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Rhythms of the day: How electronic media and daily routines influence mood during COVID-19 pandemic

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Abstract

This study aims to investigate how daily activities affect mood in the context of social distancing guidelines enforced during the COVID-19 pandemic. Using Ecological Momentary Assessment (EMA) administered four times a day during a 2-week period, we asked participants ($N = 91$) about their mood and the activities they engaged in. Seven individuals were selected for a follow-up, open-ended questionnaire. Results show that a stable routine, including physical exercise, hobbies, regular sleep hours, and minimal time spent in front of the computer, helps maintain a good mood. Coping strategies such as planning and scheduling help keep routines and circadian rhythms stable. Face-to-face contact is associated with a more positive mood, while similar interaction through electronic communication has a less positive effect. We observe an effect related to the infodemic phenomenon: Daily reports on COVID-19 cases and deaths affect mood fluctuations. This is an important consideration in shaping public information policies.

KEYWORDS

COVID-19, daily routines, ecological momentary assessment, infodemic, mood, social distancing

INTRODUCTION

The Coronavirus disease (COVID-19) has affected everyday life on an unprecedented scale. To prevent rapid spread of the infection, local governments worldwide have enforced a social distancing policy recommended by the World Health Organization, resulting in a large percentage of the global population living in isolation for extended time periods. Enforcement of radical lockdown measures was necessary for physical health. However, it has led to the global socio-economic crises and psychological stress (Serafini et al., 2020). The stay-at-home order has resulted in financial hardships, job loss, and radical change in people's lifestyles, including deprivation of social support, loneliness (Tull et al., 2020), and increased uncertainty about one's own physical, social, and financial fitness (Chtourou et al., 2020).

In this study, we analyzed the life of individuals during the lockdown period to understand what shapes their well-being and how to improve it. We focused on intraindividual variability of mood across different intervals and momentary factors that affect it. Our participants were young adults living in Poland during the imposed lockdown. Using an ecological momentary assessment (EMA) design, we studied the dynamics of momentary mood changes in response to daily activities, contacts (both offline and online), and COVID-19 statistics published in the media. To further explain those changes, we enriched quantitative EMA data with qualitative analyses of reports written by our participants. We identified the strategies that people implemented to regain the sense of agency and cope with the hardships of social isolation. Based on these results, we formulated general recommendations for mitigating adverse psychological effects of lockdown measures.

The longitudinal character of the study allowed for a better understanding of mechanisms underlying the effect of isolation on mental health. First, it allowed us to inspect how the structure of activities within longer time periods (a day and a week timeframe) affected participants' mood. As a result, we were able to recognize patterns of behavior and sequential organization of activities that related to increased or decreased mood. Second, by tracking intraindividual mood variations, we were able to rule out the variability in mood levels between subjects. The between-subject variability can be linked to individual differences, not to external factors, such as differences in daily COVID-19 statistics. By using the within-subjects design, we were able to distinguish external factors more accurately.

Well-being in the pandemic

Studies show that during the pandemic, global population was affected by heightened levels of psychological distress, anxiety, and depression (de Lima et al., 2020; Debowska et al., 2020; Gosavi et al., 2020; Serafini et al., 2020; Tull et al., 2020). Those less affected were still subject to lowered mood and, which translated to impaired overall well-being. Terry et al. (2020) characterized significant differences between mood responses during COVID-19 as compared with normative values developed before the outbreak. The authors estimated that approximately 33% of respondents showed an increased risk of clinically recognizable mood-related disorders, marked by heightened levels of tension, depression, anger, fatigue and confusion, and lowered vigor as compared with standards. Similarly, Ammar et al. (2020) estimated an increase in depressive mood symptoms to 44.9%, as compared with the data between “during” and “before” home confinement. Ingram et al. (2020) investigated behavioral patterns during COVID-19 lockdown that had a negative impact on respondents' mood. Results confirmed that bad diet, low levels of

physical activity and low sleep quality led to a more negative mood. Lades et al. (2020), who studied factors affecting intraindividual mood variability, confirmed the positive role of physical exercises and outdoor activities on the mood reported during COVID-19-related confinement.

Numerous studies have demonstrated that individual self-reported mood is influenced by current events of daily life (Clark & Watson, 1988; Weinstein & Mermelstein, 2007). When people experience stress and trauma, such mundane events may either help them cope with the difficulties or act as additional aggravating stressors (Hou et al., 2018). In their Drive to Thrive theory, Hou et al. (2018) compare human reaction to stress to elasticity of fabrics. If the fabric is supported by a tight weaving of everyday routines, the resilience of the "material" under stress is high. Even if some threads in the fabric (daily activities) break, this can be compensated by consolidating other threads or weaving new ones (introducing new activities, for example, a new hobby). The authors further categorize activities as either primary routines (eating, sleeping, and personal hygiene) and secondary routines (work, hobby, social life). In conditions of high emotional strain, maintaining and regularizing the overall daily routine and prioritizing primary routines having the most direct impact on mental health becomes a key factor in warranting an adaptive, healthy reaction to stress. This fully applies to the COVID-19 pandemic, when people were not only subject to prolonged stress, but also many of their regular activities were severely limited due to the introduced sanitary restrictions (Hou et al., 2020). Strategies of adaptation of daily routines to new circumstances should be related to the overall well-being.

