Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Short Communication

Evidence for changes in population-level subjective well-being during the COVID-19 pandemic from 30 waves of representative panel data collected in Austria between March 2020 and March 2022

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ABSTRACT

Objectives: This study was conducted to describe how population-level subjective well-being (SWB) evolved throughout the pandemic.
Study design: Thirty waves of panel data representative of the Austrian population aged ≥14 years were collected between March 2020 and March 2022. Participants were quota sampled from a pre-existing online panel based on key demographics closely mirroring the Austrian resident population.
Methods: We present wave-specific means of SWB throughout 2 years of the COVID-19 pandemic next to the evolution of the pandemic (cases and deaths) and stringency of lockdown measures in Austria as well as estimate their bivariate correlations.
Results: The analysed sample consisted of 3,293 participants contributing to a total of 46,168 observations. All components of SWB – negative affect, positive affect and life satisfaction – showed population-level fluctuation between March 2020 and March 2022. The magnitude of these changes was small. Population-level SWB correlated with the incidence rate of COVID-19 deaths (negative affect: r = 0.69, positive affect: r = −0.70, life satisfaction: r = −0.47), the Stringency Index (negative affect = 0.50, positive affect = −0.47, life satisfaction = −0.47) and less so with the incidence of COVID-19 cases (negative affect = 0.43, positive affect = −0.31, life satisfaction = −0.38).
Conclusions: Population-level SWB fluctuated in accordance with rises and falls in COVID-19 cases and deaths as well as with the stringency of lockdown measures. This connection suggests that incidence of COVID-19 cases and deaths, as well as public health measures to contain the pandemic affect population-level SWB and could thereby impact population health and productivity.

Introduction

As the COVID-19 pandemic continues, early and sustained efforts to collect longitudinal data offer opportunities for a better understanding of how the pandemic affects mental health and subjective well-being (SWB). So far, studies have shown that population mental health and SWB deteriorated after the pandemic hit in early 2020 compared with prepandemic levels.[1–6] To 'break' waves of COVID-19 infections during the pandemic, governments responded with policies aiming to restrict social contacts and thereby contain the spread of COVID-19. Evidence on whether population mental health and SWB changed in accordance with pandemic waves and respective government responses – deteriorating when restrictions got more stringent and improving when restrictions were eased – is still conflicting. SWB is not only a desirable outcome in itself [7] but has also been associated with better illness prognosis[8] and lower all-cause and cause-specific mortality.[9] Answering whether and how the COVID-19 pandemic is affecting population-level SWB requires frequent monitoring of representative samples of the target population under different levels of exposure to the pandemic threat (new COVID-19 cases and deaths) and pandemic-related mitigation measures.

Exploiting differences in stringency of containment policies between England and Scotland against similar pandemic

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trajectories in May 2020, easing lockdown measures was associated with improvements in population mental health.[2] Using monthly panel data from December 2018 to December 2020, another study[5] found that mental health and SWB among German workers were reduced during the first and second wave of the COVID-19 pandemic, but recovered between waves. Latent class analyses of mental health trajectories during the pandemic support these observations: Although most included study participants were able to maintain very good or good mental health throughout the respective observational period, the mental health of a fair share of respondents was either recovering after an initial shock or fluctuating seemingly in accord with pandemic waves.[3,4] In contrast, a comprehensive study in the United Kingdom,[1] which combined data from 11 longitudinal studies, has not found consistent time-varying effects of the COVID-19 pandemic on mental health.

In this short report, we leverage 30 waves of population-representative panel data collected between March 2020 and March 2022 in Austria to assess population-level changes in SWB throughout 2 years of the COVID-19 pandemic using.

Methods

Data

We used data from the Austrian Corona Panel Project,[10] a high-frequency online panel survey conducted by the University of Vienna (https://viecer.univie.ac.at/en/projects-and-cooperations/austrian-corona-panel-project/). Between 27 March 2020 and 25 March 2022, 30 waves of initially weekly and later monthly interviews were conducted, each with >1,500 participants. Inclusion criteria were Austrian residency and age ≥14 years. Participants were quota sampled from a pre-existing online panel based on key demographics (age, gender, region, municipality size, educational level) closely mirroring the Austrian resident population. The initial participation rate was 35%, and the retention rates for panellists ranged from 86% in wave 2 to 48% in wave 30. In total, 3,293 participants provided 46,168 repeated observations (14 interviews per person on average).

