Persecutory ideation and anomalous perceptual experiences in the context of the COVID-19 outbreak in France: what's left one month later?

COVID-19 AND PSYCHOTIC EXPERIENCES

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Abstract

Aims: Beyond the effects of the coronavirus pandemic on the public's health, the length of lockdown and its possible psychological impacts on populations around the world is heavily debated. However, the consequences of lockdown on psychotic symptoms have not yet been investigated.

Methods: An online survey was run from April 13 to May 11, 2020; a total of 728 French subjects from the general population participated. We assessed the perceived impact of the COVID-19 outbreak, length of self-isolation, diagnosis/symptoms/hospitalisation related to the COVID-19 (oneself and family). Paranoid ideations and anomalous perceptual perceptions were assessed via the Paranoia Scale and the Cardiff Anomalous Perceptions Scale. Measures of negative affect, loneliness, sleep difficulties, jumping to conclusion bias, emotion regulation, and perseverative thinking were also included.

Results: Final regression model for paranoia indicated that socio-demographic variables, loneliness, cognitive bias, anxiety, repetitive thoughts and hallucinations were associated with paranoia ($R^2 = 0.43$). For hallucinations, clinical variables as well as the quality of sleep, behavioural activation, repetitive thoughts, and paranoia were associated with hallucinations in our sample ($R^2 = 0.27$). Neither length of self-isolation nor the perceived impact of the COVID-19 pandemic were associated with psychotic experiences in the final models.

Conclusions: No evidence was found between a significant impact of self-isolation on psychotic symptoms in the general population in France one month after the lockdown. It nevertheless confirms the preeminent role of several factors previously described in the maintenance and development of psychotic symptoms in the context of a pandemic and lockdown measures.

Key-words: COVID-19; Lockdown; Self-isolation; Hallucinations; Paranoia

Introduction

The pandemic of the novel coronavirus disease (COVID-19) has now affected millions of people, including people in France. French people have been under lockdown from Mar 15 until May 11 leading, in many cases, to abrupt changes in 'people's lives, such as working from home or under stressful circumstances, loss of employment, and social and physical distancing with outstanding consequences for 'people's mental and physical health (Cava et al 2005, Marjanovic et al 2007). In addition to the uncertainty and stress of the global outbreak, questions about the effects of quarantining on mental and psychological health have quickly emerged.

A recent review by Brooks and colleagues (2020) published at Lancet summarise the currently available knowledge on the psychological effects of quarantine. Mental health issues mostly explored were post-traumatic disorder symptoms, depression, anxiety, loneliness, insomnia and other negative emotions in general (e.g., anger, frustration and boredom) (Brooks et al 2020). Nevertheless, all studies reviewed by the authors were carried out in situations of quarantine where the person was isolated due to the infected with SARS, Ebola, H1N1 influenza pandemic, among others.

A few studies have been carried out in these last few weeks to understand the specific impact of the COVID-19 quarantine on mental health. For instance, Pancani and colleagues (2020) showed, in a sample of 1006 Italians currently locked down, that the length of isolation is associated with worse mental health including higher levels of depression, unworthiness, and helplessness. Another study by Zhang et al. (2020) showed that individuals who had to stop working during the outbreak are more vulnerable to mental and physical health issues. As for another example, Shevlin and colleagues (2020) who found in a sample of 2025 UK adults increased levels of anxiety, depression and trauma compared to previous populations studies, but not a dramatic increase. Factors that predicted higher levels of mental health symptoms

included young age, high estimates of personal risk, low income, loss of revenue, as well as pre-existing health conditions.

Surprisingly, no study has yet explored whether the current situation or its perceived impact can exacerbate psychotic experiences such as paranoid ideas and hallucinations and/or contribute to the emergence of these experiences in the general population. This fact is even more surprising if one considers that factors that have been the focus of attention of the studies described above such as sleep-related problems (Reeve et al 2015), aggravated social isolation and loneliness as a result of the lockdown (Lamster et al 2017, Michalska da Rocha et al 2018), emotional distress (Delespaul et al 2002, Lincoln et al 2009) and worry/rumination (Badcock et al 2011, Startup et al 2016) are significant predictors of psychotic symptoms in clinical, but also in non-clinical populations (Butler et al 2019, Reeve et al 2018). For instance, many studies have shown that isolation are associated with increased frequency of hallucinatory experiences (Davis et al 1961, Kellerman et al 1977, Zubek et al 1961). Likewise, Grassian (1983) found that inmates exposed to solitary confinement described perceptual distortions and hallucinations. Moreover, sleep deprivation has been found to increase paranoia and hallucinations in a sample of non-clinical volunteers (Reeve et al 2018).

Indeed, the vulnerability-stress model emphasises the role of stress in the emergence of psychotic experiences (Lecomte et al 2019, Nuechterlein et al 1994). Many studies have found consistent evidence showing that emotional reactivity to stress is a vulnerability marker for psychosis (Myin-Germeys and van Os 2007). Moreover, theoretical models of hallucinations highlight the fundamental role of negative emotions in the emergence and maintenance of auditory hallucinations (Birchwood 2003, Freeman and Garety 2003, Morrison 2001). Similarly, theoretical models of paranoia place anxiety and worry as core predictors of paranoia (Startup et al 2016). Therefore, the recent outbreak of COVID-19, the lockdown and the

exposure to sensationalised news about crises are here important stress-inducing events that can predispose individuals to paranoia and hallucinations.