Another factor that might have an impact on psychological well-being and mood is what the media reports about the state of the pandemic itself—how serious the disease currently is and how strongly lockdown measures affect participants' daily lives (Debowska et al., 2020). The infodemic, understood as a flood of both accurate reports and misinformation about the disease (Zarocostas, 2020), is of genuine concern during the ongoing COVID-19 pandemic. It can further exacerbate psychological stress and anxiety related to the pandemic itself (Khan et al., 2020). In their study on psychological adjustment during the COVID-19 pandemic, Ellis et al. (2020) found a correlation between the time spent on social media and depressive symptoms in adolescents. Abundance of information in the news and social media causes people to constantly read and share the news about COVID-19 (Yu et al., 2020). Furthermore, using social media may help alleviate anxiety by sharing useful information within one's social network (Wiederhold, 2020). Thus, the actual influence of the infodemic on mental well-being remains to be studied.

Our study

We focused on factors shaping well-being during the lockdown from an individual's perspective. We used EMA design to sample participants' experiences during the day as they appear naturally. In the EMA questionnaire, sent four times a day, we asked about mood, performed activities, and social contacts made both offline and online. Understanding this timescale of daily activities and emotional reactions gave us a better idea of how global conditions (state of the pandemic, sanitary restrictions) affect specific conditions of individuals' life. Quantitative data collected through EMA were supplemented by qualitative analyses of participant's reflections and recollections of their time in isolation.

We formulated hypotheses regarding the effect of specific daily activities on mood. In line with previous work, we expected that engagement in physical exercises or hobbies should be positively associated with well-being while working or studying might lower participants' mood

(Lades et al., 2020). Stable daily routines, especially those related to maintaining physical wellness, that is, sleep and rest, physical activity, and household chores (cooking and cleaning), should have a positive effect on well-being (Hou et al., 2020). Electronic media might provide much-needed social contact. It should improve mood, but it is an open question as to whether they are as effective as face-to-face contact. As our study was conducted during the lockdown period, we expected external events, such as a large increase of new COVID-19 cases, to have an impact on participants' mood. We examined how weekly and daily routines and organization of activities in time affected the mood, expecting that regularization and structured daily routines would predict a better mood of the participants.

METHOD

Participants

We based our sample size on the basic power analysis. In order to detect within-subject change in mood with effect size 0.3 using paired t test with power 0.8 and a level of significance of 0.05, we need a sample of size 90.

We recruited participants through social media, targeting mostly young people proficient in using Internet technologies. Willing participants were invited for a short interview conducted as a video meeting or a phone call. During the interview, the procedure of the EMA study was explained to them and they were asked whether they would be able to follow it. We paid participants 100 PLN (after taxes) for completing the study (they were allowed to miss at most eight reporting occasions during the 2-week study). A small number of selected participants was further recruited to participate in a follow-up qualitative study for which they were paid 150 PLN (after taxes). All participants filled in an informed consent form. All procedures were approved by the ethical committee of the Faculty of Psychology, University of Warsaw.

All participants were Polish and native speakers of the Polish language. Most of them resided in Poland during the study (with two exceptions). We recruited 94 individuals, out of which one person explicitly resigned from the study and two people did not complete any EMA questionnaires. The final sample consisted of 91 individuals. Among these, 31 individuals were males and 59 females (one person did not fill in the initial questionnaire and thus did not disclose their gender). The average age of a participant was 27 (minimum: 19, maximum: 54, median: 24, standard deviation: 7.67). Of the sample, 12% lived alone during the lockdown, 12% had children, and 58% had a higher education or were university students.

The group was relatively homogeneous and not representative of the Polish population—a limitation of the current study. However, as they all used Internet technologies on a daily basis, they formed a proper group to investigate the effects of electronic media on well-being.

Data were collected between May 5, 2020, and June 30, 2020, (participants were recruited continuously and started studying at different dates). This period corresponded to the gradual relaxation of lockdown measures introduced in Poland in Spring 2020 to combat the COVID-19 pandemic. The third stage of loosening restrictions was introduced on May 18, 2020, and the fourth (and final) stage on May 30, 2020. General recommendations concerning social distancing were still in place on June 30, 2020. Schools and universities provided only online learning courses, while many companies switched to fully remote work. The severity of the pandemic itself was relatively low in Poland at this time with a total of less than 35,000 confirmed

COVID-19 cases for a country with a population of 38 million people. Daily lives of most of the people were more likely to be affected by the preventive measures rather than direct contact with the disease.

Measures

We used data from EMA questionnaires distributed to each participant four times a day (at 4 h intervals) for 14 consecutive days. Questionnaires were prepared using Qualtrics Survey platform (Qualtrics, Provo, UT). We distributed links via email using a custom script. Time of the last daily questionnaire was negotiated individually with participants to target their last waking hour in their usual daily routine. This way we covered approximately 16 h of daily activity for each participant. Of the sample, 32% of participants returned all 56 questionnaires, 54% returned between 50 and 56 questionnaires, 10% returned between 40 and 50 questionnaires, 4% returned between 23 and 40 questionnaires. Missing questionnaires were treated as if no activity took place at a particular time (since both dependent variables and predictors were missing, we could not include those time points in the analysis).

