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Research article

## Validation of the French COVID-Related Thoughts and Behavioral Symptoms Questionnaire (Cov-Tabs): A self-report assessment

*Validation du questionnaire français sur les pensées et les symptômes comportementaux liés au COVID (Cov-Tabs) : une évaluation par auto-évaluation*

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### ABSTRACT

**Objectives.** – The COVID-Related Thoughts and Behavioral Symptoms (Cov-Tabs) is a self-reported questionnaire developed to identify the presence of psychological distress and anxiety-related behavior associated with COVID-19. This scale has been used since the first episodes of mass contamination of COVID-19 disease in the USA without psychometric validation analysis. The objective of this paper is to validate the French version of the Cov-TaBS.

**Method.** – In this study, we assessed a French translation of Cov-Tabs in 300 subjects from the general population. Moreover, we assessed convergent and discriminant validities using an anxiety and depression scale and a paranoid ideation scale. Statistical analyses consisted of evaluating internal consistency, test-retest reliability, and construct validity as well.

**Results.** – The French translation of the Cov-Tabs demonstrated high internal consistency and reliability, as well as good temporal stability over a period of less than 2 weeks. It also showed strong convergent validity with anxiety and depression traits and divergent validity with paranoid ideation.

**Conclusion.** – Our study indicates that the French version of the Cov-Tabs has robust psychometric properties and is a valid tool for evaluating behavioral symptomatology and thoughts related to COVID-19 disease. Therefore, the French version of the Cov-Tabs is a valid tool that can be used in French-speaking individuals.

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### RÉSUMÉ

**Objectifs.** – Le questionnaire *COVID-Related Thoughts and Behavioral Symptoms* (Cov-Tabs) est un auto-questionnaire développé pour identifier la présence de détresse psychologique et de comportements liés à l'anxiété associés au COVID-19. Cette échelle a été utilisée depuis les premiers épisodes de contamination massive de la maladie à COVID-19 aux États-Unis sans analyse psychométrique de validité. L'objectif de cet article est de valider la version française du Cov-TaBS.

**Méthode.** – Dans cette étude, nous avons réalisé une traduction française du Cov-Tabs sur 300 sujets de la population générale. De plus, nous avons évalué les validités convergente et discriminante à l'aide d'une échelle d'anxiété et de dépression ainsi que d'une échelle d'idéation paranoïaque. Les analyses statistiques ont consisté à évaluer la cohérence interne, la fidélité test-retest et l'analyse factorielle.

**Résultats.** – La traduction française du Cov-Tabs a démontré une cohérence interne élevée et une fiabilité satisfaisante, ainsi qu'une bonne stabilité temporelle sur une période de moins de 2 semaines. Elle a également montré une forte validité convergente avec les traits d'anxiété et de dépression, ainsi qu'une validité divergente avec l'idéation paranoïaque.

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*Conclusion.* – Notre étude indique que la version française du Cov-Tabs présente des propriétés psychométriques solides et constitue un outil valide pour évaluer la symptomatologie comportementale et les pensées liées à la maladie COVID-19. Par conséquent, la version française du Cov-Tabs est un outil valide pouvant être utilisé auprès des francophones.

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## 1. Introduction

COVID-19, also classified as SARS-CoV-2 disease, is a highly contagious severe acute respiratory syndrome that has been classified as a pandemic by the World Health Organization (WHO) on March 11, 2020. Since the discovery of the novel coronavirus and its subsequent transmission rates and severity, authorities in every continent implemented security measures such as generalized lockdown. Prior to the COVID-19 pandemic, several studies had already highlighted the psychological effects of isolation, a practice used in prisons [1] or subsequent to quarantine [2]. However, the scale of lockdown implemented during the COVID-19 pandemic is unprecedented including worldwide psychological impact in the mass population.