The goal of the present study is, therefore, to add to the current literature information about the impact of the COVID-19 pandemic and lockdown on psychotic experiences. More specifically, we sought to study which factors are associated with paranoid ideas and hallucinations during the lockdown period. Our main correlates of psychotic experiences can be divided into five groups. We adopted Freeman and Garety's model (2014) of paranoia and their general model of psychotic symptoms (Garety et al 2001) to guide the inclusion of our variables. According to their models, when facing stressful situations (e.g., COVID-19, lack of sleep, social isolation, etc.), individuals might interpret internal and external events in a different way because of different cognitive (i.e., jumping to conclusion) and emotional (i.e., anxiety, repetitive thoughts, emotion regulation strategies) factors, which ultimately will result in increased paranoid ideas. Likewise, stressful situations are suggested to trigger hallucinations, notably through cognitive and affective changes. Cognitive and emotional processes associated with hallucinations include repetitive thinking and intrusive thoughts (Badcock et al 2011, Gracie et al 2007), negative affect such as depression and anxiety (Delespaul et al 2002, Hartley et al 2014), and experiential avoidance (Goldstone et al 2011, Langer et al 2010).

Therefore, we first included the social-demographic variables (e.g., age, gender and level of education) as well as clinical variables (e.g., cannabis consumption, previous mental health disorders diagnosis). Second, we assessed the length and perceived impact of the lockdown and participant exposure to the virus (COVID-19 related triggers). Third, we also added measures of sleep quality, level of activity and loneliness during the quarantine (Contextual triggers). Forth, we included a measure of jumping to conclusion bias (JTC), which describes individual's tendency to make a hasty decision on the basis of little evidence. JTC is the reasoning bias most consistently associated with delusions and particularly paranoid

ideations in both clinical (Dudley et al 2016) and non-clinical samples (Freeman et al 2008). Fifth, in light of previous studies highlighting the role of emotional processes we included measures of emotion regulation (i.e., experiential avoidance, cognitive restructuring and catastrophisation), emotional distress (i.e., anxiety) and repetitive thoughts. Finally, we considered the role of paranoia (for the hallucination model) and hallucinations (for the paranoia model) since they often appear together.

First, we hypothesise that emotion regulation (emotional avoidance), negative affect, level of activity, loneliness, sleep quality, perception of the impact of the COVID-19 pandemic, and length of self-isolation (number of days since the beginning of lockdown in France) will be associated with hallucinations. Second, we hypothesise that emotion regulation (catastrophising and reappraisal), cognitive bias, negative affect, worry, level of activity, loneliness, sleep quality, length of self-isolation, and perception of the impact of the COVID-19 pandemic will be associated with paranoia.

The hypothesis of the study was pre-registered (<https://osf.io/gxy79/>). Based on the literature, we made two corrections in our second hypothesis: we added both sleep quality (Reeve et al 2015) and loneliness (Lamster et al 2017) as predictor of paranoia.

Method

Participants

Our sample was recruited in the general population through online social media, through university websites and via acquaintances of the authors with a snowball procedure. Moreover, each participant was requested to invite at least three friends, family members, or acquaintances to take part in the study. Inclusion criteria consisted of being 18 years old or more and being fluent in French.

In total, 1154 participants started the study, but only 733 complete all scales, including the Paranoia Scale. Fewer participants completed both the measure of paranoia and hallucination-like experiences ($N = 719$). Participants who failed at least two validation questions (6 questions were included in the study) were excluded ($N = 5$). In total, 728 participants who consented to participate and complete at least the Paranoia Scale were included in the final sample.

Ethical clearance was provided by Centre Hospitalier Universitaire de Montpellier, IRB-MTP_2020_04_202000449.

Measures

Socio-demographic variables: Participants completed a series of questions about the socio-demographic characteristics, including sex, age, nationality, education level, professional status, and family situation.

Clinical measures: Participants provided information about current and past mental health diagnosis, mental health treatment and drugs consumption.

COVID-19 related measures: Participants were requested to complete different questions about their perception of the lockdown and security measures as well as the impact of the lockdown. The latter question covered different domains, including the effect of the lockdown on French's lifestyle, economy, mental health and health system, as well as its impact on one's psychological and physical health and finances. Participants were requested to rate whether they agree with the statement, and if they did, they also evaluate their levels of preoccupation and distress. Finally, participants were requested to assess whether they or someone close to them was infected by the COVID-19 and/or hospitalised.

The *Behavioural Activation for Depression Scale* – BADS (Kanter et al 2007) is a 10-item scale assessing behavioural activation. Each item is rated on a 7-point scale (from 0 to 6). For the total scale, higher scores indicate higher behavioural activation.

The *UCLA Loneliness Scale* (Russell 1996) is a 20-item measure that assesses how often a person feels disconnected from others. Items are rated on a 4-point rating scale ranging from 1 (never) to 4 (always). Higher scores indicate higher levels of loneliness.

The *Pittsburgh Sleep Quality Index – PSQI* (Buysse et al 1989) is a subjective measure of sleep. It measures seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the last month. Scoring of the answers is based on a 0 to 3 Likert Scale. In the current study, we assessed only two domains (three questions): use of sleep medication and daytime dysfunction.

The *Brief Experiential Avoidance Questionnaire – BEAQ* (Gámez et al 2014) is a self-report questionnaire designed to measure experiential avoidance, that is, the unwillingness to remain in contact with distressing emotions, thoughts and other experiences (Hayes, Strosahl, & Wilson, 2012). Items are rated on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). This brief version is composed of 15 items.