Participants reported their activities (within 12 predefined categories) and social contacts they had during that time via electronic media (see Supporting Information S1 for the detailed questions). They indicated their general mood on a visual slider scale with a reading between 0 and 100 ("very bad mood" to "very good mood"). This kind of simple univariate scale was reported in previous EMA studies as having good psychometric properties and being both sensitive and specific when used to detect recurrent depressive disorders (van Rijsbergen et al., 2014).

We distinguished 12 categories of activities constituting the daily routines: *sleep and rest*, *household activities and chores*, *family life*, *social life*, *physical exercises and taking care of health*, *entertainment and culture*, *hobbies* (e.g., DIY, painting), *self-development* (e.g., deepening one's own interests), *studying and education* (e.g., participating in lectures, homework), *professional work*, *shopping and official matters*, and *volunteering*.

The choice of categories was influenced by both the existing literature on daily mood and routines maintained during the pandemic (Lades et al., 2020) and the research on time spent on different activities in Poland (among other countries) (Fisher & Robinson, 2010). We also conducted pilot discussions in focus groups consisting of researchers, students and their peers to select activities likely to be influenced by the COVID-19 pandemic. This allowed narrowing the poll to 12 types of daily activities included in the study. Following the categorization of the Drive to Thrive Theory (Hou et al., 2018), selected activities can further be qualified as primary routines related to basic survival needs (*sleep and rest*, *household activities*, *physical exercises*, and *taking care of health*) and secondary routines related to satisfying one's own preferences and achieving goals (*professional work*, *hobbies*, etc.).

The data that support the findings of this study are openly available in figshare at https://doi.org/10.6084/m9.figshare.14925351.v2 (Zubek et al., 2021).

Data analysis

Analyses of participants' mood were performed on a couple of different levels. First, we analyzed within-subjects change of average daily mood explained by daily increase of new COVID-

19 cases. This answered the question how external events and their reporting in the media affect population mood. Second, we analyzed within-subjects change of hourly mood explained by the activities and contacts they engage with at a particular moment. This told us which activities are related to momentary change of mood as they happen. Third, we analyzed between-subjects differences in average mood during the 2-week study explained by the regularity of daily routine and relative rates of their activities sorted into the 12 categories. This analysis helped to answer the question on how to compose a healthy routine. For within-subjects analyses, we used mixed-effects linear regression. For between-subjects analyses, we used standard linear regression, where independent variables were statistics derived from individual participants' time series. The analyses were performed using Python statsmodels package (Seabold & Perktold, 2010).

Mood was self-reported by our participants on a visual 0–100 scale reflected by their subjective experience. There was no objective "average" mood. When participants had to report their momentary mood on the scale, they probably recalled recent experiences as a point of reference. Following the suggestion by Hasselman and Bosman (2020), we adopted a simple transformation called change profile (CP) to deal with this kind of data. The idea was to calculate a cumulative sum of deviations of the current mood from a previous moving window average. Large mood CP means that mood was systematically increasing for some period of time. Local maxima of mood CP correspond to turning points where the trend goes from an increasing trend to a decreasing trend. Change profile transformation simultaneously smooths out large mood fluctuations and assures that the reported mood values are only compared with a local reference level. Change profile at time point $j > W - 1$ can be calculated with the following formula:

$$CP_j = \sum_{i=W-1}^{j} \left(x_i - \left(\frac{1}{W} \sum_{k=i-W+1}^{i} x_k \right) \right),$$

where W is the width of the moving window (time span over which mood is averaged). The window is right-aligned, which means that the current time point is the right-most point of the window. We used $W = 6$, which means that local mood changes were compared with an average mood from the last 1.5 days.

Mood CP is meaningful primarily as a characteristic of a given time point. When positive mood CP scores occur at the same times as a particular activity, it suggests that this activity helps to maintain a trend of mood increase. We used mood CP as dependent variables in within-subjects analyses concerning reported COVID-19 cases and momentary activities. Average mood CP for a single participant represents a general trend of mood change (increase or decrease) during the 2-week study period. However, it is not a good measure of how well an individual copes with adverse circumstances overall (a person with a stable mood—high or low—would have mood CP close to 0). Thus, in between-subjects analysis concerning routine organization we used simple mood average as the dependent variable.

We represented daily routine organization through its composition and its regularity. Routine composition was operationalized as relative rates of different activities. For example, if a category A has rate 0.5, it means that 50% of all activities reported by this participant belong to category A. To represent the regularity of a daily routine ("rhythms of the day"), we calculated statistics inspired by Recurrence Quantification Analysis (RQA) (Marwan et al., 2007). For each participant, let E_i be a set of activities that they engaged in at time point i ($i = 1, 2, ..., n$). Let C be a $n \times n$ matrix with elements $C_{ij} = |E_i \cap E_j|$ (value of element ij is a

number of common activities between time points i and j). Matrix D is a binarized version of C: $D_{ij} = 1$ iff $C_{ij} > m$, 0 otherwise, where m is the average of all elements of C ($m = 1/n^2 \Sigma_k \Sigma_l C_{kl}$). The rationale here is as follows: If the sets of activities for two time points are similar enough (more than average similarity of activities for a given person), they are considered a case of recurrence. Next, we define laminarity, a statistic representing stability, as follows: LAM_l is a fraction of non-zero points in D that form consecutive horizontal lines of length $\geq l$. Laminarity is a measure capturing stationarity of behavior: If a participant has a tendency to engage in the same activities over longer intervals, laminarity will be larger. Threshold l is a parameter regulating the length of the interval over which stable behavior occurs. In the context of our study, LAM_3 measures how often an activity spans more than half a day. A person who is constantly mixing work and entertainment—for example, doing some work in the morning, relaxing in the afternoon, then doing some more work in the evening—will exhibit low laminarity. A person who is working hard during the week and relaxing during the weekend will exhibit higher laminarity. We calculated overall laminarity for the set of all possible activities—as a general measure of daily routine organization—and then separately calculated laminarities for individual activity categories. Descriptive statistics of all variables used in the qualitative analysis can be found in Supporting Information S3.

