

# The effects of the COVID-19 pandemic on wellbeing up to 2.5 years from its outbreak in Switzerland

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## ABSTRACT

**Background:** This article examined to what extent pandemic-related exposures were associated with negative affect up to 2.5 years from the outbreak of the pandemic in Switzerland.

**Methods:** We drew on longitudinal data from five waves (2018–22) of the Swiss Household Panel, including the pandemic questionnaire collected in May–June 2020 ( $n = 5657$ ). Our outcome, negative affect (e.g. frequency of negative emotions such as anxiety or sadness), was measured in 2020, 2021, and 2022.

**Results:** Our study showed that a higher frequency of psychosomatic symptoms (e.g. sweating), greater worries (e.g. lifestyle), and concerns about perceived financial risk were strongly and persistently associated with higher negative affect up to 2.5 years after the outbreak of the pandemic. Worsened relationships with neighbours and a deteriorated financial situation were associated with higher negative affect during the pandemic, but not postpandemic. Finally, an increase in physical activity (but not an absolute frequency of exercising) was linked to lower negative affect in the short-term.

**Conclusion:** The findings emphasize the importance of mitigating pandemic-related worries and stress, as these can have long-lasting postcrisis consequences on people's wellbeing. Moreover, preventing a decline in the financial situation and relationships within the community as well as adopting a healthy lifestyle may have protective effects.

### Highlights:

- Psychosomatic symptoms were associated with higher postpandemic negative affect.
- Pandemic-related worries were linked to persistently higher negative affect.
- Anticipated financial risk was associated with higher negative affect postpandemic.
- Worsened relationships with neighbours were associated with higher negative affect during the pandemic.

**Keywords:** COVID-19 pandemic; negative affect; psychosomatic symptoms; social support; Switzerland; wellbeing; worries

## Introduction

### The COVID-19 pandemic and mental health/wellbeing

There is a large amount of evidence showing that mental health somewhat declined during the COVID-19 pandemic, both in Switzerland and internationally.<sup>1–4</sup> However, these declines have been described as small and highly heterogeneous, with some demographic groups (e.g. women and young people) having greater drops in wellbeing than others.<sup>1–4</sup> For instance, a study using the Swiss Household Panel (SHP)—the same dataset as in our article—found that there is a noticeable rise in the number of people who were somewhat

dissatisfied with life in general immediately following the first lockdown, while the proportion of individuals who report being very satisfied also increased. This suggests that the pandemic has elicited a varied and polarizing response.<sup>5</sup>

These studies typically provided a descriptive picture of a wellbeing trend over time, with the decline happening around 2020–21 being attributed to the pandemic. However, it is

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difficult to disentangle the (causal) impact of the pandemic from other events happening at the same time, for instance, rising concerns about climate change, increasing living costs, or armed conflicts. This is because everyone has been exposed to the pandemic, hence there is no control group for comparison to make causal inferences. One way to examine the effect of the pandemic is by directly asking the participants about the extent to which it has impacted their lives.

There have been several attempts to capture the impact of the pandemic on wellbeing and mental health using questionnaires specifically designed for this purpose.<sup>6–8</sup> These studies typically included questions on the pandemic-related impact on diverse aspects of life, such as the financial situation or lifestyle changes, and wellbeing or mental health. Their key limitation was that they tended to use convenience sampling strategies (e.g. online surveys), which limits their representativeness for the general population. Moreover, these surveys were mainly cross-sectional, hence it was not possible to link their findings with postpandemic outcomes or pre-pandemic exposures.<sup>6–8</sup> Some of the long-running population-based studies did include an additional wave of data collection during the pandemic or incorporated pandemic-related questions in their usual questionnaires.<sup>9</sup> Nonetheless, we are not aware of any population-based research which has used COVID-related questions to study the long-lasting impacts of the pandemic.

We address these gaps by examining a longitudinal association between pandemic-related exposures and wellbeing during and after the pandemic using data from the SHP. This survey implemented an *ad hoc* COVID-19 questionnaire during the first wave of the pandemic (May–June 2020), in addition to the typical field work that takes place at the end of each year. Our study focuses on the exposures that were of relevance for most participants, as opposed to selected groups such as older adults only or the unemployed, and are potentially amenable to change, for instance, by an intervention, policy, or lifestyle adaptation. These included (i) perceived financial risk, (ii) their financial situation, (iii) physical activity, (iv) frequency of leaving home during lockdown, (v) volunteering, (vi) relationships with neighbours, (vii) worries, and (viii) psychosomatic symptoms. As the SHP is an ongoing longitudinal study, we can examine to what extent these pandemic-related exposures were associated with later wellbeing even up to two and half years after the pandemic started. In doing so, our study can provide some insight into the factors that are more impactful over the short or longer term. The exposures that are found to be most strongly and persistently linked with wellbeing could be candidates for potential intervention during future pandemics or other crises.

