



## Impact of work arrangements during the COVID-19 pandemic on mental health in France

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### 1. Background

Studies of past epidemics have shown that, beyond the immediate impacts in terms of morbidity and mortality, these outbreaks have adverse effects on population patterns of mental health. There was evidence of mental health problems during the Spanish flu pandemic a century ago, in contexts where misinformation and unpreparedness exacerbated anxiety (Ammon, 2002; Kelly, 2020). For more recent viruses, such as SARS-CoV-1 (El-Hage et al., 2020), H1N1 (El-Hage et al., 2020), MERS-CoV (Park, Lee, Park, & Choi, 2018) and Ebola (Kamara et al., 2017; Srivatsa & Stewart, 2020), mental health was mostly studied among health care workers, who were exposed to the virus, had

increased workloads and experienced potentially traumatic events (e.g. patients unexpectedly passing away). During the COVID-19 pandemic, there is now evidence of a mental health burden (Hossain et al., 2020; Santomauro et al., 2021; Wu et al., 2021; Xiang et al., 2020; Xiong et al., 2020) with, for instance, 27% and 25% respective increases in depressive and anxiety disorders observed globally (Santomauro et al., 2021).

COVID-19 has been accompanied by a sudden surge in employment difficulties, such as decreased numbers of job postings, increased rates of unemployment, reduced or frozen activity and job losses in some economic sectors (OECD, 2020; RESPOND, 2021b; Rosén & Stenbeck, 2021). This has created a quasi-experimental context for which mental health comparisons before and during the pandemic have been

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performed (Prati & Mancini, 2021). Job losses sharply increased during the COVID-19 pandemic (ILO, 2021) and disproportionately affected individuals who were already economically vulnerable prior to the COVID-19 pandemic (Ksinan Jiskrova, Bobák, Pikhart, & Ksinan, 2021). This instability and deterioration of the labour market has been found to be related to population mental health. In Australia, the deterioration of job security has been linked to the occurrence of mental health difficulties (LaMontagne, Too, Punnett, & Milner, 2021). COVID-19-related job loss or anticipation of job loss for the individual or someone in one's household was also seen to associate with symptoms of anxiety/depression in the United States (Ganson, Tsai, Weiser, Benabou, & Nagata, 2021). And in Switzerland, despite universal healthcare, people who lost their jobs due to the COVID-19 crisis experienced a higher psychological impact (Marmet et al., 2021). Similarly to job losses, a drop in working hours has been also linked with depression (Guerin, Barile, Thompson, McKnight-Eily, & Okun, 2021). Thus, unemployment during the COVID-19 crisis has been identified as a risk factor for poor mental health (de Miquel et al., 2022; Ngoc Cong Duong et al., 2020; Solomou & Constantinidou, 2020; van der Velden, Contino, Das, van Loon, & Bosmans, 2020).

Evidence shows that mental health follows a socioeconomic gradient (Allen, Balfour, Bell, & Marmot, 2014; Bartoll-Roca, Palència, Gotsens, & Borrell, 2021), with low socioeconomic status affecting mental health due to both material and psychosocial impacts (Marmot, 2001). Disadvantaged economic situation has been seen to associate with worse mental health before (Chung et al., 2018; San Sebastián, Mosquera, & Gustafsson, 2018) and during the COVID-19 pandemic (Claes, Smeding, & Carré, 2021; Hassan, Mohd Hassan, Kassim, & Utoh Said, 2021). Financial difficulties are a burden that grew during the COVID-19 pandemic (Clark, Lusardi, & Mitchell, 2021; Ettman et al., 2021; Goyal, Kumar, Rao, Colombage, & Sharma, 2021). It has been demonstrated that persons with a disadvantaged economic situation are more likely to have depression and anxiety symptoms in various countries: in Austria, where moderate symptoms of depression/anxiety/insomnia were observed to be especially frequent in low incomes groups (Pieh, Budimir, & Probst, 2020), in the United Kingdom, where individuals with a disadvantaged economic situation were more frequently exposed to COVID-19 and more strongly experiencing negative effects from lockdown (Patel et al., 2020) and in Thailand where job loss, income loss, and financial problems were related to the occurrence of adverse mental health outcomes including anxiety/depression (Ruengorn et al., 2021). In the context of COVID-19, individuals that are already socially and economically vulnerable suffer more severely from the negative health effects (i.e. higher rates of infection and mortality) of the crisis than the rest of the population, aggravating health inequalities (Bambra, Riordan, Ford, & Matthews, 2020). The worsening of these inequalities is largely due to the deleterious effect of the pandemic and the associated measures on labour and economy (Nicola et al., 2020).