The *Cognitive Emotional Regulation Questionnaire - CERQ* (Garnefski and Kraaij 2007) is a 36-item scale designed to evaluate nine cognitive strategies used to regulate emotions in response to negative or unpleasant events. In the present study, we focused on two: Catastrophizing and Putting into perspective (or cognitive reappraisal) because previous studies have found that catastrophizing and impaired cognitive reappraisal are important correlated of paranoia (Startup et al 2007, Westermann et al 2014).

The *Perseverative Thinking Questionnaire – PTQ* (Ehring et al 2011). The PTQ was developed to propose a transdiagnostic measure of the core characteristics of negative repetitive thinking (RNT), such as the repetitiveness, the intrusiveness, or the difficulty of disengaging, and the perceived unproductiveness of RNT. The PTQ is a 15-item scale. Items are rated on a 5-point scale ranging from 0 (never) to 4 (almost always).

The *Cognitive bias questionnaire for Psychosis* - CBQp (Peters et al 2013). The CBQp was developed to capture 5 cognitive distortions including jumping to conclusions. For the purpose of the study, we focused on the six items of the CBQp related to the jumping to conclusion bias (JTC). The potential range of scores was 6–18.

The *Depression Anxiety and Stress Scale* – DASS (Lovibond & Lovibond, 1994) is a scale measuring negative affect including depression, anxiety and stress. Each item is scored on a 4-point scale (0-never; 4-all the time). Higher scores indicate greater levels of negative affect.

The *Paranoia Scale* – PS (Fenigstein and Venable 1992) is a 20-item self-report questionnaire developed to assess the frequency of subclinical levels of paranoia. It is scored on a 1–5 Likert scale with scores ranging from 20–100.

The *Cardiff Anomalous Perceptions Scale* – CAPS (Bell et al 2006) is a self-report scale designed to assess a range of hallucination-like experiences. It consists of 32 items, with yes/no as response options.

The *Validation questions*. Five items were added to detect random completion or attention lapses (e.g., "please answer 4 to this question"), lies (issued from the Eysenck Personality Questionnaire-Revised; (Eysenck et al 1984) and simulation of psychotic symptoms (Moritz et al 2013).

For all measures, participants were requested to consider only the period of lockdown while completing the questionnaires.

All measures employed in this study are available here: <https://osf.io/gxy79/>. This study was pre-registered.

1. Statistical Analyses

Mean, and the standard deviation was calculated for all variables (see Table 1). Subsequently, correlations and multiple linear regression analysis were used to test the relationship between the dependent variables (Paranoia and Hallucinations) and the independent variables. Regressions were performed in R with the *lm* (linear model) function. Moreover, we perform, regression diagnostics including tests of normality of residuals (Normal Probability Plot), homoscedasticity (Plot of residuals versus predicted value), independence (Durbin-Watson statistic) of Residuals, Non-linearity, and multicollinearity ($VIF < 2$). The function *Normalize()* was employed to improve the model. Dummy variables were created for the categorical variables. The significance level for our analyses was set at $p < 0.05$. All statistical analyses were performed using the R Studio.

Results

Descriptive Variables

Descriptive characteristics of the sample are presented in Table 1 (for continuous variables) and Table 2 (for categorical variables).

Insert Table 1 and 2 here

Correlates of Paranoia

Correlation between paranoia and the other variables are presented in Table 3. After Benjamini and Hochberg correction, paranoia was found to be statistically correlated to age, education, perceived impact of lockdown, sleep quality, loneliness, experiential avoidance, behavioural activation, catastrophisation, repetitive thoughts, cognitive bias, negative affect and hallucinations.

For the categorical variables entered in the model, refer to Table 4. Mann-whitey test showed statistically significant differences in paranoia when considering the following independent variables: Diagnosis of Mental disorder, Past Mental disorder, Currently seeing a mental health professional, and Currently taking medication for a mental disorder.

Insert here Table 3 and 4

Regression

Seven different models were tested for paranoia. First, we entered only the socio-demographic variables (Model 1). Although sex was not related to paranoia, we decided to keep it in the final model. Nevertheless, we decided to keep sex in the regression model due to the important number of female (vs male) in our sample. Second, we also included clinical variables (Model 2).

Third, we entered the COVID-19 related triggers (Model 3). Forth, in Model 4, quality of sleep during the quarantine, behavioural activation and loneliness were added (Contextual triggers). Fifth, the cognitive factors were included (Model 5) followed by the emotional ones (Model 6). Finally, in Model 7, we also included paranoia. The choice of anxiety was based on theoretical grounds (Freeman & Garety, 2014) and in order to avoid collinearity issues. Entering the total score of the DASS resulted in multicollinearity.

As it can be seen in Table 5, most clinical and COVID-19 related variables were no longer statistically associated with paranoia once we entered in the model the affective and cognitive processes that are commonly associated with paranoia. Together with the socio-demographic variables, loneliness, cognitive bias, anxiety, repetitive thoughts and hallucinations were associated with paranoia.

Insert here Table 5

Correlates of Hallucinations and Other unusual experiences

See Table 3 for the correlation analyses for Hallucinations and other unusual perceptual experiences. After Benjamini and Hochberg correction, hallucinations were found to be statistically correlated to all variables except for the length of self-isolation and reappraisal.

For the categorical variables entered in the model, refer to Table 4. Mann-whitey test showed statistically significant differences in hallucinations when considering the following independent variables: Diagnosis of Mental disorder, Past Mental disorder, Currently seeing a mental health professional, and Currently taking medication for a mental disorder.