Qualitative study

We designed a questionnaire composed of 14 long, open-ended questions (see Supporting Information S2). The aim of this part of the study was to deepen our understanding of moods, emotions during the lockdown period, shifts in the quality of interpersonal contact, and attitudes toward modern, remote, means of communication, social media, and media in general. We invited nine participants to a questionnaire study, post lockdown period, and post quantitative data collection. Of these, seven participants completed the questionnaire and were included in the analysis, one person was excluded due to the low quality of the reports and lack of completion within time, one person did not complete the questionnaire at all. The average age of the study group was 22.6 years with a range of 21–25 years old and consisted of two men and five women. All participants had secondary or higher education. The inclusion criteria for participants to be invited to the qualitative part of the study were chosen based on obtained data analysis in accordance with previously defined criteria, such as:

- Diverse patterns in EMA results (including stable high participants, stable low participants, and participants with mood swings).
- Linguistic richness and insightfulness of reports during the main phase of the study.
- Reflexiveness and introspective quality of the previous reports.

In order to reduce potential bias, collected data were analyzed by two independent, double-blinded researchers. Double blinding in qualitative, phenomenological research was called for by Froese et al. (2011) as a method to increase the validity of the analysis. Our analysis method was inspired by Interpretative Phenomenological Analysis (McGrath & Smith, 2005; Pietkiewicz & Smith, 2014). The analysis involved multiple readings of the written reports of the participants, making personal notes, and tagging reports with themes. Delineated themes were subsequently extracted, and put into previously prepared tables. Next, two independent analysts discussed

differences in defined themes and unified interpretations of the reports. All differences were resolved, resulting in unified, streamlined analysis in which four themes were shown to be particularly interesting: *infodemic*, *social contacts*, *daily activities*, and *general daily routines.*

RESULTS

General population mood and infodemic

Our study spanned over a period of almost 2 months. We started with the analysis of within-subjects daily mood variability over this time period in the light of the reported COVID-19 statistics. First, we calculated change profiles (CP) of mood for individual participants. Next, we calculated daily average of mood CP for each of the participants separately. As controls of the pandemic severity, we chose daily numbers of new COVID-19 cases and deaths in Poland. As the perception of these two statistics was subjective and relative to current levels, we calculated their CPs too. Figure 1 presents CPs of all three variables. At the first glance, there appears to be a relationship between mood CP and new cases CP: Local minimum of mood CP on June 8 co-occurs with a peak in new cases CP and high mood in the last week of June corresponds to low new cases CP.

In order to verify quantitatively potential association between mood CP and reported pandemic statistics, we fit a mixed-effects linear model with random intercept for each participant predicting mood CP. For independent variables, we included new cases CP and new deaths CP. For an additional control, we introduced a binary variable differentiating between weekdays and weekends. This followed an observation that numbers of reported COVID-19 cases in Poland were systematically lower on weekends, and that weekends may be associated with higher overall mood. Coefficients of the fitted model are presented in Table 1. Apart from the weekend effect, there is a visible negative effect of new cases CP ($b = -0.046$, $p = 0.005$), and a

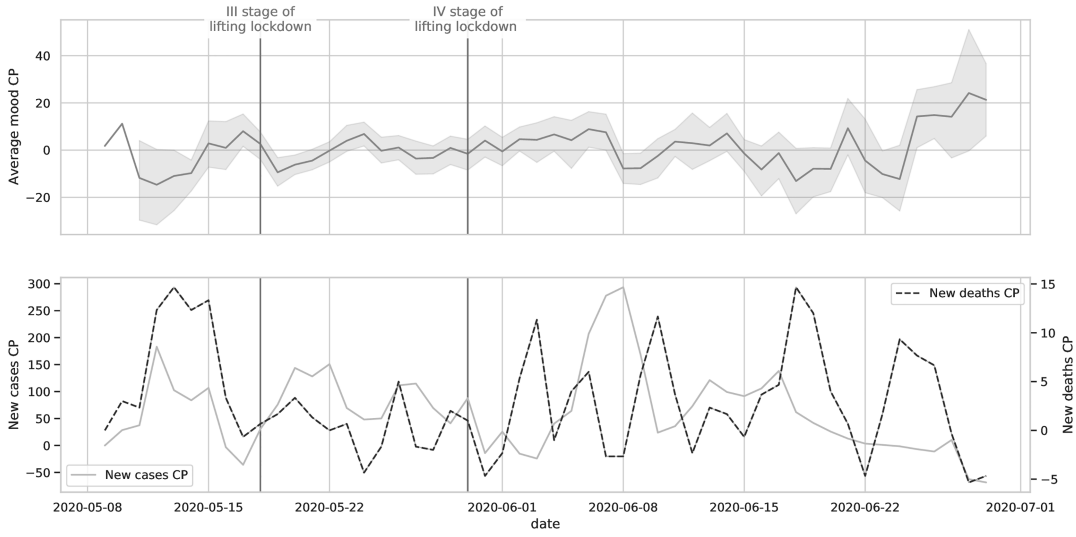

FIGURE 1 Average daily mood CP (with standard deviation) and CPs of daily new COVID-19 cases (solid line) and deaths (dashed line). Important stages of loosening sanitary restrictions are marked on the plot