When the COVID-19 pandemic started, France implemented major economic measures, to allow companies suffering from a significant drop in activity to benefit from state-funded partial unemployment, with no remaining costs for the employer, in which case employees benefited from 84% of their original salary. Additionally, companies going bankrupt, small businesses, care workers and the health sector received financial support and unemployment benefits were extended.

The COVID-19 pandemic has impacted mental health patterns through multiple pathways, including negative changes in individuals' work and financial circumstances. Exact relations between changes in employment, financial situation and mental health in times of COVID-19 have however not yet been fully documented. Previous studies have rarely provided longitudinal prospective pre- and intra-pandemic data or in the position to control for individuals' work and financial situations prior the COVID-19 pandemic. However previous crises showed that work-related and financial uncertainty has an impact on individual's health (Knabe & Rätzl, 2011). Then, as the COVID-19 pandemic worsened individuals' work-related and financial situations,

it is relevant to test if mental health deteriorated with the sanitary crisis. Pre-pandemic data covering employment, financial and anxiety/depression characteristics isolates the effect of each of these factors during the pandemic.

Given this information, we expected the pandemic to have further exacerbated the social inequalities related to mental health to the disadvantage of those experiencing employment or financial difficulties, even in the context of government support, as they might suffer more from the uncertainty induced by the COVID-19 pandemic. It will then potentially distinguish a vulnerable mental health group during the pandemic and identify their need for mental health studies and intervention.

Using longitudinal data collected through the TEMPO cohort study, we tested the hypothesis that individuals in the least stable and least paid jobs before and during the COVID-19 public health crisis were more likely to have symptoms of anxiety and depression.

## 2. Study population and procedures

The TEMPO (Trajectoires Épidémiologiques en POPulation) cohort started in 2009 with the aim of better understanding mental health patterns and addictive behaviours over time (Mary-Krause, Herranz Bustamante et al., 2021). Study participants were recruited, using a random sampling strategy from young adults who had taken part in a study on children's mental health in 1991 (when they were aged 4–18 years) and participated in a follow-up in 1999. The TEMPO cohort included participant evaluations in 2009, 2011, 2015 and 2018. In 2020, as soon as measures to contain the COVID-19 pandemic were put in place in France, TEMPO cohort participants were contacted to collect data monitoring their health status during COVID-19. Nine waves of data were collected using self-administered questionnaires between March 24, 2020, and the end of July 2021. From March 24 to April 21, 2020, participants completed one questionnaire per week; from April 21 to May 19, 2020, participants completed one questionnaire every other week; and then from June 26 to July 10, 2020, and December 7, 2020 to July 18, 2021, participants completed one questionnaire, respectively (Supplementary Fig. 1). All questionnaires were sent online to TEMPO participants with valid email addresses ( $n = 1224$ ). The last questionnaire was also sent by post to TEMPO participants without a valid email address ( $n = 955$ ). Overall, 904 individuals completed at least one study questionnaire between March 2020 and July 2021 (Five study questionnaires were completed on average (Mean = 4.55; Standard Deviation (SD) = 3.09)).

### 2.1. Measures

#### 2.1.1. Outcome: symptoms of anxiety/depression

High levels of anxiety/depression were identified using depression/anxiety-related items from the French version of the Achenbach System of Empirically Based Assessment (ASEBA) Adult Self-Report (ASR) (Achenbach & Rescorla, 2003), at each data-collection wave. This self-administered questionnaire includes 8 to 13 items, each rated on a 3-point Likert scale ("Not at all true"; "Sometimes or a little true"; "Very true or often true"). The sum of all relevant items was standardised from 0 to 100 and dichotomised at the 85th percentile according to the ASR guidelines, to identify persons with significant symptoms of anxiety/depression. Participants with less than 66% of complete ASR items were considered to have missing data on this dimension. Within this study, the Cronbach's  $\alpha$  and McDonald's  $\omega$  of this scale were respectively 0.91 and 0.92.