Insert here Table 6

Regression

The same steps adopted to test the models for paranoia were adopted here (Table 5). The only difference here is that paranoia was entered in the final step. Again, we choose to include here only anxiety considering previous studies showing that it is "the most prominent emotion during hallucinations" and that "reports of anxiety intensity exceeded baseline levels before the first report of auditory hallucinations" (Delespaul, et al., 2002, abstract). Moreover, we decided to keep only one of the DASS scores to avoid multicollinearity problems.

As it can be seen in Table 6, socio-demographic and COVID-19 related variables were not statistically associated with hallucinations once we entered in the model the factors that are commonly associated with hallucinations were considered (see Model 4 and 6). In Model 7, diagnosis of a mental disorder, currently taking medication, quality of sleep, behavioural activation, repetitive thoughts, and paranoia were associated with hallucinations in our sample. Having a diagnosis was associated with having more hallucinatory experiences. Medication use was negatively associated with hallucinations indicating that those not consuming medication also reported less hallucinatory experiences. Lower sleep quality (higher score) was associated with reporting more hallucinations. Surprisingly, behavioural activation was positively associated with hallucinations indicating that those individuals who were engaging in more activities in their daily life also reported more hallucinations. Repetitive intrusive thoughts, anxiety and paranoia were positively associated with hallucinations.

Insert here table 6

Influential outliers were found in the model as well as issues with the normality of residuals. Exclusion of outliers did not improve the model; neither changed the results. We decided to report the model without excluding them. Nevertheless, caution is necessary when generalising our findings.

Discussion

The actual pandemic of the new Coronavirus disease (COVID-19) has led many countries to impose lockdown to a large proportion of their population to avoid spreading the

disease further. France, for example, has been put on lockdown for eight weeks between 17/03/2020 and 11/05/2020. As indicated by a recent review (Brooks et al 2020), past experiences revealed that more extended quarantine is associated with poorer psychological outcomes and generally marked by increased incidence for various psychiatric symptoms, particularly post-traumatic stress symptoms, depression, or sleep disturbances. Also, and as discussed elsewhere, pandemic conditions are « unique circumstances to determine causal mechanisms associated with poor mental health » outside the laboratory (Holmes et al 2020). Surprisingly, no study has yet explored whether the length of lockdown and its perceived impact can exacerbate psychotic experiences, including paranoid ideas and hallucinations in the general population. This is despite the report of several cases of brief psychotic disorder triggered or exacerbated by the fear of the coronavirus (Fischer et al 2020).

Our study had two main objectives. First, to study the impact of the length of the quarantine and perceived impact associated with the COVID-19 pandemic on paranoid ideation and hallucinations in the general population. Second, to examine an integrative model of psychotic symptoms in the context of the lockdown imposed by COVID-19 pandemic.

Overall, despite cumulative evidence and scientific reports that the COVID-19 pandemic and, particularly, self-isolation affects mental health and particularly financial worry, y or loneliness in the general population (Asmundson and Taylor 2020, Tull et al 2020), our results did not support such a conclusion regarding paranoid ideations and hallucinations and other unusual perceptual experiences.

Firstly, the average score of paranoid ideations ($M = 35.58$; $SD = 12.32$) and hallucinations ($M = 3.73$; $SD = 4.68$) was similar or inferior to those previously found in the general community populations outside pandemic conditions. For instance, for paranoia, Hajdúk et al. (2019), in UK, reported a mean score of 39.35 ($SD = 12.39$), while in another study by Pinto-Gouveia and colleagues (2014) conducted in Portugal, they found the mean

score for the Paranoia Scale of 44.20 (SD = 10.61). Regarding hallucinations and other unusual perceptual experiences, the validation study of the CAPS (Bell et al 2006), in UK, found a mean of 7.3 (SD = 5.8; participants were much younger in their study, mean age = 21.6, SD = 5.4). As for another example, Moseley and colleagues (in preparation), in a large multi-country sample (including France), reported a mean for the CAPS of 4.68. Thus, there is no evidence of abnormal levels of psychotic symptoms in our sample one month after the confinement.

Secondly, the length of self-isolation was found to be correlated with neither paranoia ideas nor hallucinations. Moreover, contrary to our hypothesis, even though the perceived impact of the COVID-19 pandemic was initially associated with psychotic symptoms, in our regression analyses, their effect was small and became non-significant once we considered other contextual factors that are commonly associated with hallucinations and paranoia such as sleep difficulties (Reeve et al 2015), and loneliness (Lamster et al 2017). Moreover, neither the presence of COVID-19 symptoms nor the presence of a family member with a diagnosis was associated with reporting more psychotic-like experiences. Unfortunately, due to the small number of participants reporting a diagnosis of COVID-19 or hospitalisations due to it, we could not test whether it could be associated with increased psychotic symptoms.

Regarding our paranoia model, the main correlates that explain 44% of the variance of paranoid ideations were loneliness, jumping to conclusions bias (failure to consider alternative explanations, anxiety, experiential avoidance and hallucinations. These findings partially support our hypothesis. Age, sex and education were also correlated to paranoia (Freeman et al 2008, Freeman and Garety 2014). Our model of paranoia during the COVID-19 pandemic fits well with the threat anticipation model (Freeman 2007, Freeman and Garety 2014), which proposes a multi-factorial account of the formation and maintenance of persecutory delusions comprising *affective processes* and especially anxiety, worry, and interpersonal sensitivity (Freeman and Garety 2003); *anomalous experiences*, such as hallucinations and perceptual

anomalies; *reasoning biases*, particularly jumping to conclusions and belief inflexibility; and finally *social factors*, such as adverse or stressful events and environments. One of the main contributions of our findings is that we reproduce and extend the threat anticipation model under exceptional conditions corresponding to the defining global health crisis of our time.

