



## Short communication

## Lockdown-related factors associated with the worsening of cardiovascular risk and anxiety or depression during the COVID-19 pandemic

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In response to the COVID-19 outbreak, the French government initiated a strict lockdown of the general population (from 17/03/2020 to 10/05/2020). During this period, the French population was required to stay at home and the only reasons for going out were to go to work (if teleworking was impossible); to do essential food shopping; to travel for health reasons, assisting vulnerable people, family emergencies and childcare; for individual physical activity or to take out a pet (within the limit of one hour per day and within a maximum radius of one kilometre around the home). Any gathering of people who did not live in the same home was prohibited. Infringements to this new rule were penalized initially by a fine of 135 € (160\$), then by a fine of 1,500 € (1,760\$) in the event of a repeat infringement within 15 days, and in the event of more than 3 infringements within 30 days, the fine was 3,750 € (4,100\$) and punishable by 6 months imprisonment. Lockdown measures have obvious psychological impacts, (Brooks et al., 2020; Luykx et al., 2020) which could, in turn, increase cardiovascular risk. (Turner et al., 2020; Lippi et al., 2020) It is therefore important to better understand lockdown consequences on psychological health, and cardiovascular risk factors and disease, all of which are major public health problems. (Douglas et al., 2020)

We assessed factors associated with worsening cardiovascular risk, and anxiety or depression during the COVID-19 lockdown.

536 subjects aged 50 to 89 years from a previous population-based

study (randomly sampled from the French general population) participated in the PSYCOV-CV study (NCT04397835) during lockdown (participation rate: 69%). All subjects gave informed consent, and the study was carried out in accordance with The Declaration of Helsinki. Data were collected during telephone interviews conducted by trained researchers from 17/04/2020 to 10/05/2020. Consequently, mean time ( $\pm$ standard deviation) in lockdown before interviews was 44 days ( $\pm$ 6 days). Worsening of cardiovascular risk was considered in case of increased antihypertensive, lipid-lowering or hypoglycaemic drug treatment; increased smoking; weight gain or reduction in diet quality [using a validated food frequency questionnaire]; (Giovannelli et al., 2014) reduced physical activity since the start of lockdown (as compared to the last 2–4 weeks before lockdown); or acute cardiovascular event during lockdown. Symptoms of anxiety or depression were recorded using validated scales for the general population: the Generalized Anxiety Disorder-7 (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9). (Spitzer et al., 2006; Kroenke et al., 2001) We assessed factors independently and significantly associated with worsening cardiovascular risk, and with anxiety or depression using multivariate logistic regression and a stepwise selection procedure. All reported P-values were two-sided and the significance threshold was  $<0.05$ .

Of the 536 participants, 48% were men, and the median age was 67

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**Table 1**

Factors independently and significantly associated with decrease in diet quality or physical activity, or weight gain during the COVID-19 lockdown (17/03/2020 to 10/05/2020, France).

	Factors independently associated with decrease in diet quality or physical activity, or weight gain (N = 335/536)		Factors independently associated with decrease in diet quality (N = 142/536)		Factors independently associated with decrease in physical activity (N = 194/536)		Factors independently associated with weight gain (N = 137/536)	
	Adjusted <sup>a</sup> Odds-Ratio [95% Confidence Interval]	P-value	Adjusted <sup>a</sup> Odds-Ratio [95% Confidence Interval]	P-value	Adjusted <sup>a</sup> Odds-Ratio [95% Confidence Interval]	P-value	Adjusted <sup>a</sup> Odds-Ratio [95% Confidence Interval]	P-value
Age < 60 years	2.11 [1.24–3.59]	0.006	2.17 [1.42–3.32]	<0.001	–	–	2.60 [1.70–3.99]	<0.001
Female gender	1.73 [1.19–2.52]	0.004	1.51 [1.01–2.27]	0.047	1.53 [1.04–2.25]	0.031	1.58 [1.05–2.37]	0.028
Children at home	0.43 [0.22–0.86]	0.017	–	–	–	–	0.45 [0.20–0.99]	0.049
Rural home	0.60 [0.42–0.89]	0.010	–	–	0.69 [0.46–1.03]	0.072	–	–
Job (out of home) without in-person contact with the public during lockdown (e.g. dustmen)	1.00	–	–	–	1.00	–	–	–
Job with in-person contact with the public during lockdown (e.g. cashiers)	3.60 [1.20–10.75]	0.022	–	–	3.04 [1.00–9.25]	0.051	–	–
Job at home during lockdown (e.g. teleworking)	2.87 [1.13–7.25]	0.026	–	–	1.96 [0.69–5.58]	0.209	–	–
No job during lockdown	1.93 [0.84–4.45]	0.123	–	–	1.79 [0.71–4.51]	0.220	–	–
Estimated risk by the participant to be contaminated by COVID-19 (on a scale from 1 to 10) > median	1.52 [1.04–2.23]	0.029	–	–	1.72 [1.16–2.54]	0.006	–	–
Physical activity before lockdown (in min/week) > median	1.98 [1.34–2.93]	0.001	–	–	3.94 [2.66–5.84]	<0.001	–	–

<sup>a</sup> Each Odds-Ratio was adjusted for all the factors shown in the table.