### 2.2. Exposures

#### 2.2.1. Employment characteristics

Participants' employment characteristics during COVID-19 were split into four categories ("Worked normally or from home"; "Worked

less or were on partial unemployment” (Reduced or paused employment, but with one’s original contract. Employees retained eighty-four percent of their original salary.); “Forced leave”; “No job”), assessed at each wave.

### 2.2.2. Financial difficulties during COVID-19

At each wave of data collection, participants’ financial difficulties in the preceding 7 days, or since the last assessment, were investigated according to four domains: “Paying the rent, heat or electricity bills for your home”; “Paying for medical care or medication (for you, your partner or your children)”; “Eating in sufficient quantities (you had to reduce your size or frequency of meals)”; “Eating varied and balanced meals (you had to eat the same thing several times)”. If participants provided at least one positive response, they were considered as having financial difficulties (“No”; “Yes”).

## 2.3. Covariates

Covariates taken into account were those potentially associated with symptoms of anxiety/depression and were as follows: recent changes in participants’ household income, pre-pandemic household income, type of work (Kim & Cho, 2020), sex (Xiong et al., 2020), age (Wang et al., 2020), educational level (Yu & Williams, 1999), loneliness (Lloyd-Evans et al., 2020), pre-existing symptoms of anxiety/depression (Andersen et al., 2021; Pierce et al., 2020), as well as chronic health problems and COVID-19-like symptoms (Chung et al., 2018; Mary-Krause, Bustamante, et al., 2021).

### 2.3.1. Type of employment prior to COVID-19

Participants’ type of employment prior to COVID-19 was defined according to their type of work contract and socioeconomic level, based on five categories “High/intermediate occupational grade with stable contract” (stable contract with no end date); “High/intermediate occupational grade and self-employed worker”; “Low occupational grade with stable contract”; “No job”; “Other” (High/intermediate occupational grade with a short-term contract (maximum duration of 24 months, renewable twice at most); Low occupational grade with short-term contract; Low occupational grade and self-employed worker). “Low occupational grade” included farmers, administrative staff and trade and service employees as well as blue-collar workers. “High/intermediate occupational grade” included business owners, managers and academic occupations (e.g. doctor, journalist), craftsmen, traders, and intermediate occupations (between managerial and employee (e.g. school teacher, nurse)).

### 2.3.2. Income

Recent changes in participants’ household income (“Increased or remained stable”; “Decreased”) since prior to the COVID-19 pandemic, and participants’ current monthly household income (“More than 2500 euros”; “2500 euros or less” (The median household income is about 2500 euros in France (Insee, 2021).)) were assessed.

Participants were also asked to self-report any financial difficulty before the pandemic (“No”; “Yes”).

### 2.3.3. Sociodemographic characteristics

Participants’ sociodemographic characteristics included sex (“Male”; “Female”), age, educational level (“No higher education level”; “Higher education level”), living situation (“With a partner and children”; “With a partner”; “Alone”; “Other”), housing type (“Individual house”; “Apartment”).

Loneliness was measured using the UCLA (University of California, Los Angeles) 3-item Loneliness Scale (“1” (hardly never) to “3” (often)) (Hughes, Waite, Hawkey, & Cacioppo, 2004) in each wave of data collection. The average level of loneliness was calculated for each wave of data collection, and, following prior research, the top 20% was considered indicative of loneliness (“No”; “Yes”) (Stephens, Shankar,

Demakakos, & Wardle, 2013).

### 2.3.4. Health characteristics

Participants’ symptoms of anxiety/depression prior to the COVID-19 pandemic were collected in the 2009, 2011 and 2018 TEMPO cohort study waves using the ASR (2009 (n = 20), 2018 (n = 748)) (Achenbach & Rescorla, 2003) and the Mini-International Neuropsychiatric Interview (MINI) (2011 (n = 117)) (Sheehan et al., 1998). The most recent measure available was systematically used.

Self-reports of chronic, physical health problems were also collected for the following conditions: cardiovascular disease, diabetes, overweight or obesity, chronic digestive disease, cancer, asthma, migraines, nervous breakdowns, musculoskeletal disorders and occurrence of self-reported COVID-19-like symptoms (“No”; “Yes”).

Some information was only collected the first time a participant answered a TEMPO COVID-19 questionnaire: employment and financial information prior to COVID-19, sociodemographic characteristics, chronic health problems. Other information was collected for each wave answered by the participant: symptoms of anxiety/depression, employment and financial information during COVID-19, loneliness and COVID-19 symptoms.

