997–1007.
<https://doi.org/10.1017/S0950268807009156>
- Rozenberg, S., Vandromme, J., & Martin, C. (2020). Are we equal in adversity? Does Covid-19 affect women and men differently? *Maturitas*, *138*, 62–68.
<https://doi.org/10.1016/j.maturitas.2020.05.009>
- Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychol*, *4*(3), 219–247.
<https://doi.org/10.1037/0278-6133.4.3.219>
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *J Pers Soc Psychol*, *67*(6), 1063–1078.
<https://doi.org/10.1037/0022-3514.67.6.1063>
- Schou-Bredal, I., Heir, T., Skogstad, L. et al. (2017). Population-based norms of the Life Orientation Test–Revised (LOT-R). *International Journal of Clinical and Health Psychology : IJCHP*, *17*(3), 216–224.
<https://doi.org/10.1016/j.ijchp.2017.07.005>
- Sheerin, C. M., Lind, M. J., Brown, E. A., Gardner, C. O., Kendler, K. S., & Amstadter, A. B. (2018). The impact of resilience and subsequent stressful life events on MDD and GAD. *Depression and Anxiety*, *35*(2), 140–147. <https://doi.org/10.1002/da.22700>
- Smith, B.W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *Int. J. Behav. Med.*, *15*, 194–200.
<https://doi.org/10.1080/10705500802222972>
- Stephenson, L. B., & Crête, J. (2011). Studying Political Behavior: A Comparison of Internet and Telephone Surveys. *International Journal of Public Opinion Research*, *23*(1), 24–55.
<https://doi.org/10.1093/ijpor/edq025>
- Tan, B. Y. Q., Chew, N. W. S., Lee, G. K. H., et al. (2020). Psychological Impact of the COVID-19 Pandemic on Health Care Workers in Singapore. *Annals of Internal Medicine*, *173*(4), 317–320.
<https://doi.org/10.7326/M20-1083>
- Tennant, R., Hiller, L., Fishwick, R., et al. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes*, *5*, 63.
<https://doi.org/10.1186/1477-7525-5-63>
- Trottier, C., Mageau, G., Trudel, P., & Halliwell, W. R. (2008). Validation de la version canadienne-française du Life Orientation Test-Revised. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement*, *40*(4), 238–243.
<https://doi.org/10.1037/a0013244>
- Trousselard, M., Steiler, D., Dutheil, F., et al. (2016). Validation of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) in French psychiatric and general populations. *Psychiatry Research*, *245*, 282–290. <https://doi.org/10.1016/j.psychres.2016.08.050>
- Yoon, M.-K., Kim, S.-Y., Ko, H.-S., & Lee, M.-S (2016). System effectiveness of detection, brief intervention and refer to treatment for the people with post-traumatic emotional distress by MERS: A case report of community-based proactive intervention in South Korea. *International Journal of Mental Health Systems*, *10*, 51.
<https://doi.org/10.1186/s13033-016-0083-5>
- Zhu, N., Zhang, D., Wang, W., et al. (2020). A Novel Coronavirus from Patients with Pneumonia in China, 2019. *The New England Journal of Medicine*, *382*(8), 727–733.
<https://doi.org/10.1056/NEJMoa2001017>

Table 1

Sociodemographic description of the sample (n=1876) and comparison of these data by residential region relative to the Great East Region