The Austrian Corona Panel Project is a social science survey study for which an ethical statement was deemed not necessary as no patients were examined, no invasive methods were used, and there were no risks for survey participants. The data used for this study are openly available (https://viecer.univie.ac.at/coronapanel/austrian-corona-panel-data/access-request/).

Variables

Individual-level measures of SWB[7] included negative affect, positive affect and life satisfaction. For negative affect, participants were asked how often during the week before questioning (1 = 'never', 2 = 'on some days', 3 = 'multiple times a week', 4 = 'almost every day' and 5 = 'every day') they felt lonely, angry, depressed, nervous, anxious, or sad. Confirmatory factor analysis with R-package *lavaan* indicated this to be a valid (χ^2 (df) = 1670 (415), *P*-value <0.001, Comparative Fit Index (CFI) = 0.980, Tucker-Lewis Index (TLI) = 0.978, Root Mean Square Error of Approximation (RMSEA) = 0.068, Standardized Root Mean Square Residual (SRMR) = 0.031) and reliable (ω = 0.89) indicator. Positive affect was based on how often participants felt happy, relaxed and full of energy, also with good measurement properties (χ^2 (df) = 80 (58), *P*-value = 0.023, CFI = 1.000, TLI = 0.999, RMSEA = 0.016 and SMR = 0.013, ω = 0.85). For both multi-item indicators, we extracted the factor scores with the original scaling. Life satisfaction was measured with a single item ("In summary, how satisfied are you currently with your life?") with possible answers ranging from 0 = 'highly unsatisfied' to 10 = 'highly satisfied.'

Country-level measures of the pandemic threat level included the daily incidence of COVID-19 cases and deaths (source: OurWorldInData) and the COVID-19 Government Response Stringency Index,[11] a sum index based on nine measures (school closing, workplace closing, cancelling of public events, restriction on gathering size, public transport closing, stay at home requirements, restrictions on internal movement, international travel control and public information campaigns) that quantifies pandemic-related containment and closure policies (range = 0–100). As the affect items refer to the last week before each interview, we calculated lagged 7-day smoothed values for all three time-varying country-level measures for the correlation analysis.

Statistical analysis

We plotted changes in country-level pandemic parameters and wave-specific mean values of SWB during the 2-year period and calculated Pearson correlation coefficients. For SWB, we applied demographic weights to obtain population-level representative values. All analyses were conducted in R (v4.1.2).

Results

The mean age of the sample in March 2020 was 40.0 (standard deviation [SD] = 17.5, range = 14–85) years, 51.2% were women, and 32.1% had completed high school education. The mean values of SWB in the pooled sample were 1.7 (SD = 0.6) for negative affect, 3.1 (SD = 0.9) for positive affect, and 6.6 (SD = 2.4) for life satisfaction.

Fig. 1 shows that the number of new COVID-19 infections remained low initially, increased in November 2020 (<8000 cases) and peaked toward the end of the observation period (>45,000 cases in March 2022). COVID-19 deaths were highest in November and December 2021. Stringency of Austrian mitigation measures also varied across the pandemic: they peaked with the first three lockdown periods (March to April 2020, November to December 2020 and January to February 2021) and were lowest during the summer 2020. As indicated by Fig. 1, the wave-specific mean values of SWB (n = 30) correlated with the incidence rate of COVID-19 deaths (negative affect = 0.69, positive affect = −0.70, life satisfaction = −0.47) and the Stringency Index (negative affect = 0.50, positive affect = −0.47, life satisfaction = −0.45). The incidence of COVID-19 cases correlated with wave-specific mean SWB to a lesser extent (negative affect = 0.43, positive affect = −0.31, life satisfaction = −0.38). The difference between the minimum and maximum wave-specific mean values amounted to 0.30 SD for negative affect, 0.26 SD for positive affect and 0.17 SD for life satisfaction. The mean negative affect, for example, fluctuated between 1.6 and 1.8, that is, it shifted in accordance with pandemic parameters somewhat away from reporting to 'never' (=1) have negative emotions towards having negative feelings 'on some days' (=2).