TABLE 1 Results of the mixed effects linear model showing the effect of reported daily new COVID-19 cases and deaths CP on the mood CP

Fixed effects	***b***	***SE*(*b*)**	***t***	***p***	**95% CI**	
Weekend	0.140	0.036	3.888	0.000	0.070	0.211
New cases CP	−0.046	0.017	−2.802	0.005	−0.079	−0.014
New deaths CP	−0.035	0.017	−2.064	0.039	−0.069	−0.002
Random effects		***SD***		**95% CI**		
Participant		0.734		0.853		0.990

Note: The model contained $N = 1255$ observations from $n = 91$ participants, with between 7 and 15 observations per participant (average 13.8). A total of 361 observations come from weekends (28.8%). The intraclass correlation coefficient was equal to 0.71, and there was significant variability in intercepts across participants, $\chi^2(1) = 1167.34$, $p < 0.0001$, justifying the use of a mixed model. The full model showed a significantly better fit than the model with only the random effects, $\chi^2(3) = 36.29$, $p < 0.0001$, and explained 71.3% of variance, while the fixed effects alone explained 0.9% variance ($R^2_c = 0.713$, $R^2_m = 0.009$; see Nakagawa et al., 2017). The dependent variable and the numerical predictors ("New cases CP" and "New deaths CP") were standardized, while "Weekend" remained dummy coded. See Supporting Information S5a for visualization of parameter estimates.

slight negative effect of new deaths CP ($b = -0.035$, $p = 0.039$). Since the overall severity of the pandemic in Poland at this period of time was low, it is unlikely that the changes in mood result from a direct contact with the disease. It is rather the effect of media reports. Our results suggest a direct association between reported statistics and day-to-day mood.

Individual reactions to infodemic

Our understanding of the relation between COVID-19 statistics and mood was deepened by the qualitative study. Infodemic, understood as a flood of information about the disease (WHO, 2020), was reflected in the obtained written reports. Particularly, when asked about the beginning of the pandemic in the first question, three out of seven participants described how a flood of information made their life difficult. It is notable that each of those reports was also assigned the theme "anxiety or fear," by the analysts.

Participant 26 begins with descriptions of her fear caused by the feeling of general disinformation. She reports that it was bad for her everyday functioning: "At the very beginning of the lockdown, I was scared. I didn't know what to expect and how long it would take. I received a lot of different information and rumors, which certainly did not help my functioning."

Participant 8 goes into more detail about different feelings co-occurring with phenomena of infodemic, all of which are centered around feelings of anxiety or fear. The habit of checking for new updates appeared to become compulsory or "intrusive" as the participant says, and became a pattern of behavior that was a source of additional distress. The beginning of the pandemic appeared like a very important event, raising uncertainty and taking its toll on the participant's feeling of safety: "At the beginning of the lockdown, I checked social media very often for new news about the coronavirus. Such intrusive phone checks were very depressing and made me feel overwhelmed by the situation. The most evident feelings that accompanied me in March and April were uncertainty, fear, helplessness, and the feeling of being locked in a cage."

The second set of reports associated analyses with the theme of infodemic and provided answers to the question (Q2) about habits, coping mechanisms, and adaptations during the

lockdown. We interpreted these reports as descriptions of later periods than the ones elicited by the first question. Participant 26, in her previous report, describes the way she dealt with infodemic symptoms. Being displeased with the quality of the statistics presented in the media (she mentions COVID-19 incidence charts, specifically), she started running her own statistical analysis. Notably, Participant 26 lists her statistical analysis as one of the means of dealing with the overall chaos and anxiety she experienced during the lockdown. Participant 26 also reports, in response to the third question, that she had to stop watching TV: "What is also important is the fact that I did not watch TV during the day. My experience is that I could waste a whole day watching programs instead of doing something constructive." She did not reveal the reasons or motives behind this behavior. However, based on her previous reports, we think that, at least in part, it can be attributed to her issues with infodemic.

Participant 8 generally formed a lot of successful coping mechanisms, but in response to the second question, she again reported issues with her dependency on a constant flow of COVID-19 information. Contrary to Participant 26, Participant 8 did not form ways to directly deal with anxiety caused by infodemic. Rather, she coped with stress by means such as physical exercises and meditation. Later, she reported that her dependency sometimes caused feelings of helplessness and fearfulness. She described these feelings as being "paralyzing": "It has become a habit for me to check the phone every now and then to see how the situation is changing - it made me feel helpless and fearful - sometimes it felt paralyzing."