	Total Respondents (N=1876) N (%)	Great East Region		p-value*
		No (N=694 ; 37%) N (%)	Yes (N=1182 ; 63%) N (%)	
Gender				0.041
Female	1544 (82.3)	588 (84.7)	956 (80.9)	
Male	332 (17.7)	106 (15.3)	226 (19.1)	
Age (average years, SD)	40.1 (13.5)	40.2 (13.6)	40.0 (13.4)	0.7
Marital status				0.2
Married	1217 (64.9)	432 (62.2)	785 (66.4)	
Single	644 (34.3)	251 (36.2)	393 (33.2)	
Unknown	15 (0.8)	11 (1.6)	4 (0.3)	
With children				0.6
No	847 (45.1)	318 (45.8)	529 (44.8)	
Yes	1013 (54.0)	366 (52.7)	647 (54.7)	
Unknown	16 (0.9)	10 (1.4)	6 (0.5)	
If yes, are children dependent				0.31
No	152 (22.4)	75 (20.5)	152 (23.5)	
Yes	495 (77.6)	291 (79.5)	495 (76.5)	
Occupational status				<0.001
Active, Independent	174 (9.3)	100 (14.4)	74 (6.3)	
Active, Employee	1228 (65.5)	415 (59.8)	813 (68.8)	
Student	223 (11.9)	73 (10.5)	150 (12.7)	
Retired	105 (5.6)	38 (5.5)	67 (5.7)	
No activity	146 (7.8)	68 (9.8)	78 (6.6)	
Socio-professional category				<0.001
Craftsman/Worker	178 (9.5)	70 (10.1)	108 (9.1)	
Management	562 (30.0)	202 (29.1)	360 (30.5)	
Intermediate Occupation/Employee	575 (30.7)	173 (24.9)	402 (34.0)	
Medical or paramedical profession	261 (13.9)	135 (19.5)	126 (10.7)	
No activity	280 (14.9)	102 (14.7)	178 (15.1)	
Unknown	20 (1.1)	12 (1.7)	8 (0.7)	
Occupational situation during the quarantine				0.8
Stopped	323 (17.2)	120 (17.3)	203 (17.2)	
Remote work	783 (41.7)	283 (40.8)	500 (42.3)	
Partial remote work	121 (6.4)	50 (7.2)	71 (6.0)	
Work on site	147 (7.8)	52 (7.5)	95 (8.0)	
Not Concerned	502 (26.8)	189 (27.2)	313 (26.5)	
Quarantine situation				0.4
Home confinement with others	1166 (62.2)	416 (59.9)	750 (63.5)	
Home confinement alone	340 (18.1)	135 (19.5)	205 (17.3)	
Unknown	370 (19.7)	143 (20.6)	227 (19.2)	
Quarantine environment				0.10
Home confinement with outdoor access	1447 (77.1)	506 (72.9)	941 (79.6)	

Home confinement without outdoor access	277 (14.8)	112 (16.1)	165 (14.0)	
Unknown	152 (8.1)	76 (11.0)	76 (6.4)	
COVID-19 cases in immediate circle				0.8
Friends/Colleagues	692 (36.9%)	235 (33.9%)	457 (38.7%)	
Family	311 (16.6%)	107 (15.4%)	204 (17.3%)	
Self	95 (5.1%)	29 (4.2%)	66 (5.6%)	
Unknown	778 (41.5%)	323 (46.5%)	455 (38.5%)	
COVID-19 related deaths in immediate circle				0.02
No	1493 (79.6%)	555 (80.0%)	938 (79.4%)	
Yes	80 (4.3%)	19 (2.7%)	61 (5.2%)	
Unknown	303 (16.2%)	120 (17.3%)	183 (15.5%)	
Risk of financial insecurity due to quarantine				<0.001
No	1297 (69.1%)	447 (64.4%)	850 (71.9%)	
Yes	295 (15.7%)	139 (20.0%)	156 (13.2%)	
Unknown	284 (15.1%)	108 (15.6%)	176 (14.9%)	

* Statistical tests performed: Wilcoxon rank-sum test; chi-square test of independence

Table 2*Means of communication used before and during quarantine and contact frequenc*