We operationalized wellbeing as negative affect. Negative affect is a component of subjective wellbeing, defined as an

individual's tendency to experience an unhappy emotional state such as anxiety, depression, and unhappiness.<sup>10</sup> We selected negative affect over a cognitive component of wellbeing, captured by questions about satisfaction with various aspects of life, which were also available in the SHP. This was due to evidence that external life circumstances (e.g. job status) and recent events (e.g. bereavement, childbirth) tend to have a stronger association with affective components of wellbeing.<sup>11,12</sup> Hence, negative affect was deemed more likely to capture the potential relationship with the pandemic-related exposures. Indeed, in our previous study, we found much more fluctuations in negative affect before, during, and after the pandemic than in life satisfaction or positive affect.<sup>13</sup>

### Research questions and hypotheses

Our first primary research question was—to what extent are the pandemic-related exposures associated with negative affect during and postpandemic (up to 2.5 years from the outbreak)? We hypothesized that a higher perceived financial risk, a detrimental change in financial situation, greater pandemic-related worries, and psychosomatic symptoms would be associated with persistently increased negative affect. On the other hand, more frequent physical activity, leaving home and volunteering, and an improvement in financial situation would be associated with lower negative affect. Our expectation was that these associations would weaken over time.

Our second pre-registered primary research question was—to what extent does perceived social support modify the association between the pandemic-exposures and negative affect? Due to limited space in the article, we report the rationale, methodology, results, and discussions of these results in the [Supplementary Text 1](#) (including [Supplementary Tables 1 and 2](#)).

## Methodology

### Participants

This article drew on longitudinal data from six waves of the SHP (spanning 2018–2022).<sup>14</sup> The SHP is a nationally representative household-based panel study that collects information yearly on different aspects of life from each household member at the time of the interview.<sup>14</sup> In May–June 2020, during the Corona crisis, the SHP team conducted an additional survey between the usual waves of data collection among the SHP participants.<sup>15</sup> This was right after the strictest regulations ended, but numerous restrictions were still in place (e.g. ban of large events and mandatory distance of 1.5 m). [Supplementary Text 2](#) provides more details about the pandemic-related context in Switzerland. A total of 5843 of the invited 8772 participants completed the COVID-19 questionnaire (response rate of 66.6%). We

combined the COVID-19 questionnaire with information from the usual annual waves, pre-COVID (2018, 2019) and after the COVID-19 questionnaire (2020, 2021, 2022). Participants eligible for the analysis completed the COVID-19 questionnaire and were at least 18 years old, as some questions were not applicable to younger participants (e.g. about the financial situation) ( $n = 5657$ ).

### Negative affect

We used negative affect as our outcome collected after the COVID-19 questionnaire—in 2020, 2021, and 2022. We also controlled for pre-pandemic negative affect in 2019. Negative affect captured the frequency of experiencing four negative emotions, namely anger, sadness, worry, and anxiety and depression. The response options ranged from never (0) to always (10). After finding evidence that the four items fall on a common factor, using a factor analysis, we summed up the four items obtaining a score between 0 and 40, where a higher value indicated greater negative affect.<sup>16</sup>

### Pandemic-related exposures

Participants were asked about how the COVID-19 pandemic affected various domains of their life in the COVID-19 questionnaire. Our focus was on (i) perceived financial risk, (ii) their financial situation, (iii) physical activity, (iv) frequency of leaving home during lockdown, (v) volunteering, (vi) relationships with neighbours, (vii) worries, and (viii) psychosomatic symptoms. The correlation between variables was weak, ranging from 0.00 to 0.19, except for the correlation between worries and financial risk which was moderate (0.41). Table 1 includes details on how each variable was measured and transformed for the purpose of this study.