To sum up, Participants 26 and 8 told two different stories about the phenomenon that we call "infodemic." Participant 26 had a strong feeling of chaos and anxiety. She was displeased with the quality of information she found in the media. Therefore, her coping mechanisms involved increasing control over the situation, whenever she could. She kept the detailed schedule of her day during the lockdown, resigned from watching TV, and counted COVID-19 data herself. Participant 8 described lack of control and revealed the details of her media dependency, which caused "*paralyzing*" feelings of helplessness and fear. Her coping mechanisms were quite different from Participant 26; that is, instead of trying to control surrounding chaos, she tried to increase her overall well-being with meditation, physical exercises, learning new skills, and improving her diet. Third perspective on infodemic is reported by Participant 15. She described symptoms of infodemic, and although her story is of a person not directly affected, her significant others clearly were. She felt the outside pressure from her family to hoard supplies, which was caused by the fear and rumors circulating at the time that shops and banks will face shortages of essential items. The participant's significant others clearly were victims of misinformation, and out of fear tried to convince her to take those unreasonable precautionary measures. Participant 15 herself did not seem to be directly affected emotionally or practically by infodemic. In response to question 8, she reported: "Were any emotions or thoughts repeating? Well, the live ones, I have every day. I haven't had any dramatic, panicky, or emotional ones." She was not unaffected by isolation to a great extent, because of her housing situation (living with a partner and friends). She described dependency on social media, but analysts were not able to relate this report to the phenomenon of infodemic. Her coping mechanisms involved increasing her overall well-being, for instance improving diet and physical exercises.

Daily activities

Next, we analyzed within-subjects mood changes in relation to particular activities performed by the participants. We fitted a mixed-effects linear model predicting mood CP with random

intercept for each participant, using occurrences of daily activities or electronic communications from the prespecified categories as predictors. Coefficients of this model are reported in Table 2. First, we only considered effects connected with particular daily activities. Consistent with our hypotheses, physical exercises ($b = 0.106$, $p < 0.001$), hobbies ($b = 0.095$, $p = 0.002$), and self-development ($b = 0.055$, $p = 0.052$) were positively associated with the mood CP, while engagement in work ($b = -0.116$, $p = 0.004$) and formal education ($b = -0.108$, $p < 0.001$) had negative effects on mood CP.

The results are congruent with conclusions from the qualitative study. In the open questions of the follow-up questionnaire, physical activity was mentioned quite often. In the question concerning one particularly important activity in lockdown (see Supporting Information S2, Q3), physical activity appeared in four out of seven answers. In other answers, three out of seven participants considered regular physical exercises crucial for maintaining their psychophysical well-being. Second repeating category, which positively correlated with mood, was hobby and self-development. When asked about new daily activities relevant for the organization of the day (Q2), our participants mentioned: reading, learning new skills (like cooking and

TABLE 2 Results of the mixed effects linear model showing the effects of daily activities on the mood CP

Fixed effects		***b***	***SE* (*b*)**	***t***	***p***	**95% CI**	
Activity	Sleep and rest	−0.013	0.020	−0.676	0.499	−0.051	0.025
	Household activities	−0.011	0.019	−0.589	0.556	−0.048	0.026
	Physical activity	0.106	0.026	4.150	0.000	0.056	0.156
	Entertainment and culture	−0.002	0.022	−0.097	0.923	−0.045	0.041
	Hobby	0.095	0.031	3.097	0.002	0.035	0.154
	Self-development	0.055	0.028	1.942	0.052	0.000	0.110
	Shopping and errands	0.009	0.030	0.313	0.755	−0.049	0.067
	Volunteering	0.051	0.095	0.537	0.591	−0.135	0.237
	Work	−0.116	0.041	−2.853	0.004	−0.196	−0.037
	Education	−0.108	0.023	−4.780	0.000	−0.153	−0.064
	Family life	0.110	0.024	4.621	0.000	0.064	0.157
	Social life	0.212	0.036	5.918	0.000	0.142	0.282
Electronic communication	Family	−0.146	0.041	−3.582	0.000	−0.226	−0.066
	Social	−0.081	0.044	−1.854	0.064	−0.167	0.005
	Work or study	0.019	0.045	0.418	0.676	−0.069	0.107
Random effects		***SD***		**95% CI**			
Participant		0.845		0.733			0.975

Note: The predictors were divided into activities and electronic communication. The model contained $N = 4660$ observations from $n = 91$ participants (23–56 observations per participant, average 51.2). The intraclass correlation coefficient was equal to 0.68, and there was significant variability in intercepts across participants, $\chi^2(1) = 4680.94$, $p < 0.0001$, justifying the use of a mixed model. The full model showed a significantly better fit than the model with only the random effects, $\chi^2(15) = 176.26$, $p < 0.0001$, and explained 69.4% of variance, the fixed effects alone explained 1.3% of variance ($R^2_c = 0.694$, $R^2_m = 0.013$; see Nakagawa et al., 2017). The dependent variable was standardized, while the predictors remained dummy coded. See Supporting Information S5b for visualization of parameter estimates.

podcasting), meditating, watching movies, playing video games. We hypothesized that these various activities helped cope with the stress related to the pandemic situation, as well as in organizing daily activities. Another category that appeared in four out of seven participants' answers and was negatively correlated with mood and general well-being was overwork and tiredness caused by time spent in front of a computer (work, studies, communication, and entertainment). Generalizing, we may say that activities performed away from the computer had a positive impact on mood, while those requiring the use of a computer had a negative impact.