<i>Means of communication :</i>		<i>Before quarantine</i>		<i>During quarantine</i>		<i>Test *</i>
		<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	
Face-to-face contact	Every day	433	27	270	17	<0.001
	Several times per week	552	34	89	6	
	Once per week	340	21	86	5	
	Less than once per week	239	15	178	11	
	Never	37	2	966	61	
Telephone contact	Every day	338	21	459	29	<0.001
	Several times per week	580	36	673	42	
	Once per week	404	25	297	19	
	Less than once per week	225	14	116	7	
	Never	45	3	46	3	
SMS messaging contact	Every day	617	39	724	45	<0.001
	Several times per week	642	40	573	36	
	Once per week	167	10	128	8	
	Less than once per week	114	7	96	6	
	Never	54	3	72	5	
Contact via social networks	Every day	554	35	714	46	<0.001
	Several times per week	458	29	405	26	
	Once per week	112	7	85	5	
	Less than once per week	185	12	113	7	
	Never	278	18	249	16	
Contact via video conferencing	Every day	46	3	194	12	<0.001
	Several time per week	103	7	450	29	
	Once per week	129	8	361	23	
	Less than once per week	386	25	243	15	
	Never	909	58	320	20	

* Statistical tests performed: Wilcoxon rank-sum test; chi-square test of independence

Table 3*Description of Scores for Mental Health, Insecurity and Confidence and Comparison by Region*

	Total Respondents (N=1876)		Great East Region				p- value*
	n (%)	mean (SD)	No (N=694 ; 37%)		Yes (N=1182 ; 63%)		
	n (%)	mean (SD)	n (%)	mean (SD)	n (%)	mean (SD)	
Well-being score (WBS questionnaire: from 14 to 70)	1540 (82.1)	49.6 (7.8)	562 (81.0)	48.9 (8.34)	978 (82.7)	50.0 (7.41)	0.06
Optimism score (LOT-R questionnaire: from 0 to 24)	1571 (83.7)	12.8 (4.5)	572 (82.4)	12.8 (4.68)	999 (84.5)	12.8 (4.41)	0.5
Resilience score (BRS questionnaire: from 1 to 5)	1537 (81.2)	3.1 (0.8)	560 (80.7)	3.09 (0.770)	977 (82.7)	3.16 (0.779)	0.1
Insecurity score (score range from 0 to 150)	1594 (85.0)	89.7 (29.2)	581 (83.7)	84.4 (30.6)	1013 (85.7)	92.7 (28.0)	<0.001
VAS of support (from 0 to 10) (average, (SD))	1430 (73.2)	5.4 (2.5)	523 (75.4)	5.36 (2.62)	907 (76.7)	5.40 (2.43)	0.9
Percentage of participants with confidence (%) :							
1) In information given by the government:	1590 (84.7)	54.5%	588 (84.7)	52.9%	1002 (84.8)	55.4%	0.3
2) In researchers' ability to combat the virus	1593 (84.9)	68.3%	587 (84.6)	67.1%	1006 (85.1)	69.0%	0.4
Level of confidence in (range from 0 to 10) :							
1) Information shared on social media	1597 (85.1)	2.5 (2.2)	587 (84.6)	2.6 (2.2)	1010 (85.4)	2.5 (2.1)	0.3
2) Information shared within immediate circle (family and friends)	1594 (85.0)	4.5 (2.2)	584 (84.1)	4.4 (2.2)	1010 (85.4)	4.5 (2.2)	0.6
3) Information provided by the media (print, television, radio)	1598 (85.2)	5.0 (2.2)	586 (84.4)	5.0 (2.2)	1012 (85.6)	5.0 (2.2)	0.7

* Statistical tests performed: Wilcoxon rank-sum test; chi-square test of independence
SD: Standard Deviation

Table 4

Description and comparison of raw scores for psychological well-being according to categorical variables and analyses of variables associated with the linearized psychological well-being score perceived during quarantine in bivariate and multivariate analysis (Linear regression)