Overall, there is a global consensus regarding several psychological effects of the COVID-19 pandemic. For example, a study from the United Kingdom [3] revealed that negative affect was related to the presence of paranoid thoughts and hallucinatory experiences in the general population during the COVID-19 lockdown. Tull et al. [4] concluded that lockdown was associated with anxiety, worry and loneliness in the United States. Similar results have been observed in Italy in which the length of isolation was associated with higher levels of depression, unworthiness, and helplessness [5]. Moreover, Shevlin et al. [6] has also found an increase in the prevalence of mental health problems in the early stages of the pandemic. According to this study, conducted on 2025 participants in the United Kingdom, anxiety, depression, and trauma symptoms were predicted by young age, presence of children at home, and by high estimation of vulnerability for mental health problems (for a review on psychological impact see Kontoangelos et al. [7]). Shanahan et al. [8] also reported that young adults showed increased levels of perceived stress and anger. Another study including 3233 Chinese subjects, showed an increase in emotional distress (particularly stress related) among people without prior mental health issues due to the global pandemic [9]. Hence, multiple studies around the world have shown the presence of detrimental psychological distress as a consequence of the COVID-19 global pandemic.

There is some evidence that the intense psychosocial stress experienced during the pandemic resulted in changes in general mental health, particularly regarding anxiety and depression [10]. Moreover, the COVID-19 pandemic saw in some vulnerable populations the emergence of psychotic symptoms such as hallucinations, perceptual alterations, and derealization experiences that are classically observed in socially isolated prison inmates [11]. A study in the United Kingdom found that the negative affect and lack of trust in official sources were related to the presence of paranoid thoughts and hallucinatory experiences during the COVID-19 lockdown [3]. Additionally, several studies have identified sleep-related problems, higher perceived stress [12], rumination, and social isolation [13] as significant predictors of psychotic symptoms in the general population [14–16].

In addition, the vulnerability-stress model suggests that stress is an important factor in the development of psychosis [17]. More precisely, according to Myin-Germeys and van Os [17], elevated emotional reactivity to the stressors of daily life is an indicator of genetic and/or environmental tendency towards psychosis. In

addition, research has previously shown that delusions and psychotic experiences can also occur in individuals from the general population when subjected to continuous stress [18]. For example, Freeman and Garety [19] and Freeman et al. [20] postulated that individuals from the general population and without severe mental illness, may experience paranoid thoughts in the presence of stressful trigger.

Moreover, these mental health issues induced by lockdowns have been also accompanied with the fear of being infected from the virus. A meta-analysis from Quadros et al. [21], noted that in several studies, the prevalence of fear was between 18.1% and 45.2% [22,23], showing differential patterns for sex and ages. Another study [24] showed that anxiety and disgust sensitivity were the predictor of fear of contracting COVID-19.

Therefore, several tools have been developed to assess psychological distress and related behaviors associated to COVID-19 infections. For instance, Ahorsu et al. [25] proposed the fear of COVID-19 scale with 7 items, and it has been tested and validated in Brazilian Portuguese [26], in Italian [27] and in Turkish [28]. Another study developed and validated a "Covid Stress Scales" [29], comprising 36 items on 5 different domains such as fears about dangerousness, contamination, xenophobia, social and economic consequences, news checking and traumatic stress related to COVID-19. Finally, a 5-item Coronavirus Anxiety Scale [30] and a 7-item COVID-19 anxiety scale [31] has been published.

However, these scales, while published and validated, have several limitations. For instance, the Fear of COVID-19 scale [25] tries to establish factors, which cannot be observable by other people such as symptoms and behaviors, but a subjective psychological construct of self-reported fear. COVID Stress Scales [29] seems to be a complete questionnaire, but 36 items take a significant amount of time to collect data and it seems to evaluate more symptoms and behaviors about COVID-19 disease, such as xenophobia and social-economic consequences of the lockdown. Finally, the validation data for the 5-item Coronavirus Anxiety scale [30] was collected in the early stages of the pandemic, before the USA experienced lockdowns throughout the country. None of these validation studies established test-retest reliability. Most prominently, all these studies (except COVID Stress Scales, which is a multitude of scales beyond anxiety related to COVID, [29]) report an exploratory factor analysis of only one factor. For instance, results from Silva et al. [31] demonstrated the extraction of a single-factor from exploratory factor analysis, which is understandable because all the questions are based on how a participant feels. This is also the case for Ahorsu et al. [25]. Lee [30], on the other hand, has deliberately chosen 5 strongest loadings based on principal component analysis, thus the confirmatory factor analysis demonstrates a single-factor model.