Social contacts and electronic communication

The rest of the coefficients of the mixed-effects model presented in Table 2 are connected with social contacts. Unsurprisingly, engagement in family life ($b = 0.110$, $p < 0.001$) and social life ($b = 0.212$, $p < 0.001$) has a positive effect on mood CP, the effect being stronger for social life. However, when contact with family members occurred via electronic means of communication instead of face-to-face communication, the positive effect was reduced ($b = -0.146$, $p < 0.001$).

In the follow-up open questionnaire, we directly enquired about the impact of the lack of touch and physical contact in social contacts mediated by electronic technologies (see Supporting Information S2, Q12). Five out of seven participants reported discomfort about the lack of physical contact which made non-verbal communication more difficult, led to misunderstandings, or impeded reconciliation. For example, Participant 13 wrote: "it was definitely an obstacle when arguing with a boyfriend, you can't come over and hug afterwards, and it's also much harder to sense the mood of the other person when it's all online." Participant 28 reported: "I missed cuddling at times because I am a person who loves touch and physical closeness to other people."

General daily routine

The third level of the analysis concerned the general organization of daily routine, not just reactions to particular daily events. To investigate the situation on this timescale, we fit a linear regression model predicting the average participant mood based on the general structure of daily routine. As predictors, we included laminarity of participant overall activity (using threshold equal to 3, i.e., LAM_3), laminarities of individual activities (again LAM_3), and rates with which particular activities occurred relative to the overall number of events. While for individual activities the threshold for laminarity equal to 3 was chosen because of sparsity of recurrence matrices, for the overall activity, the thresholds 3, 4, and 5 have proven to give almost identical results (see Supporting Information S6). Hence, for parsimony, we decided on the common threshold of 3. Additionally, we controlled for participant gender and age, as it might have an influence on the average mood reported. The model explained a significant portion of variance, $R^2 = 0.41$, adj $R^2 = 0.23$, $F(21, 68) = 2.287$, $p = 0.006$. Coefficients of this model are presented in Table 3. Longer periods of stable behavior (LAM_3, $\beta = 0.331$, $p = 0.006$) were connected with better mood. This may be considered a form of daily routine organization. Among particular activities, large relative rates of hobby activities ($\beta = 0.344$, $p = 0.013$) and family life ($\beta = 0.447$, $p = 0.016$) were positively associated with mood. Sleep and rest rate ($\beta = 0.357$, $p = 0.025$) had a positive association with mood, but its laminarity was negatively related to

TABLE 3 Linear model showing the effects of structure of the daily routine on the average mood of the participants

Variable		β	SE(β)	t	p	95% CI	
LAM_3	**Overall activity**	**0.331**	**0.117**	**2.841**	**0.006**	**0.099**	**0.564**
LAM_3	Sleep and rest	−0.319	0.138	−2.309	0.024	−0.595	−0.043
	Household activities	−0.059	0.188	−0.315	0.754	−0.435	0.316
	Physical activity	−0.302	0.121	−2.498	0.015	−0.543	−0.061
	Entertainment and culture	0.470	0.171	2.739	0.008	0.128	0.812
	Hobby	−0.016	0.138	−0.114	0.909	−0.291	0.260
	Self-development	0.103	0.120	0.857	0.395	−0.137	0.342
	Work	−0.245	0.177	−1.382	0.172	−0.599	0.109
	Family life	−0.254	0.143	−1.779	0.080	−0.538	0.031
	Social life	−0.054	0.134	−0.401	0.690	−0.322	0.214
Rate	Sleep and rest	0.357	0.156	2.287	0.025	0.046	0.668
	Household activities	0.127	0.179	0.708	0.481	−0.231	0.484
	Physical activity	0.283	0.150	1.885	0.064	−0.017	0.583
	Entertainment and culture	−0.309	0.191	−1.617	0.110	−0.690	0.072
	Hobby	0.344	0.135	2.553	0.013	0.075	0.613
	Self-development	0.263	0.148	1.778	0.080	−0.032	0.559
	Work	0.210	0.198	1.059	0.293	−0.186	0.606
	Family life	0.447	0.180	2.480	0.016	0.087	0.806
	Social life	0.153	0.134	1.146	0.256	−0.114	0.421
Age		0.176	0.123	1.428	0.158	−0.070	0.421

	b	*SE*(*b*)	*t*	*p*	95% CI	
Gender (male)	−0.490	0.217	−2.256	0.027	−0.923	−0.057

Note: For each of the daily activities, rate and LAM_3 were entered into the model (see Methods). Additionally, the LAM_3 for overall activity was used. The model contained $n = 90$ observations. The model was significant, $F(21, 68) = 2.287$, $p = 0.006$, with $R^2 = 0.41$. See Supporting Information S5c for visualization of parameter estimates.

mood ($\beta = -0.319$, $p = 0.024$). While sleep is important for maintaining well-being, extended periods of sleep during the day are a sign of lower mood (this may be connected with disturbed circadian rhythm). We observed a similar relation for physical activity (laminarity: $\beta = -0.302$, $p = 0.015$, rate: $\beta = 0.283$, $p = 0.064$): It seems that multiple short episodes of physical activity worked better for the overall good mood than a single longer episode. For entertainment and culture, we observed the opposite relationship: its laminarity had positive association ($\beta = 0.470$, $p = 0.008$), but its rate pointed towards a negative association ($\beta = -0.309$, $p = 0.110$), though not reaching significance. While having longer periods of time devoted specifically to entertainment might be helpful in maintaining a good mood, the large overall amount of time spent on entertainment might not be a good sign.