Concerning our model for hallucinations, the main correlates were anxiety, a current diagnosis of mental disorder, and currently taking medication. The other correlates were reduced sleep quality, higher levels of behavioural activation, repetitive negative thinking and paranoia ideation that all together explain 27% of hallucination. These results corroborate some of our hypothesis and also previous studies showing the importance of anxiety (Delespaul et al 2002), quality of sleep (Reeve et al 2015), and repetitive thinking (Badcock et al 2011, Gracie et al 2007) as important factors contributing to hallucinatory experiences. Surprisingly, behavioural activation was positively associated with hallucinations in the regression model (although not in the correlation analyses). Multicollinearity problems were not detected. Theoretically, these results contradict the idea that individuals who are more engaged in meaningful activities might report fewer hallucinations in daily life. The interaction with another variable might be contributing to this finding, despite the absence of multicollinearity problems.

Conclusions. No evidence was found between a significant association between length of self-isolation and psychotic symptoms in the general population in France. Our findings indicate that although the perceived impact of lockdown is associated with increased paranoid ideas and hallucinatory experiences, other factors are more important contributors to our final model. Contrary to what one might have feared (Troyer et al 2020), the COVID-19 pandemic does not appear to be a direct risk factor for psychotic symptomology, at least in the French population with an average lockdown length above one month. One could, however, hypothesise that the

pandemic and the lockdown might maximise other relevant risk factors. Indeed, our study confirms the preeminent role of several cognitive, emotional and contextual factors previously described in the maintenance and development of psychotic symptoms in the context of an epidemic and lockdown measures.

Limits. Our study has several limits. First, this is a cross-sectional study, and it is still too soon to forecast the medium-term consequences of the correlates. Second, our sample comes from the general population without restricted access to the internet. Our results need to be confirmed in populations that are socially or economically fragile, belonging to an immigrant or minority group of the population with a higher risk of developing paranoid ideations (Lopes, Bortolon, & Jaspal, under review). Similarly, even if it was not the aim of our study, our results cannot be generalised to clinical populations. Future studies are needed to explore specifically the short and long-term consequences of the correlates on psychotic symptoms in populations facing difficulties in accessing timely health services (Yao et al 2020).

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Conflicts of Interest: None

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 200. Ethical clearance was provided by Centre Hospitalier Universitaire de Montpellier, IRB-MTP_2020_04_202000449.

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Table 1.

Minimum, Maximum, Mean and Standard Deviation for the categorical variables (N = 728)

	Mean	SD
<i>Age</i>	44.90	15.95
Covid-19 related triggers		
<i>Perceive impact of the quarantine</i>	23.36	5.36
Associated Preoccupation	25.21	9.97
Associated Stress	20.05	11.14
<i>Length of Isolation</i>	38.23	8.42
Contextual triggers		
<i>Sleep quality</i>	1.99	1.77
<i>Behavioral Activation</i>	31.39	9.42
<i>Loneliness</i>	41.71	8.87
Cognitive and Emotional factors		
<i>Experiential Avoidance</i>	48.83	12.65
<i>Reappraisal</i>	15.49	3.62
<i>Catastrophisation</i>	5.84	2.41
<i>Repetitive thoughts</i>	22.97	13.01
Jumping to conclusion bias	9.51	1.74
Negative Affect	13.96	11.33
<i>Anxiety</i>	3.11	3.59
<i>Depression</i>	4.91	4.67

<i>Stress</i>	5.94	4.63
Paranoia	35.58	12.32
Hallucination *	3.73	4.68

Note : * N = 714

Table 2.

Number (N) and percentage (%) for the categorical variables

	N	%
Sex		
Female	554	76.10
Male	173	23.76
Other	1	0.1
Education		
Elementary School	2	0.20
Secondary School	9	1.24
High School	129	17.72
Bachelor's Degree	228	31.32
'Master's degree	295	40.52

PhD	65	8.93
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Family Situation

Single	191	26.24
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Married	222	30.49
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In a couple	186	25.55
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Divorced	111	15.25
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Widower	18	2.47
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Profession

Student	97	13.32
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Employee	302	41.50
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Independent worker	90	12.36
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Retired	112	15.38
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Unemployed	52	7.14
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Incapacity to work	21	2.88
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Autre	54	7.42
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Nationality

French	691	94.92
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Other	37	5.08
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Country

France	714	98.08
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Other	14	1.92
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Diagnosis of Serious Mental Disorder

No	634	87.09
Yes	80	10.99
<i>Depression</i>	31	38.75
<i>Anxiety Disorders</i>	20	25
<i>Schizophrenia/Psychosis</i>	3	3.75
<i>Bipolar Disorder</i>	6	7.5
<i>Eating Disorder</i>	2	2.5
<i>Personality Disorder</i>	8	10
<i>Autism Spectrum Disorder</i>	6	7.5
<i>Other</i>	4	5
Prefer not to say	14	1.92

Past Serious Mental Disorder

No	546	75.00
Yes	165	22.66
<i>Depression</i>	117	70.90
<i>Anxiety Disorders</i>	21	12.72
<i>Schizophrenia/Psychosis</i>	2	1.21
<i>Bipolar Disorder</i>	6	3.63
<i>Eating Disorder</i>	7	4.24
<i>Personality Disorder</i>	2	1.21
<i>Autism Spectrum Disorder</i>	1	0.60
<i>Other</i>	8	4.84

Prefer not to say	17	2.34
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Currently seeing a mental health professional

No	595	81.73
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Yes	128	17.58
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Prefer not to say	5	0.69
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Currently taking medication

No	619	85.03
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Yes	102	14.01
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Prefer not to say	7	0.96
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Cannabis consumption

No	698	95.88
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Yes	30	4.12
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Diagnosis of COVID-19

No	711	97.66
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Yes	17	2.34
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Family diagnosed COVID-19

No	564	77.47
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Yes	164	22.53
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COVID-19 symptoms

No	642	88.19
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Yes	86	11.81
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Family hospitalised due to COVID-19

No	712	97.80
Yes	16	2.20

Hospitalised due to COVID-19

No	727	99.86
Yes	1	0.14

Table 3.