Finally, Schneider et al. [32] also proposed a self-report questionnaire aimed at assessing specifically COVID-related Thoughts and Behavioral Symptoms (Cov-Tabs). The Cov-Tabs, unlike other questionnaires, has several advantages: it has 10 items focusing only on anxiety and observable symptoms related to COVID-19, which facilitates administration to subjects and patients and is not time-consuming like the COVID Stress Scales [29], which have objectives beyond psychological constructs. Moreover, it is based on two factors: verbalized fear or anxiety (e.g. "I worried a lot about

COVID-19") and observable behavior related to COVID-19 (e.g. "I was very diligent about cleaning my hands and surfaces to avoid COVID-19"). Since there were no prior validation studies of this questionnaire, the aim of the present study was to translate the original English version of the Cov-Tabs into French and to evaluate its factor structure, internal consistency, and test-retest reliability. We also determined the discriminant and convergent validity of this French version of the Cov-Tabs. To the best of our knowledge, our study presented here is the only one that assesses two factor loadings (thoughts and behavior), establishes internal consistency and test-retest reliability, and determines discriminant and convergent validity.

## 2. Method

### 2.1. Participants

A total of 300 participants have been included from the general population through social media groups, following a snowballing procedure on LimeSurvey. Subjects were excluded from participating for the following reasons: (a) spending the period of COVID-19 pandemic outside France; (b) not native French speakers and (c) uncompleted questionnaire (d) less than 18 years old. Moreover, we excluded people who reported taking antipsychotic medication or that were undergoing neurological trauma. The confidentiality and privacy information, as well as possible benefits and risks, were described at the beginning of the questionnaire. This study was approved by the Ethics Committee of the University Hospital of Montpellier. It has been registered in clinicaltrials.gov under the identifier NCT04384419. Finally, the study was carried out according to the code of ethics of the World Medical Association (Declaration of Helsinki). This study was online between 30/06/2020 and 15/07/2020.

### 2.2. Procedure

The Cov-Tabs was translated and adapted into French following the specific guidelines for translations and cultural adaptations standards [33]. The Cov-Tabs was translated by two French-English bilingual PhD psychologists, then a third English native speaker Ph.D. psychologist compared both forward translations and resolved any discrepancies between both versions into a single target version. A back translation was then done by a bilingual expert and a comparison between the back translation and the original tool was revised and any discrepancies were discussed and resolved. A pretest from 10 subjects was conducted to verify whether the translation was understood by native French speakers. At this point, no difficulties had been identified, allowing the French translation of the Cov-Tabs to be finalized (see supplementary file).

In order to test for temporal stability, a subsample of participants was asked to complete the Cov-Tabs a second time, at one-week, two-week or three-week intervals.

### 2.3. Measures

The French version of Cov-Tabs is a 10-item auto-questionnaire that evaluates COVID-related emotional distress and related behaviors. It was created by clinical psychologists and psychiatrists and is intended for adults. The questionnaire is based on thoughts and behaviors over the past two weeks regarding the disease known as COVID-19. Examples of questions include "I could not stop thinking about terrible things that might happen because of COVID-19". Scoring is based on a 5-point Likert scale: not at all, a little, sometimes, a lot, all the time.