**Table 2**

Factors independently and significantly associated with anxiety or depression during the COVID-19 lockdown (17/03/2020 to 10/05/2020, France).

Factors independently associated with anxiety, or depression (N = 148/489 <sup>a</sup> )	Adjusted <sup>b</sup> Odds-Ratio [95% Confidence Interval]	P-value
Female gender	1.98 [1.23–3.20]	0.005
Home without balcony, terrace, or garden during lockdown (reference)	1.00	–
Home with balcony or terrace	0.21 [0.04–1.04]	0.050
Home with garden	0.29 [0.06–1.26]	0.090
Not in total agreement with the effectiveness of preventive measures <sup>c</sup>	2.46 [1.42–4.27]	0.001
Feeling socially isolated during lockdown	1.68 [1.05–2.67]	0.030
Worsening relationship with partner since the beginning of lockdown	5.24 [2.11–13.0]	<0.001
Pre-lockdown diet quality score <sup>d</sup> > median	0.51 [0.31–0.85]	0.010
History of anxiety	7.34 [4.45–12.1]	<0.001

<sup>a</sup> Subjects with a physician-prescribed anxiety or depression drug treatment before lockdown (N = 47 (9%)) were excluded, thus leading to an analysis sample of 489 subjects. <sup>b</sup> Each Odds-Ratio was adjusted for all the factors shown in the table. <sup>c</sup> i.e. regular hand washing, coughing/sneezing into one's elbow, using single-use tissues, avoiding handshaking/embracing, avoiding touching one's face, keeping 1 m away from others; totally agree (reference) versus quite agree, agree a little, slightly disagree, do not really agree, or do not agree at all. <sup>d</sup> National Health and Nutrition Programme (*Programme National Nutrition Santé*) guidelines score 2.

years. Lockdown requirements were followed by more than 91% of the participants (<9% of the participants left their home more than once a day). During lockdown, 63% of participants reported reduced physical activity [reduction of  $\geq 15$  min/week (median = 180 min/week), N = 194], poorer diet quality [i.e. increased consumption of sugary foods, alcohol, fat or carbohydrates, not compensated by increased fruit and vegetable, dairy (within a limit of 2.5 servings/day), or lean protein consumption, N = 142], or weight gain [ $\geq 500$  g (median = 2Kg), N = 137] compared to pre-lockdown. Only one acute cardiovascular event (heart failure), was reported, antihypertensive, lipid-lowering or

hypoglycaemic drug treatment was increased for two participants, and 21 participants reported increased smoking ( $\geq 1$  cigarette/day). Furthermore, 32% of participants reported symptoms of anxiety (Generalized Anxiety Disorder-7 greater than 4, N = 125) or depression (Patient Health Questionnaire-9 > 4, N = 123).

**Table 1** shows factors independently and significantly associated with worsening cardiovascular risk (i.e. reduced physical activity or diet quality, or weight gain). Of note, we found that participants living in urban areas and continuing to work at home (teleworking) or in a role requiring in-person contact with the public (such as cashiers, nurses or physicians...) were more likely to report a deterioration in cardiovascular risk factors during lockdown, and specifically a decrease in physical activity. Furthermore, living in a home with no terrace or balcony during lockdown, not being fully convinced by the effectiveness of COVID-related preventive measures, feeling socially isolated during lockdown, or having a deteriorating relationship with one's partner since the beginning of lockdown were all associated with depression or anxiety (**Table 2**). As expected, an association between psychological health and worsening cardiovascular risk was not yet evident during lockdown (adjusted p = 0.278), but this will be further explored after follow-up interviews at 1, 6 and 12 months post-lockdown.

Our study, conducted in a representative sample of an age-group at increased risk of both cardiovascular disease and severe COVID-19, found that modifiable lockdown-related factors were associated with worsening cardiovascular risk and anxiety or depression during the COVID-19 pandemic. Given that the over 50 s are at increased risk of severe COVID-19, this population in particular, could be subject to additional lockdown periods. We believe that our results increase the understanding of modifiable factors that may be associated with the health impact of the lockdown. The results of the PSYCOV-CV cohort study will be further explored after follow-up interviews at 1, 6 and 12 months' post-lockdown.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Author contributions

All authors contributed to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND contributed to drafting the article or revising it critically for important intellectual content; AND approved the final version to be published; AND agree to be accountable for all aspects of the work thereby ensuring that questions related to the accuracy or integrity of any part of the work

are appropriately investigated and resolved.

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