## 2.4. Statistical analyses

The aim of our statistical analyses was to identify associations between participants’ employment characteristics and symptoms of anxiety/depression in the context of the COVID-19 pandemic.

Due to the longitudinal nature of the exposure and outcome variables, we used Generalized Estimating Equations (GEE) modelling (Liang & Zeger, 1986). This method allows the inclusion of repeated observations and considers the correlation of within-subject data. The correlation structure of the statistical model was chosen using Quasi Information Criterion (QIC) (Cui & Qian, 2007; Pan, 2001) and Correlation Information Criterion (CIC) (Hin & Wang, 2009), and the exchangeable correlation structure was chosen. Collinearity of model variables was explored and measured with GVIF and GVIF<sup>2</sup>(1/(2\*Df)), which are Variance Inflation Factor (VIF) derivatives (Fox, 2016; Fox & Monette, 1992; Fox & Welsberg, 2018; James, Witten, Hastie, & Tibshirani, 2013).

Both bivariate and multivariate GEE models were tested. Covariates included in multivariate statistical models were selected based on a hypothesised association and a p-value of less than 0.20 in bivariate GEE models. Interactions were tested while adjusting for the multivariate model variables.

An average of 5.1% missing data on study covariates was observed and subsequently imputed using Multiple Imputations by Chained Equations (MICE) with Fully Conditional Specification (FCS), based on five multiple imputations (Bodner, 2008; White, Royston, & Wood, 2011). The study outcome, as well as pre-existing symptoms of anxiety/depression and loneliness, were not imputed because they were not missing at random. After removing incomplete cases for those unimputed variables, 864 participants had data sufficient for analyses. Statistical analyses were performed with R software (R Core Team, 2020).

## 3. Results

Across all TEMPO study waves since the beginning of the COVID-19 pandemic, 28.8% of participants had symptoms of anxiety and depression at least once during the period of data collection. People who had left their employment, reduced their work hours, were on forced leave, or had no employment during the pandemic were more likely to experience symptoms of anxiety/depression. Furthermore, experiencing financial difficulties, a decrease in income during the pandemic, having had a low income before COVID-19, being female, having pre-existing symptoms of anxiety/depression, feeling lonely, having chronic health problems or having experienced COVID-19-like symptoms were found to

be characteristics associated with higher prevalence of symptoms of anxiety/depression (Table 1).

In bivariate GEE models (Table 2), when compared to participants who worked as usual, those who worked less or were on partial unemployment (OR = 1.43; 95% CI = 1.09–1.88), were unemployed (OR = 2.53; 95% CI = 1.75–3.67) or experienced financial difficulties (OR = 1.55; 95% CI = 1.15–2.07) were more likely to experience symptoms of anxiety/depression.

After adjusting for covariates, being unemployed during the COVID-19 pandemic and having financial difficulties remained respectively significantly and almost significantly associated with higher odds of symptoms of anxiety/depression (OR = 1.89; 95% CI = 1.07–3.33 and OR = 1.43; 95% CI = 0.99–2.07, respectively) (Table 2).

No interactions were found between unemployment or financial difficulties during the COVID-19 pandemic and participants' sex.

#### 4. Discussion

Using data from 864 persons participating in the longitudinal TEMPO cohort, specifically followed-up between March 2020 and July 2021, we found that those who experienced job instability or financial difficulties during the COVID-19 pandemic were more likely to have symptoms of anxiety/depression. Importantly, these findings were obtained while controlling for pre-existing employment, as well as prior financial and mental health difficulties. Moreover, as the income and employment difficulties that participants encountered were largely due to the pandemic, and independent of participants' characteristics, our data suggest a direct role of employment and economic circumstances on individuals' likelihood of mental health difficulties during the course of the pandemic.