	N	Raw Score Psychological Well-being Mean (SD)	P	Bivariate analysis*			Multivariate analysis**		
				OR	95% CI	p	OR	95% CI	p
Gender			0.3			0.3			0.02
Female	1276	49.7 (7.4)		Ref.			Ref.		
Male	264	49.1 (9.5)		-1.0	-2.8 ; 0.9		-2.2	-4.1 ; -0.3	
Age	1540			0.14	0.09 ; 0.2	<0.001			
Marital status			<0.001			<0.001			0.04
Married	997	50.4 (7.2)		Ref.			Ref.		
Single	531	48.2 (8.6)		-3.9	-5.3 ; -2.4		-1.6	-3.2 ; -0.1	
With children			<0.001			<0.001			
No	695	48.4 (8.1)		Ref.					
Yes	834	50.6 (7.3)		3.9	2.5 ; 5.2				
If yes, are children dependent			0.8						
Non	189	50.7 (6.9)							
Oui	645	50.5 (7.4)							
Medical healthcare professional			0.02			0.02			
No	1318	49.5 (7.8)		Ref.					
Yes	209	50.8 (6.6)		2.4	0.4 ; 4.4				
Occupational status			<0.001						
Active, Employee	1021	50.2 (7.2)		Ref.					
Active, Independant	139	51.8 (7)		2.9	0.5 ; 5.3	0.02			
Student	183	46.3 (9.1)		-6.9	-9.0 ; -4.7	<0.001			
Retired	81	50.6 (6.5)		0.86	-2.2 ; 3.9	0.6			
No activity	116	46.4 (9.2)		-6.8	-9.4 ; -4.2	<0.001			
Occupational situation during the quarantine			<0.001						
Remote work	653	50.5 (7.1)		Ref.					
Stopped	269	49.7 (7.8)		-1.5	-3.3 ; 0.4	0.1			
Partial remote work	100	52 (7.3)		2.7	-0.03 ; 5.4	0.05			
Work on site	113	49.7 (6.8)		-1.5	-4.1 ; 1.0	0.2			
Great East Region			0.01			0.01			0.05
No	564	48.9 (8.3)		Ref.			Ref.		
Yes	976	50 (7.4)		1.8	0.38 ; 3.3		1.5	0 ; 3.0	
Quarantine situation			<0.001			<0.001			
Home confinement with others	998	50 (7.7)		Ref.					
Home confinement alone	293	47.6 (8.4)		-4.3	-6.1 ; -2.5				
Quarantine environment			<0.001			<0.001			
With outdoor acces	1243	49.9 (7.6)		Ref.					
Without outdoor access	239	47.7 (8.6)		-3.9	-5.9 ; -2.0				
COVID-19 cases in immediate circle			0.4						
Friends, Colleagues	664	50.1 (7.4)							
Family	303	50.3 (6.7)							
Self	92	49.2 (8.8)							
COVID-19 related deaths in immediate circle			0.1			0.12			
No	1433	49.5 (7.8)		Ref.					
Yes	77	50.9 (6.9)		2.5	-0.6 ; 5.7				
Risk of financial insecurity due to quarantine			<0.001			<0.001			
No	1248	50 (7.5)		Ref.					
Yes	281	47.9 (8.9)		-3.6	-5.4 ; -1.8				
Confidence in the government			<0.001			<0.001			

No	986	49.1 (8.1)		Ref.					
Yes	541	50.6 (7)		2.7	1.2 ; 4.1				
Confidence in research			<0.001			<0.001			
No	293	47.8 (9.1)		Ref.					
Yes	1238	50 (7.4)		3.9	2.2 ; 5.7				
Support score				0.16	0.1 ; 0.2	<0.001	0.6	0.03 ; 0.09	<0.001
Optimism score				0.45	0.42. 0.48	<0.001	0.27	0.23 ; 0.32	<0.001
Resilience score				0.38	0.35. 0.41	<0.001	0.21	0.16 ; 0.25	<0.001
Insecurity score				-0.06	-0.09. -0.02	0.002			
Trust in social networks				0.02	-0.02. 0.05	0.4			
Trust in the press				0.05	0.01. 0.08	0.005			
Trust in immediate circle				0.08	0.04. 0.11	<0.001	0.05	0.02 ; 0.09	0.004

Abbreviations: OR, odds ratio:

* : only variable with p<0.30 values are presented in bivariate analysis

** : variables with p<0.05 values are considered significantly associated with variables of well-being in multivariate analysis