### Confounding factors

Following the ‘disjunctive cause criterion’, we specified the potential confounding factors as any preexposure variable that is a cause of the exposure (pandemic-related exposures; perceived social support), or of the outcome (negative affect), or of both.<sup>17</sup> We did not include any covariates that might be on the pathway between the exposures and negative affect, typically referred to as mediators, as these might block some of the effect.<sup>18</sup> We also controlled for the baseline outcome to reduce the potential bias due to reverse causation, where participants could be more likely to report negative consequences of the pandemic due to poor wellbeing.<sup>19</sup> This approach helps to strengthen the confounding adjustment by controlling for variables that affect the pandemic-related exposures and negative affect only through previous negative affect. Socio-demographic information (e.g. sex) was collected

in the COVID-19 questionnaire. All other confounding factors were measured in 2018 or 2019 and included (among others) wellbeing, physical health, various stressors (e.g. family conflicts), socioeconomic indicators (e.g. household income), personality (e.g. sense of control), and caring responsibilities. Supplementary Table 3 includes the full list of adjusted confounding factors and details on how these variables were measured.

### Analytical approach

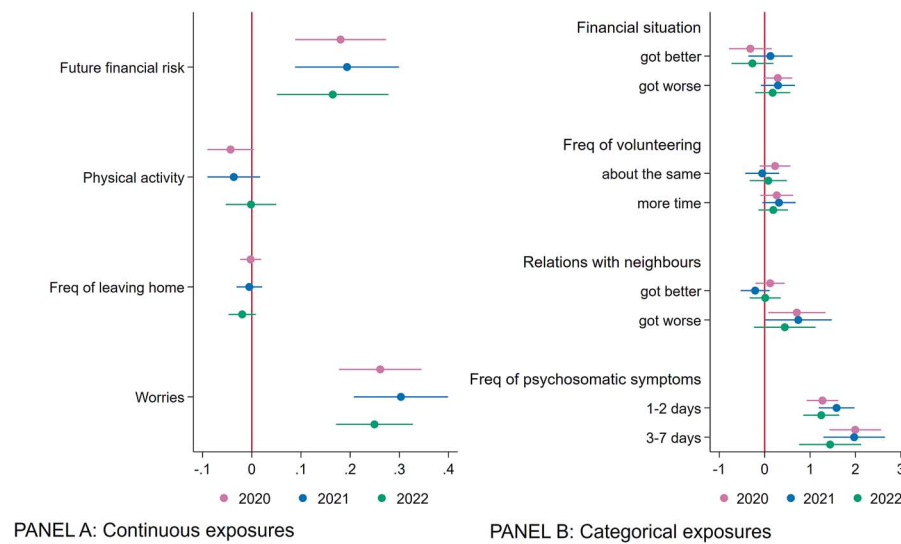
The study was pre-registered and is accessible through <https://doi.org/10.17605/OSF.IO/H536J>. The analysis code is also available online (<https://osf.io/vnzcw/>). Any deviations from the protocol or decisions made after the registration were described in Supplementary Table 4. These were minor, hence unlikely to affect the results and their interpretation. To reduce a potential bias due to nonresponse, all analyses were based on missing information replaced using multiple imputation by chained equations, resulting in 50 imputations (see Supplementary Text 3 for details).

First, we examined the association between the pandemic-related exposures and negative affect using multivariate linear regression, assuming a normal distribution of the outcome. We regressed each exposure one at a time, while adjusting for confounding factors. Moreover, we controlled for the pre-pandemic negative affect (measured in 2019), which allowed to interpret the coefficients as the association between the pandemic-related exposure and change in pre-pandemic negative affect and subsequent waves. Negative affect was collected three times after the COVID-19 questionnaire took place—in 2020, 2021, and 2022. Using a multivariate approach, in which we jointly regressed negative affect over the three time points, allowed us to compare the strength of the association between exposures and the outcome over time. For instance, we could compare whether the pandemic-related worries were more strongly associated with negative affect at beginning of the pandemic than two and half years after its outbreak.

We compared the coefficients using Wald tests, with  $P$ -values Bonferroni-adjusted for multiple testing, which helps to control family-wise error.<sup>20</sup> The more conservative  $P$ -value of .017 was used as a threshold indicating statistical significance when examining strength of the association across measures of negative affect for each exposure. That is, we divided the typically used  $P$ -value of .05 by the number of times negative affect was measured as an outcome (2020, 2021, 2022). The rationale was that a potential intervention would likely target each pandemic-related exposure individually, however, the effect would be desirable at any of the time points.