##### 4.1. Strengths and limitations

This study has some limitations which need to be described before interpreting the data. First, TEMPO participants are not representative of the general French population, as women and people with high socioeconomic position are overrepresented (Mary-Krause, Herranz Bus-tamante et al., 2021). This may have led to an underestimation of the levels of work-related and financial difficulties, as well as mental health outcomes, in the study. Generalisability is also limited in the sense that the association between employment or financial characteristics and mental health is studied in a context of social support, potentially underestimating the strength of the association compared to countries where the level of economic support was weaker (Hale et al., 2021). Second, participants' psychological symptoms were not assessed by objective diagnoses but by self-reports, leading to possible reporting bias (Althubaiti, 2016). Nevertheless, the ASEBA scale which we used is well-validated and makes it possible to identify the presence of internalising symptoms with precision (Achenbach & Rescorla, 2003). In addition, pre-COVID-19 measures are based on different data collection points, and measures obtained since the beginning of the sanitary crisis evaluate different periods, which could induce measurement bias. Finally, financial difficulties were self-reported, again risking reporting bias. However, as the questionnaires are anonymous and self-completed, this source of bias is probably limited (Ong & Weiss, 2000).

Our study also has several strengths. First, pre-COVID-19 data were included in the analyses, allowing to control for participants' previous employment situation, financial difficulties and mental health. Second, data were collected throughout the course of the COVID-19 pandemic, making it possible to monitor participants' situation over this period. This longitudinal approach to data collection during the pandemic also enables less recall bias than data collection conducted retrospectively. Finally, participants were contacted by both e-mail and post, thus limiting participation bias even though differences in measurement may arise from the use of two different data collection methods.

**Table 1**

Employment and financial characteristics of TEMPO participants and the occurrence of symptoms of anxiety/depression during the COVID-19 pandemic, March 2020–July 2021, n = 864 ( $\chi^2$  or mean comparison test, p-value).

	Symptoms of anxiety/depression during COVID-19 (n = 864)		
	No (n = 615 (71.2%))	Yes <sup>a</sup> (n = 249 (28.8%))	p-value <sup>b</sup>
<b>Employment and financial characteristics</b>			
<b>Employment during COVID-19</b>			
Worked normally or from home	75.6%	24.4%	<b>0.0002</b>
Worked less/forced leave/no job <sup>a</sup>	63.2%	36.8%	
<b>Type of employment before COVID-19<sup>c</sup></b>			
High/intermediate occupational grade <sup>d</sup> with stable contract	74.5%	25.5%	<b>0.0059</b>
High/intermediate occupational grade and self-employed worker	62.1%	37.9%	
Low occupational grade <sup>e</sup> with stable contract	69.9%	30.1%	
No job	48.0%	52.0%	<b>0.0046</b>
Other	61.5%	38.5%	
<b>Changes in income during COVID-19</b>			
Increased or remained stable	74.5%	25.5%	<b>0.0003</b>
Decreased <sup>a</sup>	65.3%	34.7%	
<b>Household income before COVID-19<sup>c</sup></b>			
More than 2500 euros	58.6%	41.4%	<b>&lt;0.0001</b>
2500 euros or less	74.0%	26.0%	
<b>Financial difficulties during COVID-19</b>			
No	75.3%	24.7%	0.1854
Yes <sup>a</sup>	56.4%	43.6%	
<b>Financial difficulties before COVID-19<sup>c</sup></b>			
No	71.9%	28.1%	<b>&lt;0.0001</b>
Yes	65.6%	34.4%	
<b>Sociodemographic characteristics</b>			
<b>Sex<sup>c</sup></b>			
Male	83.3%	16.7%	<b>&lt;0.0001</b>
Female	64.4%	35.6%	
<b>Age (Mean(SD))<sup>c</sup></b>			
40.2 (3.7)	39.9 (3.5)	0.2264	0.9256
<b>Educational level<sup>c</sup></b>			
No higher education level	71.0%	29.0%	0.3065
Higher education level	72.3%	27.7%	
<b>Living situation<sup>c</sup></b>			
With a partner and children	73.3%	26.7%	0.5879
With a partner	65.9%	34.1%	
Alone	69.5%	30.5%	
Other	57.9%	42.1%	
<b>Housing type<sup>c</sup></b>			
Individual house	72.0%	28.0%	<b>&lt;0.0001</b>
Apartment	69.7%	30.3%	
<b>Loneliness<sup>e</sup></b>			
No	41.2%	58.8%	<b>&lt;0.0001</b>
Yes	80.5%	19.5%	
<b>Health characteristics</b>			
<b>Symptoms of anxiety/depression before COVID-19<sup>f</sup></b>			
No	82.8%	17.2%	<b>0.0047</b>
Yes	37.9%	62.1%	
<b>Chronic physical health problems<sup>g, h</sup></b>			
No	75.8%	24.2%	<b>0.0211</b>
Yes	66.9%	33.1%	
<b>COVID-19-like symptoms</b>			
No	73.6%	26.4%	<b>0.0211</b>
Yes <sup>a</sup>	63.8%	36.2%	

<sup>a</sup> At least once during follow-up.