Spearman correlations for Paranoia and Hallucinations.

	Paranoia		Hallucination	
	r	p-value	r	p-value
<i>Demographic</i>				
Age	-0.17	0.0001	-0.13	0.0005
Education	-0.15	0.0001	-0.08	0.0365
<i>Covid-19 measures</i>				
Length of Isolation	0.03	0.4149	0.01	0.7625
Perceive impact of the quarantine	0.19	0.0001	0.15	0.0001
<i>Other measures</i>				
Sleep quality	0.25	0.0001	0.28	0.0001
Loneliness	0.48	0.0000	0.27	0.0000
Behavioural Activation	-0.29	0.0000	-0.16	0.0000
Experiential Avoidance	0.35	0.0000	0.20	0.0000
Reappraisal	-0.04	0.2511	-0.04	0.2314
Catastrophisation	0.27	0.0001	0.18	0.0001
Worry	0.45	0.0001	0.38	0.0001
Jumping to conclusion bias	0.37	0.0001	0.21	0.0001
Anxiety	0.45	0.0001	0.44	0.0001
Depression	0.48	0.0001	0.33	0.0001
Stress	0.40	0.0001	0.35	0.0001

Paranoia	0.44	0.0001
Hallucination		

Note: Benjamini and Hochberg (1995) corrected significance level $p < 0.04$

Table 4.

Group comparisons for Paranoia and Hallucinations

	Paranoia	Hallucination
<i>Demographic</i>		
Sex	W = 46906, p-value = 0.673	W = 51850, p-value = 0.673
<i>Clinical</i>		
Diagnosis of Serious Mental Disorder	W = 15064, p-value < 0.0001	W = 15762, p-value < 0.0001
Past Serious Mental Disorder	W = 39311, p-value = 0.003	W = 37995, p-value = 0.003
Currently seeing a mental health professional	W = 29844, p-value < 0.0001	W = 29843, p-value < 0.0006
Currently taking medication	W = 21939, p-value < 0.0001	W = 25889, p-value = 0.0001
Cannabis consumption	W = 9415, p-value = 0.349	W = 8841, p-value = 0.349
<i>Covid-19 measures</i>		
Familiy diagnosed COVID-19	W = 47028, p-value = 0.742	W = 41230, p-value = 0.742
COVID-19 symptoms	W = 27166, p-value = 0.810	W = 23817, p-value = 0.810

Note: Benjamini and Hochberg (1995) corrected significance level $p < 0.03$

Table 5.

Regression Models for Paranoia.

Paranoia				
<i>Model 1</i>	<i>Estimate s</i>	<i>CI</i>	<i>p</i>	R^2 / R^2 adjusted
(Intercept)	52.50	46.31 – 58.69	<0.001	0.048 / 0.044
Age	-0.13	-0.18 – -0.07	<0.001	
Sex	1.20	-0.83 – 3.23	0.246	
Education	-2.14	-3.17 – -1.11	<0.001	
<i>Model 2</i>	<i>Estimate s</i>	<i>CI</i>	<i>p</i>	R^2 / R^2 adjusted
(Intercept)	49.50	43.38 – 55.62	<0.001	0.104 / 0.095
Age	-0.13	-0.18 – -0.07	<0.001	
Sex	1.29	-0.69 – 3.28	0.201	
Education	-1.89	-2.91 – -0.88	<0.001	
Diagnosis of Serious Mental Disorder	4.94	1.36 – 8.52	0.007	
Past Serious Mental Disorder	2.28	0.19 – 4.37	0.033	
Currently seeing a mental health professional	0.78	-1.91 – 3.46	0.569	
Currently taking medication	3.09	0.13 – 6.06	0.041	

<i>Model3 – Covid-19 triggers</i>	<i>Estimate s</i>	<i>CI</i>	<i>p</i>	<i>R² / R² adjusted</i>	
(Intercept)	39.31	32.17 – 46.4 4	<0.001	0.137 / 0.127	1
Age	-0.12	-0.17 – -0.07	<0.001		
Sex	1.44	-0.51 – 3.39	0.148		
Education	-1.83	-2.83 – -0.83	<0.001		
Diagnosis of Serious Mental Disorder	4.66	1.15 – 8.18	0.009		
Past Serious Mental Disorder	2.32	0.26 – 4.37	0.027		
Currently seeing a mental health professional	0.67	-1.97 – 3.30	0.621		
Currently taking medication	2.62	-0.30 – 5.53	0.078		
Perceived impact of the quarantine	0.42	0.26 – 0.57	<0.001		
<i>Model 4 – Contextual triggers</i>	<i>Estimate s</i>	<i>CI</i>	<i>p</i>	<i>R² / R² adjusted</i>	
(Intercept)	24.32	14.98 – 33.6 5	<0.001	0.317 / 0.306	3
Age	-0.14	-0.19 – -0.09	<0.001		
Sex	1.29	-0.46 – 3.03	0.148		
Education	-1.47	-2.36 – -0.57	0.001		
Diagnosis of Serious Mental Disorder	1.23	-1.95 – 4.41	0.447		