**Table 1** Detailed information about the pandemic-related exposures.

<i>Pandemic-related exposure</i>	<i>Items</i>	<i>Response options</i>	<i>Transformation of the variables</i>
Perceived financial risk	How big do you assess the risk of the following effects of the Corona crisis for yourself in the next 12 months? (1) Be forced to use your savings? (2) Be forced to take out a loan? (3) Have to apply for social assistance or other welfare benefits? (4) Be forced to drastically lower your standard of living?	0 'no risk'–10 'a very high risk'; with additional category—11 'this has already happened'	We derived a principal component capturing the maximum amount of variance across the items. The component was used as a continuous variable.
Financial situation	(1) Since the beginning of the Corona crisis, has your financial situation worsened or improved?	0 'very much worsened'–10 'very much improved'	The variable was categorized as 0–4 'worsened'/5 'not change'/6–10 'improved'
Physical activity	(1) In the period with the strictest confinement measures, how many days a week did you practise for half an hour minimum a physical activity which made you slightly breathless? (These 30 min of daily activity can be divided up in three sessions of 10 min each). The week is 7 days (weekend included)	In days	The variable will be used in its original form, as continuous
Frequency of leaving home	(1) On average, how many times a week did you leave your home (e.g. for work, shopping, errands, a walk, sports)? An estimation is sufficient.	Times per week	The variable will be used in its original form, as continuous
Volunteering	(1) Did you spend more or less time on volunteering activities or helping out others outside the household compared with before the Corona crisis?	1 'less time'/2 'about the same'/3 'more time'	The variable will be used in its original form, as categorical
Relationships with neighbours	(1) Since the start of the Corona crisis, have relations with your neighbours generally deteriorated or improved?	0 'strongly deteriorated'–10 'strongly improved'	The variable will be used in its original form, as continuous (with a possible range from 0 to 10)
Worries	How concerned are you about the following? (1) the economy in general (2) your own economic situation (3) your health (4) the health of your close ones (5) about whether you will receive the necessary medical treatment if you do contract the coronavirus (6) solidarity in our society (7) your social relations (8) your lifestyle (9) share prices and other forms of investments	0 'not at all'–10 'very much'	We derived a principal component capturing the maximum amount of variance across the items. The component was used as a continuous variable
Psychosomatic symptoms	(1) In the past week, regarding your experience with the Corona crisis (e.g. social distancing, loss of income/work, concerns about infection), how often have you had physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart, when thinking about it? The was adapted from the Impact of Event Scale-Revisited, a scale on posttraumatic stress symptoms. <sup>31</sup>	1 'not at all or less than 1 day'/2 '1–2 days'/3 '3–4 days'/4 '5–7 days'	The variable was binarized: 1 'not at all or less than 1 day'/2 '1–7 days'. This is due to relatively few individuals who responded '3–4 days' or '5–7 days'



**Figure 1** The magnitude of association between pandemic-related exposures and negative affect in fully adjusted models. Adjustment for: sex; age in 2020; cohabitor status; employment status; interview language; years of education; first nationality; physical health; illness, accident of closely related person; family conflicts; exhaustion after work; participation in clubs or other groups; political affiliation; region of residence; moved since last interview; type of household; standard of living; type of residence; tenant or owner; inviting friends; satisfaction with financial situation of household; household income; getting help; providing care; stress; pre-pandemic negative affect; sense of control; self-perception; volunteering before the pandemic.

## Results

Descriptive information can be found in the [Supplementary Text 4](#) (including [Supplementary Table 5](#)).

### Pandemic-related exposures and negative affect

As presented by [Fig. 1A](#), higher perceived future financial risk due to the pandemic was associated with higher negative affect, measured up to two and half years after the pandemic started in fully adjusted models—with the coefficients ranging from 0.25 (0.18–0.33,  $P < .001$ , standardized  $\beta = .05$ ) in 2020 to 0.28 (0.19–0.37,  $P < .001$ ,  $\beta = .05$ ) in 2021.

We found a similar effect for worries ([Fig. 1A](#)), with its highest values being persistently associated with higher negative affect—from 0.18 (0.10–0.26,  $P < .001$ ,  $\beta = .09$ ) in 2020 to 0.20 (0.11–0.29,  $P < .001$ ,  $\beta = .09$ ) in 2021. An increased frequency of psychosomatic symptoms (Panel B) was also continually associated with higher negative affect in a fully adjusted model.