<sup>b</sup> P-values in bold are statistically significant at the 5% threshold.

<sup>c</sup> Measured at the first TEMPO-COVID-19 wave answered.

<sup>d</sup> Business owners, managers and academic occupations, craftsmen and traders, intermediate occupations.

<sup>e</sup> Farmers, administrative staff, trade and service employees, blue-collar workers.

<sup>f</sup> Last information available in 2018 (n = 748), 2011 (n = 117) or 2009 (n = 20).

<sup>g</sup> Measured at each TEMPO-COVID-19 wave answered and averaged.

<sup>h</sup> At least one among: cardiovascular disease, diabetes, overweight or obesity, chronic digestive disease, cancer, asthma, migraines, nervous breakdowns, musculoskeletal disorders.

#### 4.2. Interpretation

We found that unemployment and financial difficulties during the COVID-19 pandemic were respectively significantly and almost significantly associated with symptoms of anxiety/depression, highlighting the role of social determinants with regard to mental health (Bambra et al., 2020; Marmot, 2001), despite the existing financial support and exceptional economic measures implemented in France to help the population face the economic and social consequences of the COVID-19 pandemic (Insee, 2020).

Similarly, in Australia, at the beginning of the COVID-19 pandemic, people who lost employment during COVID-19 were more likely to report psychological distress and poor mental and physical health compared to those whose working hours were not reduced (Griffiths et al., 2021). Interestingly, this study showed that unemployed people experienced higher levels of symptoms of anxiety/depression during the COVID-19 pandemic even when maintaining a similar financial situation before and during the pandemic. In parallel to financial concerns, loss of social status and increased stress due to unemployment are important and can have an impact on mental health (Korzeniewska, 1995). In other contexts, previous work has shown that the impact of job loss on mental health depends on non-financial factors such as the feeling of injustice when one's employer downsizes (Brenner et al., 2014). In the context of the COVID-19 pandemic, uncertainty about the present and future situation could explain difficulties related to mental health. Such uncertainty has been shown to have had tangible negative consequences for job seekers, as companies have been particularly reluctant to hire during the health crisis (OECD, 2020). The lack of work-related social interaction and daily structure, especially during lockdowns, could also explain these difficulties (Gilan et al., 2021).

The uncertainty linked to the COVID-19 pandemic (Mengin et al., 2020) could have disproportionately affected individuals with limited resources, like those experiencing financial difficulties identified in this study, more severely (Brooks et al., 2020). Indeed, similar conclusions have already been drawn about exposure to work-related and financial uncertainty during financial crises, such as the Great Recession, and the negative impact on health (Knabe & Rätzel, 2011; Kopasker, Montagna, & Bender, 2018). In the context of the COVID-19 pandemic for instance, anti-pandemic health measures led to additional expenses (e.g. face masks, hydroalcoholic gel) which could have worried individuals from disadvantaged economic positions more. During the COVID-19 pandemic, strict health measures such as lockdown could have led to more negative emotions in individuals with financial difficulties related to poor housing (Brooks et al., 2020). People with unemployment and income problems are often more isolated and constrained by low resources, a situation that has continued and was exacerbated during the pandemic (Berhuet & Hoibian, 2021). In the future, people with financial difficulties might find the pandemic more worrying because of the potential upcoming financial crisis that could follow (Sultana et al., 2021). Therefore, in the manner of a vicious circle, such effects of the COVID-19 pandemic on income and labour may lead to a decrease in risk-taking skills and thus negatively impact the economy overall (Galandra et al., 2020).

Many policy recommendations have already emerged since the beginning of the COVID-19 pandemic to better address the needs of vulnerable populations (Rahman et al., 2021) and could inspire interventions for persons who are unemployed or have financial difficulties. These recommendations aim to reduce mental health inequalities between vulnerable groups and the population with

**Table 2**

Employment and financial characteristics of TEMPO cohort participants and symptoms of anxiety/depression, France, March 2020–July 2021, n = 864 (bivariate and multivariate GEE models, OR, 95% CI).