The Hospital Anxiety and Depression Scale [34] was used to assess the convergent validity of the French Cov-Tabs. The HADS

is an instrument used for screening anxiety and depressive disorders. It consists of 14 items rated from 0 to 3, with 7 questions relating to anxiety (total A) and 7 other items relating to the depressive dimension (total D). Two total scores may be calculated for each dimension with a maximum score of 21 for each. Although it was originally created for the assessment of anxiety and depression in hospitalized patients, this questionnaire can be used as an alternative for assessing anxiety and depression [35,36]. Cronbach's alpha for the HADS has been identified to vary between 0.81 and 0.90, indicating very good internal consistency [37]. Based on 15 different studies, [38] calculated the average of Cronbach's alpha coefficients to be equal to 0.82, indicating high internal consistency. The test-retest reliability after two weeks was  $r > 0.80$ , which confirms strong temporal validity for this scale [37]. Spinhoven et al. [39] also investigated test-retest reliability after a 4-week period. For the depression subscale, he obtained a Pearson correlation coefficient of 0.86 ( $P < 0.001$ ). Therefore, based on the aforementioned studies, the HADS is considered a stable instrument that is resistant to situational influences [37]. Regarding the French version of the HADS [40], the reliability factors (Cronbach's alpha) have been established at 0.82 for anxiety, 0.83 for depression, and 0.89 for the HADS altogether.

The Paranoid Thought Scales (The GPTS, [41]) is a self-report assessment of paranoid thoughts used in both clinical and non-clinical populations. A revised version of the GPTS, the revised Green et al., Paranoid Thoughts Scale (R-GPTS, [42]) has been reported demonstrating better psychometric properties than the original. The R-GPTS has good reliability (Cronbach's alpha) established at 0.90. The version used in this research was developed by Bianchi and Verkuilen [43]. The French brief version of the R-GPTS [43] has been reported to demonstrate a strong reliability and high factorial validity. Further analysis confirmed that the French brief version of the R-GPTS [43] can be considered unidimensional in practice. Thus, the French brief version of the R-GPTS [43] is a valid tool for the measure of paranoid ideation in French-speaking populations.

### 2.4. Statistical analysis plan

Item and scale characteristics (means, standard deviations, skewness, and kurtosis values) of the French Cov-Tabs were calculated. Internal scale consistency of the French Cov-Tabs was calculated by using Cronbach's alpha. Interclass correlation of the French Cov-Tabs were evaluated using the intraclass correlation coefficient (ICC) with a 95% confidence interval. To establish construct validity and explore the French Cov-Tabs structure, we performed an exploratory factor analysis and a confirmatory factor analysis. Prior to the factor analysis, we conducted a Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity to verify whether the sample was large enough to conduct an exploratory factor analysis.

To study temporal stability (test-retest), a new set of participants of 62 subjects, which were not included in the first set of 300 participants have completed the French Cov-Tabs scale twice. Because the Cov-Tabs has the instruction of responding to questions regarding the thoughts and behaviors for the past two weeks, we re-tested this group of subjects one week later and another group two weeks later and the last group three weeks later. To prevent dropout issues typically observed in long questionnaires, we had half of our participants complete the HAD scale (Hospital Anxiety and Depression scale; [34]), while the other half completed the R-GPTS [43]. Correlations between the French Cov-Tabs and the HADs and the R-GPTS were used to determine both convergent and discriminant validities. Specifically, convergent validity was established by examining whether the French Cov-Tabs correlated significantly with the anxiety and depression subscales of

**Table 1**  
 Sociodemographic characteristics of participants.

	n	%	M	SD
Gender				
Female	199	66		
Male	101	34		
Age			25.8	10.5
Highest educational level				
Middle school	7	2		
High school/some college	118	39		
University or postgraduate degree	175	59		

n = 300. M: means; SD: standard deviation.

**Table 2**  
 Means and standard deviation (SD) and item reliability with internal consistency of French version of Cov-TABS.

	If item dropped			Cronbach's $\alpha$	Skewness	Kurtosis
	Mean	SD	Item-rest correlation			
Item 1	2.01	1	0.6	0.82	0	-0.6
Item 2	0.85	1	0.68	0.82	1.2	0.9
Item 3	1.25	1.1	0.65	0.82	0.7	-0.2
Item 4	1.11	1.1	0.67	0.83	0.7	-0.6
Item 5	1.44	1.3	0.56	0.84	0.5	-1
Item 6	0.9	1.1	0.75	0.81	1.3	0.9
Item 7	3	1.1	0.61	0.83	-0.7	-0.2
Item 8	1.9	1.3	0.46	0.83	0.1	-1
Item 9	0.61	0.8	0.35	0.84	1.4	1.7
Item 10	2.82	1.2	0.55	0.84	-0.7	-0.5

n = 280.

the HADs whereas discriminant validity was presented by verifying that the French Cov-Tabs did not correlate with the R-GPTS.