Experiencing psychosomatic symptoms for 1–2 days during the previous week ([Fig. 1B](#)), compared to none/less than a day, was associated with an increase in negative affect of 1.26 (0.82–1.71,  $P < .001$ ,  $\beta = .06$ ) in 2022 to 1.29 (0.96–1.63,  $P < .001$ ,  $\beta = .06$ ) in 2020. The values for 3–7 days ranged between 1.45 (0.47–2.42,  $P = .007$ ,  $\beta = .04$ ) in 2022 and 1.90 (1.30–2.49,  $P < .001$ ,  $\beta = .06$ ) in 2020.

There was some evidence of an association between a deteriorating financial situation due to the pandemic and higher negative affect in 2020 (compared with ‘no change’:

0.32, 0.02–0.63,  $P = .04$ ,  $\beta = .02$ ), however, the  $P$ -value was above the Bonferroni adjusted threshold of 0.017 ([Fig. 1B](#)). The uncertainty around the estimates increased in following years (2021: 0.35,  $-0.02$  to 0.73,  $P = .07$ ,  $\beta = .10$ ; 2022: 0.11,  $-0.45$  to 0.67,  $P = .68$ ,  $\beta = .00$ ). An improved financial situation was not found to be linked with subsequent negative affect (e.g. 2020:  $-0.28$ ,  $-0.67$  to 0.11,  $P = .16$ ,  $\beta = -.02$ ).

A worsened, but not an improved, relationship with neighbours was associated with negative affect in 2020, with  $P$ -value being marginally above the Bonferroni adjusted threshold of 0.017 (0.70, 0.08–1.31,  $P = 0.03$ ,  $\beta = .03$ ) ([Fig. 1B](#)). The estimates for subsequent years were highly imprecise (2021: 0.74,  $-0.11$  to 1.59,  $P = .09$ ,  $\beta = .03$ ; 2022: 0.40,  $-0.27$  to 1.07,  $P = .24$ ,  $\beta = .03$ ). We found no evidence for the association between frequency of physical activity, leaving home, and volunteering and negative affect. There was no evidence for differential associations between pandemic-related exposures and negative affect across different age groups. We also ran several pre-registered analyses that aimed to assess the robustness of our findings. For brevity, these are reported in [Supplementary Text 5](#) (including [Supplementary Fig. 1](#) and [Supplementary Tables 6](#) and 7).

## Discussion

### Main finding of this study

Our study examined to what extent pandemic-related exposures were associated with negative affect over a period over two years after the COVID-19 pandemic started. We found



Participants without missing information tend to be of advantaged background, with better wellbeing and greater resources.<sup>30</sup> One could speculate that this could have biased some of the associations towards null (e.g. between economic situation and wellbeing). We attempted to deal with the bias due to nonresponse to some extent by imputing missing information. Secondly, despite a vast adjustment, there is still possibility of residual confounding, for instance, due to genetic factors causing both the pandemic-related worries or anxiety and negative affect. Thirdly, we were unable to test whether social support during the pandemic mattered to a greater extent as a buffering factor than its pre-pandemic levels, as its measure was not available during the pandemic. Fourthly, despite adjusting for prepandemic negative affect, there is still a risk of reverse causality, where pandemic-related exposures are caused by negative affect. This is particularly relevant if these effects are contemporaneous. Finally, the question about the financial situation was asked in reference to the period of the pandemic, rather than pandemic itself. Hence, as pointed out by one of the reviewers, it is still possible that factors which only coincided with the pandemic played a role in changing the financial circumstances.

## Conclusions

The findings of this study emphasize the importance of preventing pandemic-related worries and stress, as these can have long-lasting post-crisis consequences on people's wellbeing. Moreover, preventing declines in individual's financial situation and relationships within the community as well as adopting a healthy lifestyle may have protective, albeit short-lasting, effects.

## Author contributions

D.G. analysed and interpreted the data and was a major contributor in writing the manuscript. All authors contributed to the conception of the study, read and approved the final manuscript. All authors have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

## Supplementary data

Supplementary data are available at the *Journal of Public Health* online.

## Conflict of interest

None declared.

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## Data availability

SHP data are freely accessible to the scientific community here: <https://www.swissbase.ch/en/catalogue/studies/6097/19347/overview>.

## Ethics approval and consent to participate

Participants receive information on the Swiss Household Panel, known to them as 'Living in Switzerland', in advance letters, information leaflets and are given information by interviewers if they are taking part in a telephone interview. These communications give participants information about the background and purpose of the study, how they were selected, how the data will be used and about the security and confidentiality of their data. Participants indicate their consent by answering questions.

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