	Symptoms of anxiety/depression during COVID-19 (n = 864)			
	Bivariate		Multivariate	
	OR (95% CI)	p-value	OR (95% CI)	p-value
<b>Employment and financial characteristics</b>				
<b>Employment during COVID-19</b>				
Worked normally or from home	1		1	
Worked less or were on partial unemployment	<b>1.43</b> (1.09–1.88)	<b>0.0101</b>	1.34 (0.92–1.95)	0.1275
Forced leave	1.30 (0.97–1.75)	0.0808	1.20 (0.82–1.76)	0.3475
No job	<b>2.53</b> (1.75–3.67)	<b>&lt;0.0001</b>	<b>1.89</b> (1.07–3.33)	<b>0.0273</b>
<b>Type of employment before COVID-19</b>				
High/intermediate occupational grade with stable contract	1		1	
High/intermediate occupational grade and self-employed worker	<b>2.01</b> (1.21–3.34)	<b>0.0067</b>	<b>1.94</b> (1.08–3.48)	<b>0.0255</b>
Low occupational grade with stable contract	<b>1.52</b> (1.10–2.12)	<b>0.0121</b>	1.07 (0.69–1.67)	0.7488
No job	<b>3.20</b> (1.71–5.98)	<b>0.0003</b>	1.11 (0.43–2.85)	0.8297
Other	<b>1.91</b> (1.07–3.39)	<b>0.0286</b>	1.22 (0.65–2.30)	0.5404
<b>Changes in income during COVID-19</b>				
Increased or remained stable	1		1	
Decreased	1.16 (0.96–1.41)	0.1269	1.08 (0.81–1.43)	0.6054
<b>Household income before COVID-19</b>				
More than 2500 euros	1		1	
2500 euros or less	<b>1.90</b> (1.34–2.70)	<b>0.0004</b>	1.42 (0.84–2.40)	0.1940
<b>Financial difficulties during COVID-19</b>				
No	1		1	
Yes	<b>1.55</b> (1.15–2.07)	<b>0.0035</b>	1.43 (0.99–2.07)	0.0566
<b>Financial difficulties before COVID-19</b>				
No	1		1	
Yes	<b>1.60</b> (1.03–2.49)	<b>0.0373</b>	1.05 (0.61–1.81)	0.8537
<b>Sociodemographic characteristics</b>				
<b>Sex</b>				
Male	1		1	
Female	<b>2.13</b> (1.50–3.04)	<b>&lt;0.0001</b>	1.40 (0.96–2.05)	0.0785
<b>Age</b>				
	0.98 (0.94–1.02)	0.3347	1.01 (0.96–1.06)	0.6386
<b>Educational level</b>				
No higher education level	1		1	
Higher education level	1.12 (0.71–1.76)	0.6218	1.10 (0.63–1.91)	0.7451
<b>Living situation</b>				
With a partner and children	1		1	
With a partner	1.36 (0.77–2.42)	0.2856	0.98 (0.53–1.80)	0.9415
Alone	1.23 (0.86–1.77)	0.2500	0.79 (0.45–1.39)	0.4123
Other	1.67 (0.91–3.05)	0.0951	0.93 (0.42–2.03)	0.8497
<b>Housing type</b>				
Individual house	1		1	
Apartment	0.96 (0.71–1.30)	0.7863	0.83 (0.57–1.21)	0.3322

(continued on next page)

Table 2 (continued)

	Symptoms of anxiety/depression during COVID-19 (n = 864)			
	Bivariate		Multivariate	
	OR (95% CI)	p-value	OR (95% CI)	p-value
<b>Loneliness</b>				
No	1		1	
Yes	<b>8.35</b> (6.12–11.41)	<b>&lt;0.0001</b>	<b>7.59</b> (5.40–10.67)	<b>&lt;0.0001</b>
Health characteristics				
<b>Symptoms of anxiety/depression before COVID-19</b>				
No	1		1	
Yes	<b>7.77</b> (5.69–10.62)	<b>&lt;0.0001</b>	<b>5.97</b> (4.26–8.36)	<b>&lt;0.0001</b>
<b>Chronic physical health problems</b>				
No	1		1	
Yes	1.28 (0.98–1.67)	0.0713	1.24 (0.91–1.70)	0.1788
<b>COVID-19-like symptoms</b>				
No	1		1	
Yes	1.22 (0.92–1.62)	0.1578	1.20 (0.83–1.72)	0.3300