Discussion

More than 2 years after the World Health Organisation declared COVID-19 a pandemic, it is still not clear how population-level SWB responds to recurring pandemic waves. Analysing 30 waves of representative Austrian panel data collected between March 2020 and March 2022, we observed population-level changes in average SWB in accordance with rises and falls in new COVID-19 cases and deaths as well as with the stringency of lockdown measures. Our findings corroborate previous longitudinal studies documenting

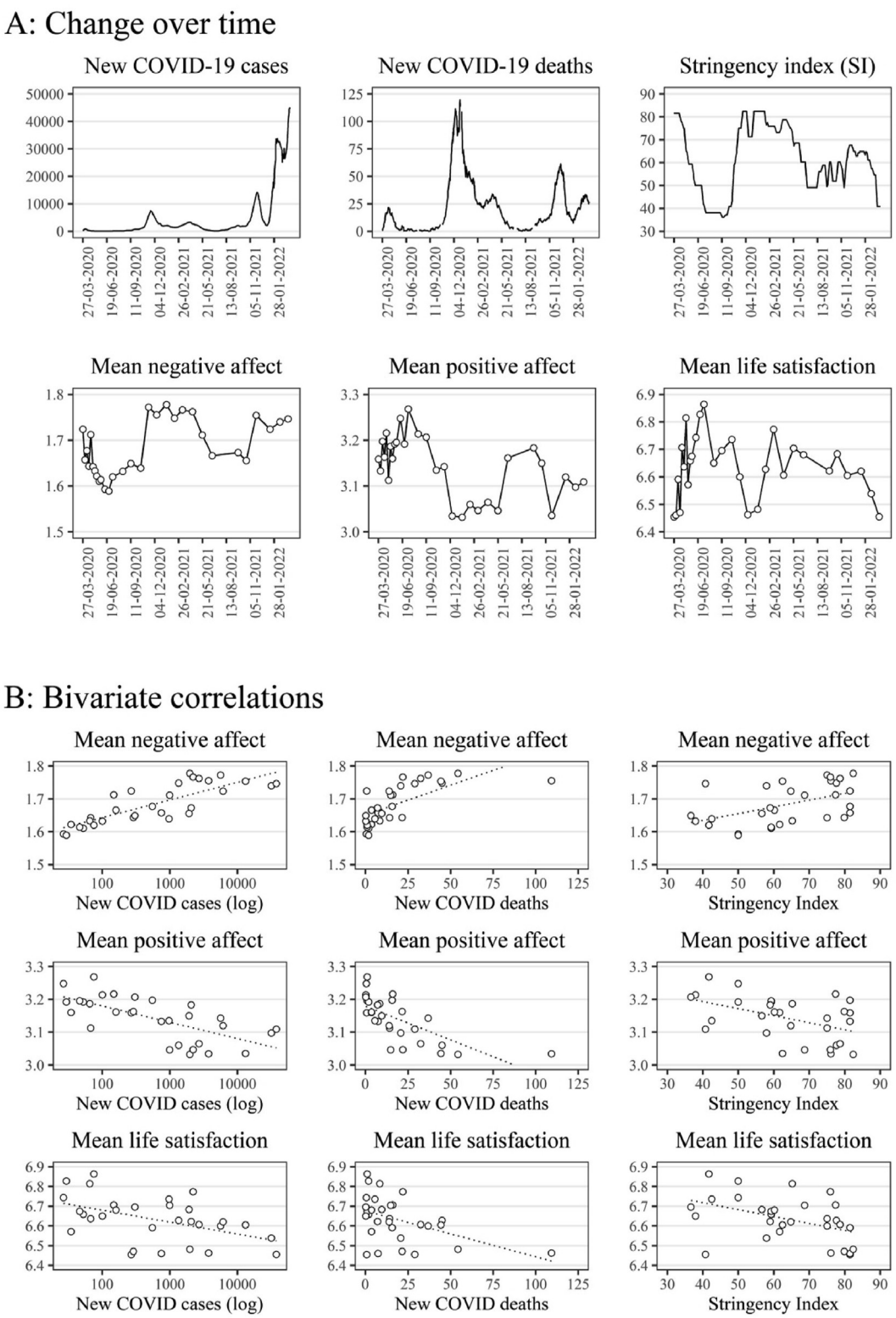

Fig. 1. Change in pandemic-related characteristics and subjective well-being over time (A), and bivariate correlations (B). The mean negative affect was calculated as a mean score based on confirmatory factor analysis of the frequency (1 = never, 5 = every day) with which six negative emotions (lonely, angry, depressed, nervous, anxious, sad) were experienced last week; the range of mean negative affect was 1.59–1.78. The mean positive affect was also calculated as a mean score based on confirmatory factor analysis of the frequency (1 = never, 5 = every day) with which three positive emotions (happy, relaxed and full of energy) were experienced last week; the range of mean positive affect was 3.03–3.27. The mean life satisfaction refers to the average reported life satisfaction (answers categories ranged from 0 = 'highly unsatisfied' to 10 = 'highly satisfied'); the range of mean life satisfaction was 6.45–6.86. New COVID cases refers to the smoothed number of new COVID-19 cases during the last 7 days; range = 26.9–37,628. New COVID deaths refers to the smoothed number of new COVID-19 deaths during the last 7 days; range = 0.29–109. Stringency index measures pandemic-related containment and closure policies; range = 36.6–82.4.

similar time-varying patterns in population mental health and SWB during the pandemic and contradict those showing mostly unchanged trajectories. Patel et al.[1] found that the prevalence of high psychological distress remained relatively stable between March and December 2020 for nine longitudinal studies in the United Kingdom, whereas they observed significant increases and decreases within only two studies. Applying latent class mixture modelling to one of those data sources – the Understanding Society Study – Ellwardt and Präg[4] reported that 24% of their sample had shown repeated elevation in psychological distress. Fancourt et al.,[12] estimating mean trajectories for a convenience sample drawn from the UK population, found declining depression and anxiety scores throughout 20 weeks after the first lockdown. Finally, analysing high-frequency longitudinal data from the YouGov survey (UK) and Google Trends, Foa et al. reach a conclusion similar to our findings. Although their measurements of negative affect are different from ours, the authors observed that changes therein mirror those in daily COVID-19 case fatalities between January 2020 and July 2021.[6]