All analyses were performed using the *psych* and *lavaan* packages in R, Jamovi software (ver.2, [44] 2021), based on R Code and the *factor\_analyzer* and *scikit-learn* packages in Python 3.

### 3. Results

Sociodemographic data including age, gender, higher education level was collected for all participants. Sociodemographic data for the 300 participants are presented in Table 1.

#### 3.1. Preliminary analyses

Two subjects with incomplete data have been eliminated for further analyses. To eliminate potential outlier participants, a standard local outlier factor (LOF) algorithm [45] with default settings was applied in which approximately 5% of participants were identified as outliers. The local outlier factor algorithm is an unsupervised anomaly detection method which computes the local density deviation of a given data point with respect to its neighbors. It considers as outliers the samples that have a substantially lower density than their neighbors. This method resulted in 280 from 298 subjects for further analysis. The rest of our sample did not have missing data.

Analyses with sociodemographic characteristics of participants have revealed a significant correlation between French Cov-Tabs scores and the age ( $P < 0.03$ ). They did not reveal a difference between sex ( $P > 1$ ).

#### 3.2. Item analyses and internal consistency for the French Cov-Tabs

Item analyses and internal consistency for the French Cov-Tabs are presented in Table 2. All item-test correlation values for the 10 items were higher than 0.35, ranging from 0.35 to 0.75, with a mean of 0.58, indicating that items correlated well with the total score. Overall, the reliability score was 1.62 with a standard deviation of

**Table 3**  
 Exploratory factor analysis.

Factor loadings	Factor		Highest	Communalities
	1	2		
Item 1		0.64	2	0.61
Item 2	0.69		1	0.56
Item 3	0.65		1	0.62
Item 4	0.75		1	0.57
Item 5	0.61		1	0.37
Item 6	0.8		1	0.71
Item 7			2	0.5
Item 8			2	0.31
Item 9	0.37		1	0.15
Item 10			2	0.57
SS loadings	2.96	2.02		
Explained variance	25.5%	20.1%		

n = 280 'Minimum residual' extraction method was used in combination with a 'oblimin' rotation.

0.75 and Cronbach's alpha was 0.85 indicating strong reliability. Skewness values ranged from -0.7 to 1.3, and kurtosis values were between -0.6 to 1.7, suggesting a deviation from normality.

The intraclass correlations (ICC) varied from 0.82 (lower 95% CI) to 0.87 (upper 95% CI), according to calculation guidelines defined by [46] for a point estimate of 0.85.

#### 3.3. Construct validity

##### 3.3.1. Exploratory factor analysis

Bartlett's test of sphericity ( $\chi^2 = 1118 P < 0.001$ ) and the KMO measure of sampling adequacy (KMO = 0.87) indicated that the French Cov-Tabs was psychometrically fit for exploratory factor analysis. Examination of the scree plot and parallel analysis with minimum residuals extraction and an oblimin rotation suggested a two-factor solution (see Table 3). Finally, model fit measure such as RMSEA is 0.07, which constitutes an acceptable fit.

##### 3.3.2. Confirmatory factor analysis

A two-factor model was tested including 6 items on the first factor (F1) and 4 items on the second (F2), leading to satisfactory fit indices: Robust  $\chi^2/df = 2.31$ ; Robust CFI = 0.98; Robust IFI = 0.98; Robust NNFI = 0.87; Robust RMSEA = 0.07; Robust CI RMSEA = [0.05; 0.09]. Moreover, Goodness of fit index (GFI) and adjusted goodness of fit index were respectively 0.99 and 0.98. The interfactor correlation between F1 and F2 was significant ( $r = 0.51, P < 0.001$  Holm-Benferoni corrected). Cronbach's alpha values for the two subscales ( $\alpha F1 = 0.83$  &  $\alpha F2 = 0.76$ ) were satisfactory.