measures targeted and adapted to specific contexts (RESPOND, 2021a). It would also be relevant to aim interventions more globally to persons who experienced work-related difficulties, such as attempts to reduce job-related stressors and promote unhealthy work dimensions (Fiol-DeRoque et al., 2021; Kunzler et al., 2021; Sharifi, Asadi-Pooya, & Mousavi-Roknabadi, 2020). For example, in the United States, the effects of household income shocks during the COVID-19 pandemic on depressive symptoms appear to be stronger in states with fewer policies aiming to protect employees' income (Donnelly & Farina, 2021). Reevaluation of low paid essential workers (McCartan et al., 2021) or financial support to families of essential workers (Fong & Iarocci, 2020) have been suggested in this context. At the workplace, communication and organisation better adapted to the public health context, alongside improved prevention of work-related health risks, are paths to support mental health (Kniffin et al., 2021). When people are unemployed, especially in times of COVID-19, they need to be supported and targeted by prevention during what may be a longer and harder than usual job search (Kniffin et al., 2021), as this study identifies them as vulnerable to anxiety/depression symptoms. Finally, these policy recommendations must be implemented so as not to reinforce health inequalities (Alberti, Lantz, & Wilkins, 2020; Chu, Alam, Larson, & Lin, 2020; Rahman et al., 2021).

## 5. Conclusion

This study provides evidence that, after adjusting for prior occupational and financial variables, there was a significant mental health impact on unemployed workers during the COVID-19 pandemic and a near-significant impact for people with financial difficulties. We demonstrated that persons in unstable situations were vulnerable to symptoms of anxiety/depression despite the rapid financial and economic measures put in place. It is thus necessary to support these individuals who have limited (monetary, material, social) resources and depend on the country's economic situation. Individuals exposed to disrupted work scheduling due to the COVID-19 pandemic, or other crises, may continue to experience increased stress due to the subsequent negative consequences and uncertainty of their future; it is therefore relevant to target these individuals in mental health prevention programs.

## Ethics

The TEMPO cohort received approval of bodies supervising ethical data collection in France, the Advisory Committee on the Treatment of

Information for Health Research (Comité consultatif sur le traitement de l'information en matière de recherche dans le domaine de la santé, CCTIRS) and the French regulatory data protection authority (Commission Nationale de l'Informatique et des Libertés, CNIL, n° 908163).

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## CRedit authorship contribution statement

**Irwin Hecker:** Conceptualization, Methodology, Software, Formal analysis, Investigation, Writing – original draft. **Tarik El Aarbaoui:** Software, Methodology, Validation, Writing – review & editing. **Solène Wallez:** Software, Validation, Data curation, Writing – review & editing. **Astrid Juhl Andersen:** Validation, Writing – review & editing. **José Luis Ayuso-Mateos:** Validation, Writing – review & editing. **Richard Bryant:** Validation, Writing – review & editing. **Giovanni Corrao:** Validation, Writing – review & editing. **David McDaid:** Validation, Writing – review & editing. **Roberto Mediavilla:** Validation, Writing – review & editing. **Ellenor Mittendorfer-Rutz:** Validation, Writing – review & editing. **Matteo Monzio Compagnoni:** Validation, Writing – review & editing. **A-La Park:** Validation, Writing – review & editing. **Antje Riepenhausen:** Validation, Writing – review & editing. **Thomas Rigotti:** Validation, Writing – review & editing. **Katharina Seeber:** Validation, Writing – review & editing. **Marit Sijbrandij:** Validation, Writing – review & editing, Supervision, Project administration. **Pierre Smith:** Validation, Writing – review & editing. **Oliver Tüscher:** Validation, Writing – review & editing. **Henrik Walter:** Validation, Writing – review & editing. **Anke Witteveen:** Validation, Writing – review & editing. **Murielle Mary-Krause:** Validation, Writing – review & editing, Supervision. **Maria Melchior:** Conceptualization, Validation, Writing – review & editing, Supervision, Project administration, Funding acquisition.

## Declaration of competing interest

None.

## Data availability

Data will be made available on request.

## Appendix ASupplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2022.101285>.

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