SWB, especially when operationalised as life satisfaction, is associated with objective health status.[13] In addition, SWB is linked to objective and subjective socio-economic status.[14] Thus, SWB is considered to be key for a healthy and productive society.[15] Against the backdrop of the SWB literature, it can be argued that the COVID-19 pandemic has not only directly harmed population health via COVID-19–related illness and death but also indirectly impacted population health and productivity by affecting population-level SWB.

The strengths of our short report stem from the quality of the data source and the valid and reliable measurement of SWB. As a limitation, we are lacking prepandemic observations and thus cannot describe initial or sustained effects of the COVID-19 pandemic on SWB. Also, given that all interviews were conducted online, it is likely that the data are not representative for the older population despite the use of demographic weights.

In this short report, we focussed on describing population-level changes in the three components of SWB (negative and positive affect, life satisfaction) and their relation to the country-level number of new COVID-19 cases and deaths as well as stringency of government responses to the pandemic. We found that all three measures of SWB correlated over time with the pandemic threat level and mitigation measures. The unique data source used in the current study, although limited to the Austrian context, offers ample opportunities for future public health research to test hypotheses about causal pathways involved in the effects of the COVID-19 pandemic on SWB.

Author statements

Ethical approval

None required.

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Competing interests

None declared.

Data and code availability

Data from the Austrian Corona Panel Project are freely available for scientific research via the University of Vienna (pre-releases: https://viecer.univie.ac.at/coronapanel/austrian-corona-panel-data/access-request/) as well as via the Austrian Social Science Data Archive: https://doi.org/10.11587/28KQNS. Data on the Stringency Index are available from the University of Oxford, and data on daily COVID-19 case numbers are available from OurWorldInData. The R code and Stata code are available via OSF (https://osf.io/pfmv3/).

Author contributions

M.O. and E.W. conceived the study. E.W. prepared and analysed the data using R. M.O. reviewed the R code. M.O. and E.W. wrote the article. M.O., E.W. and T.E.D. provided critical feedback on the article drafts and approved the final version of the article.

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