Past Serious Mental Disorder	1.96	0.12 – 3.79	0.037
Currently seeing a mental health professional	0.34	-2.02 – 2.69	0.779
Currently taking medication	1.46	-1.23 – 4.15	0.286
Perceived impact of the quarantine	0.04	-0.12 – 0.20	0.642
Sleep quality	0.61	0.09 – 1.13	0.021
Behavioural Activation	-0.06	-0.16 – 0.04	0.231
Loneliness	0.58	0.48 – 0.68	<0.001

<i>Model 5 – Cognitive Factors</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>R² / R² adjusted</i>
(Intercept)	11.60	1.83 – 21.37	0.020	0.358 / 0.347
Age	-0.11	-0.15 – -0.06	<0.001	
Sex	2.51	0.79 – 4.24	0.004	
Education	-1.64	-2.51 – -0.77	<0.001	
Diagnosis of Serious Mental Disorder	1.22	-1.86 – 4.31	0.437	
Past Serious Mental Disorder	1.98	0.19 – 3.76	0.030	
Currently seeing a mental health professional	-0.02	-2.31 – 2.26	0.985	
Currently taking medication	0.89	-1.72 – 3.50	0.503	
Perceived impact of the quarantine	0.01	-0.14 – 0.17	0.868	

Sleep quality	0.60	0.10 – 1.10	0.019
Behavioural Activation	-0.05	-0.15 – 0.05	0.297
Loneliness	0.50	0.40 – 0.60	<0.001
Cognitive Bias	1.64	1.16 – 2.11	<0.001

<i>Model 6 – Emotional factors</i>	<i>Estimate s</i>	<i>CI</i>	<i>p</i>	R^2 / R^2 adjusted	
(Intercept)	4.90	-4.81 – 14.62	0.322	0.422 / 0.409	3
Age	-0.08	-0.13 – -0.04	0.001		
Sex	2.81	1.16 – 4.46	0.001		
Education	-1.21	-2.06 – -0.37	0.005		
Diagnosis of Serious Mental Disorder	0.19	-2.75 – 3.14	0.898		
Past Serious Mental Disorder	1.76	0.06 – 3.46	0.042		
Currently seeing a mental health professional	-0.94	-3.15 – 1.27	0.403		
Currently taking medication	0.66	-1.84 – 3.15	0.605		
Perceived impact of the quarantine	-0.07	-0.22 – 0.08	0.372		
Sleep quality	0.05	-0.45 – 0.55	0.842		
Behavioural Activation	0.07	-0.02 – 0.17	0.140		
Loneliness	0.42	0.32 – 0.51	<0.001		

Jumping to conclusion Bias	1.22	0.76 – 1.68	<0.001
Anxiety	0.85	0.57 – 1.12	<0.001
Experiential Avoidance	0.08	0.02 – 0.14	0.011
Repetitive Thoughts	0.10	0.03 – 0.18	0.009
Catastrophisation	0.17	-0.20 – 0.55	0.366

<i>Model 7 – Comorbid symptom</i>	<i>Estimate s</i>	<i>CI</i>	<i>p</i>	R^2 / R^2 adjusted	
(Intercept)	9.51	0.27 – 18.75	0.044	0.448 / 0.435	3
Age	-0.09	-0.13 – -0.04	<0.001		
Sex	2.92	1.30 – 4.54	<0.001		
Education	-1.29	-2.11 – -0.47	0.002		
Diagnosis of Serious Mental Disorder	-0.72	-3.64 – 2.20	0.628		
Past Serious Mental Disorder	1.53	-0.15 – 3.20	0.074		
Currently seeing a mental health professional	-0.89	-3.08 – 1.30	0.424		
Currently taking medication	1.79	-0.68 – 4.27	0.154		
Perceived impact of the quarantine	-0.07	-0.22 – 0.08	0.385		
Sleep quality	-0.15	-0.64 – 0.35	0.559		
Behavioral Activation	0.02	-0.07 – 0.12	0.636		

Loneliness	0.42	0.32 – 0.51	<0.001
Jumping to conclusion Bias	1.28	0.83 – 1.74	<0.001
Anxiety	0.59	0.31 – 0.87	<0.001
Experiential Avoidance	0.09	0.01 – 0.16	0.023
Repetitive Thoughts	0.25	-0.12 – 0.62	0.190
Hallucinations	0.54	0.36 – 0.72	<0.001

Note: *** $p < 0.0001$

Table 6.

Regression Models for Hallucinations.