Although, the exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA) have been applied to the same 280 participants, a randomised 50%-50% participant split procedure was also examined for the EFA and CFA analyses, in which we verified that similar results were obtained as in the full participant sample on each.

##### 3.3.3. Test-retest reliability

A new set of participants of 62 subjects completed the French Cov-Tabs scale twice. Because the Cov-Tabs has the instruction of responding to questions regarding the thoughts and behaviors for the past two weeks, we re-tested this group of subjects one week later ( $n = 21$ ) and another group two weeks later ( $n = 18$ ) and the last group three weeks later ( $n = 23$ ). In order to assess test-retest reliability, we conducted a two-tailed *t*-test, which showed no difference for those who took the second test one week later ( $P > 0.2$ ) but a significant difference for two weeks later ( $P < 0.007$ ) and three weeks later ( $P < 0.001$ ).



**Table 4**

Means and standard deviations (SD) for the French version of Cov-Tabs versus anxiety and depression scale from HADs and R-GPTS.

	Mean	SD
Anxiety subscale	8.5	4.3
Depression subscale	4.9	3.7
R-GPTS	13.2	6.7
French Cov-Tabs	15.9	7.2

*n* = 280. R-GPTS: revised Green et al., Paranoid Thoughts Scale.

### 3.3.4. Convergent and discriminant validities

The clinical indicators used to test convergent and discriminant validities are presented in Table 4. To prevent dropout issues typically observed in long questionnaires, we had half of our participants complete the Hospital Anxiety and Depression scale (HAD scale; [34]), while the other half completed the R-GPTS [42]. Correlations were conducted with the French version of Cov-Tabs as a dependent variable and French Anxiety and Depression scales of HAD [40] as covariates for convergent validity. They established a correlation between Cov-Tabs and anxiety ( $r = 0.47$ ;  $P < 0.001$  Holm-Bonferroni corrected) and a correlation between Cov-Tabs and depression ( $r = 0.57$ ;  $P < 0.001$  Holm-Bonferroni corrected). Another correlation has been conducted with French version of Cov-Tabs and French R-GPTS [43], which did not establish a significant correlation ( $r = 0.33$ ;  $P > 1$ ).

## 4. Discussion

Following the increased need to appropriately assess COVID-related anxiety, our main goal in this study was to translate and validate French version of the COVID-related thoughts and behavior scale [32]. The results of this study validated its translation and adaptation, allowing us to propose a French version of the Cov-Tabs in a French population.

The reliability analysis showed that the overall internal consistency of the French Cov-Tabs was high. Moreover, item-total correlation values for each question were high, stating that every question was highly correlated with the total score, establishing appropriate internal validity. Similar conclusions can be drawn from the intraclass correlation coefficient. Regarding exploratory factor analysis, we found a 2-factor solution with a model fit measure RMSEA indicating a perfectly acceptable fit. This 2-factor solution shows that the Cov-Tabs assesses non-observable thoughts and ruminations in one factor and observable behaviors such as cleaning hands repeatedly, frequently checking the news and social media, discussing with others, and adopting a behavior to avoid exposure in the other factor.

Our results indicate that our sample declared to be more anxious about item 7 and 10 (with a mean of 3 and 2.8 out of 5) which state "I was very diligent about cleaning my hands and surfaces to avoid COVID-19" and "I did everything I could in order to avoid exposure to COVID-19". On the other hand, our sample indicated to be less anxious about item 9 (with a mean of 0.37 out of 5) for the statement "I was very concerned about having enough food and supplies".

Temporal reliability test is generally used to determine whether a questionnaire evaluating a psychological trait is reliable across time. However, the Cov-Tabs is a questionnaire, which evaluates COVID-related emotional distress and related behaviors over the past two weeks. Adding to that, the pandemic situation and underlying lockdown measures are often dynamic. Hence, the temporal reliability for a psychological trait is not suitable for this questionnaire. However, we wanted to assess whether there was a difference in the responses between one-, two- and three-weeks retests after the initial administration of the questionnaire. Results showed that only at one-week retest there was no significant dif-

ference. Thus, confirming that the instructions of the Cov-Tabs to respond "over the past two weeks" is adequate. As a result, the emotional state and behaviors provoked by the Covid pandemic are stable only if re-tested within one week.