Hallucinations					
<i>Model 1</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	7.77	5.56 – 9.99	< 0.001	0.027 / 0.023	6.58***
Age	-0.03	-0.05 – -0.02	0.001		
Sex	-0.59	-1.32 – 0.13	0.108		
Education	-0.41	-0.77 – -0.04	0.031		
<i>Model 2</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	6.91	4.70 – 9.12	< 0.001	0.068 / 0.058	7.31***
Age	-0.03	-0.05 – -0.01	0.002		
Sex	-0.57	-1.28 – 0.15	0.122		
Education	-0.36	-0.72 – 0.01	0.056		
Diagnosis of Serious Mental Disorder	2.38	1.08 – 3.67	< 0.001		
Past Serious Mental Disorder	0.80	0.05 – 1.56	0.038		
Currently seeing a mental health professional	0.14	-0.84 – 1.12	0.777		
Currently taking medication	-0.33	-1.41 – 0.75	0.544		
<i>Model3 – Covid-19 triggers</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	4.33	1.73 – 6.93	0.001	0.085 / 0.074	8.14***
Age	-0.03	-0.05 – -0.01	0.003		

Sex	-0.53	-1.24 – 0.18	0.142
Education	-0.34	-0.70 – 0.02	0.067
Diagnosis of Serious Mental Disorder	2.30	1.01 – 3.59	<0.001
Past Serious Mental Disorder	0.81	0.06 – 1.56	0.034
Currently seeing a mental health professional	0.12	-0.86 – 1.09	0.816
Currently taking medication	-0.45	-1.52 – 0.63	0.415
Perceived impact of the quarantine	0.11	0.05 – 0.16	<0.001

<i>Model 4 – Contextual triggers</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	0.53	-3.13 – 4.19	0.775	0.158 / 0.145	12.00***
Age	-0.03	-0.05 – -0.01	0.002		
Sex	-0.50	-1.19 – 0.18	0.148		
Education	-0.28	-0.63 – 0.07	0.118		
Diagnosis of Serious Mental Disorder	1.78	0.53 – 3.04	0.005		
Past Serious Mental Disorder	0.69	-0.03 – 1.41	0.062		
Currently seeing a mental health professional	0.04	-0.90 – 0.97	0.939		
Currently taking medication	-1.07	-2.13 – -0.01	0.048		
Perceived impact of the quarantine	0.02	-0.04 – 0.09	0.470		
Sleep quality	0.53	0.33 – 0.74	<0.001		

Behavioural Activation	0.02	-0.02 – 0.06	0.431
Loneliness	0.10	0.06 – 0.13	<0.001

<i>Model 5 – Cognitive Factors</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	-1.10	-5.05 – 2.84	0.583	0.164 / 0.150	11.45**
Age	-0.03	-0.05 – -0.01	0.008		
Sex	-0.35	-1.04 – 0.35	0.331		
Education	-0.30	-0.65 – 0.05	0.091		
Diagnosis of Serious Mental Disorder	1.78	0.53 – 3.03	0.005		
Past Serious Mental Disorder	0.69	-0.03 – 1.41	0.061		
Currently seeing a mental health professional	-0.01	-0.94 – 0.92	0.983		
Currently taking medication	-1.15	-2.21 – -0.08	0.034		
Perceived impact of the quarantine	0.02	-0.04 – 0.08	0.527		
Sleep quality	0.53	0.33 – 0.73	<0.001		
Behavioural Activation	0.02	-0.02 – 0.06	0.393		
Loneliness	0.09	0.05 – 0.13	<0.001		
Cognitive bias	0.21	0.02 – 0.40	0.032		

<i>Model 6 – Emotional Factors</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	-2.73	-6.64 – 1.19	0.172	0.247 / 0.231	14.4***
Age	-0.01	-0.03 – 0.00	0.150		
Sex	-0.17	-0.84 – 0.49	0.608		

Education	-0.19	-0.53 – 0.15	0.280
Diagnosis of Serious Mental Disorder	1.42	0.23 – 2.62	0.020
Past Serious Mental Disorder	0.61	-0.07 – 1.30	0.080
Currently seeing a mental health professional	-0.40	-1.30 – 0.50	0.389
Currently taking medication	-1.24	-2.25 – -0.23	0.016
Perceived impact of the quarantine	-0.00	-0.06 – 0.06	0.956
Sleep quality	0.31	0.11 – 0.51	0.003
Behavioural Activation	0.06	0.02 – 0.10	0.002
Loneliness	0.06	0.02 – 0.10	0.003
Cognitive bias	0.06	-0.13 – 0.24	0.558
Repetitive Thoughts	0.05	0.02 – 0.08	0.003
Experiential Avoidance	0.01	-0.01 – 0.04	0.260
Anxiety	0.37	0.26 – 0.48	<0.001
Catastrophisation	-0.06	-0.21 – 0.09	0.456

<i>Model 7</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	R ² / R ² adjusted	F
(Intercept)	-3.17	-7.00 – 0.66	0.104	0.283 / 0.266	16.17**
Age	-0.01	-0.02 – 0.01	0.551		
Sex	-0.41	-1.07 – 0.25	0.219		
Education	-0.08	-0.41 – 0.26	0.644		

Diagnosis of Serious Mental Disorder	1.43	0.26 – 2.60	0.016
Past Serious Mental Disorder	0.46	-0.22 – 1.13	0.183
Currently seeing a mental health professional	-0.31	-1.19 – 0.57	0.484
Currently taking medication	-1.33	-2.32 – -0.34	0.008
Perceived impact of the quarantine	0.00	-0.06 – 0.07	0.874
Sleep quality	0.31	0.11 – 0.50	0.002
Behavioural Activation	0.06	0.02 – 0.10	0.004
Loneliness	0.02	-0.02 – 0.06	0.264
Cognitive bias	-0.05	-0.24 – 0.13	0.573
Repetitive Thoughts	0.04	0.01 – 0.07	0.013
Experiential Avoidance	0.01	-0.02 – 0.03	0.564
Anxiety	0.30	0.19 – 0.42	<0.001
Catastrophisation	-0.08	-0.22 – 0.07	0.315
Paranoia	0.09	0.06 – 0.12	<0.001

Note: *** $p < 0.0001$