Concerning convergent and discriminant validity, we chose the HADs [34] and R-GPTS [43] because it is quick and evaluates state anxiety and depression and paranoid ideation rather than trait. As expected, the statistical analysis showed that the emotional distress and behaviors were associated with state anxiety and depression but not with paranoid ideation. Thus, our results seem to be in line with Ahorsu et al.'s Fear of COVID-19 scale [25], which reported a correlation with anxiety and depression measured by the HADs.

Besides suitable psychometric properties, this questionnaire has the advantage of being rapidly administered within clinical populations as well as the general population for screening vulnerability to COVID-19-related thought and behavioral dysfunction. Indeed, increased psychological distress, such as anxiety, depression, and a feeling of helplessness, can be observed in the context of an increased risk of COVID-19 contamination [4,6,9]. These mental health issues can significantly decrease the quality of life in individuals without any clinically diagnosed psychopathology. As we presented in the introduction of this study, there is a wealth of evidence demonstrating how stress can provoke unfounded paranoid thoughts in the general population without severe mental illness. Thus, our questionnaire has several utilities: it can be used as a screening tool in hospitals, community mental health centers, and outpatient clinics, in parallel with paranoid ideation, anxiety and depression questionnaires. By comparison, this would help determine whether the extent of the clinical symptoms can be attributed to COVID-19-related stressors or is completely independent.

Furthermore, vulnerability to ruminations and psychological distress in people with severe mental illness is another topic of concern for mental health professionals. Some rare studies have already highlighted that people with mental illnesses are more prone to worsening their symptoms in the context of the COVID-19 pandemic [47]. A recent study, using the French version of the COVID-19-related thoughts and behaviors questionnaire presented in this paper, found that individuals with schizophrenia are more affected by the COVID-19 pandemic, particularly regarding the second factor (observable behaviors), than a control group without any mental illness [48]. The authors concluded that the fear of COVID-19 may have compelled individuals with schizophrenia to adopt more intense behaviors to avoid it, but also to alleviate psychological distress associated with the fear of infection. However, in the long term, this might be a highly exhausting strategy that can disrupt the delicate equilibrium of the mental state of certain individuals with schizophrenia. The questionnaire presented in our study can also be used to evaluate changes in rumination and behaviors in individuals with severe mental illnesses including in people with schizophrenia, bipolar disorder and major depression with symptoms of psychosis.

Finally, taken altogether, the analysis suggests that the French version of Cov-Tabs is an accurate tool to evaluate emotional distress and behaviors related to the COVID-19 pandemic over a two-week period. To the best of our knowledge, our validation study on fear of Covid-19 disease is the only one that establishes a two-factor solution (thoughts and behaviors) with a highly internally consistent questionnaire, a test-retest stability for 2 weeks, convergent validity with anxiety and depression and discriminant validity with paranoid ideation. Our results suggest that this tool can be used in future research to evaluate COVID-related thoughts and behaviors as a variable. Indeed, in the context of the ongoing pandemic, there is a real need for validated tools to assess health and pandemic-related distress, which can be accompanied by depression, anxiety, and other mental health issues.

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## Disclosure of interest

The authors declare that they have no competing interest.

## Ethical approval

The study was registered in clinicaltrials.gov under the identifier NCT04384419. It was approved by the Ethics Committee of Montpellier University Hospital (IRB No. 198711) and carried out in accordance with the Declaration of Helsinki.

## Author contributions

Design of the study: AO, YL, SR, data collection: AO, YL, SR; statistical analyses: AO, RA; study writing: AO. All authors were involved in discussing the findings and writing the manuscript. They all approved its final version. All authors have read and agreed to the published version of the manuscript.

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