Extensive reports concerning daily routines were found in the follow-up open questionnaire. Most participants reported that their daily routines changed. For example, they gained more free time because they did not have to travel to work or school. This situation was recognized

by some participants as an opportunity to rest and have more time for themselves. For example, Participant 24 asked, when about the first days of lockdown (see, Supporting Information S2, Q1), answered: "My emotions and thoughts at the beginning were very positive. I was happy I could spend more time at home with friends and a newly adopted dog. I was happy that I would have more time for myself and time to write my bachelor's thesis. It was a relief that I didn't have to be physically present at school, and made me happy."

The amount of time using the computer for work, for communication with relatives and friends, and for entertainment increased rapidly. This appears often in the questionnaire answers as a cause of tiredness and feeling overworked. Lockdown also affected participants' circadian rhythm. Most participants (5/7) reported that they were sleeping longer as compared with the sleeping hours before lockdown, and some of them started to take naps during the day (Participant 24). Longer or additional sleep during the day affected participants' functioning and well-being. For example, Participant 15 reports: "I started to sleep much longer, I tried to keep it at a standard 8 hours, which was not good for me; I later realized that I function best after 7 hours of sleep." Some participants also reported changes in their eating routines such as decrease in hunger (Participants 26 and 12) or eating later (26 and 28).

Some participants reported that during lockdown their days became disorganized, and distinction between work time and leisure time and day and night began to blur, influencing their mood and well-being. For example, Participant 24, who initially experienced lockdown positively, when asked about daily organization (see Supporting Information S2, Q2) wrote: "My day during lockdown is not organized at all. Before [the lockdown] I knew when to wake up, when to eat, when I can have leisure time (playing games, meeting friends, reading books). In lockdown, I don't organize anything, I do everything at the last moment, and days intertwine with nights." Participant 28, when asked about a typical day in lockdown and its organization (Q4) answered, "...working remotely from home and a lot of distractors (like smartphone, Netflix, music, food) made working time longer. Instead of 8-9 hours, this half-work half-leisure time lasted a whole day." Such reports allow hypothesizing that disorganization of daily routines significantly affected participants' well-being. Importantly, some participants (26 and 28) employed coping strategies that resulted in daily organization of time. For example, Participant 26, when asked about the first days in lockdown (Q1), answered that she felt anxiety and uncertainty. At first, her coping strategy was introducing home activities (like cleaning the flat); subsequently, she started to use a weekly schedule to plan exactly what she was going to do in the following days. Asked about one particularly important activity in lockdown, she (Q3) answered: "These weekly schedules saved my life, they motivated me to do something (otherwise I would lie in bed and stare into the ceiling because I have a tendency to procrastinate), but most importantly they gave me orientation of what weekday it was." Other participants (like Participant 12) mentioned new daily activities (like cooking more often, regular walks) as important for keeping daily organization.

DISCUSSION AND CONCLUSIONS

The quantitative and qualitative part of the study confirms the strong negative impact of infodemic on mood. Variations in daily mood were significantly predicted by the current reports on new COVID-19 cases and deaths. Moreover, participants' written accounts revealed that checking social media and news regarding the pandemic induced negative feelings like sadness, fear, and feelings of being overwhelmed. Furthermore, the impact of pandemic-related

information on mood may be indirect, if relatives and close ones affected by the infodemic put pressure on a participant who is relatively resistant to it (Participant 15). The fact that the official information on the COVID-19 pandemic in Poland negatively impacted mood shows that the infodemic problem is not simply limited to conspiracy theories and misinformation, widely discussed in other studies (Jolley & Paterson, 2020; Oleksy et al., 2020). Fluctuations resulting from measurement inaccuracy, like lower number of reported active COVID-19 cases during weekends than during weekdays, may contribute to the destabilization of recipients' affective states.

This leads to a discussion regarding responsible data and science communication in the media during a time of crisis (Orso et al., 2020; Saitz & Schwitzer, 2020). Repeating biased information in mainstream media may contribute to an atmosphere of fear and confusion. Therefore, it is important to communicate the pandemic-related precautions in the form of simple, take-home messages, backed up by reliably collected data (Goldstein et al., 2020). Media should partner with known and trusted sources, avoid generating hype, be honest about the state of current knowledge, and be upfront about what is not known. In cases of crisis such as the COVID-19 pandemic, we should especially "strive to make science more accessible, transparent, and understandable; maintain trusted sources of information; and promote evidence-based policies" (WHO, 2020).

Another important conclusion relates to the factors that may shield individuals against the negative impacts of physical confinement. The results of the quantitative analysis show that social and family life (but only in the form of face-to-face contact), physical activity, as well as engagement in hobbies and self-development, were positively associated with the reported mood. These findings corroborate previous evidence on the positive impact of physical exercise (Chtourou et al., 2020), social contacts (Gosavi et al., 2020), and pursuit of a hobby (Lades et al., 2020), on mental well-being during the COVID-19 confinement. Furthermore, work and study, related to longer hours spent using the computer, were negatively associated with the reported mood. These results suggest that a simple reproduction of a workday schedule from before the pandemic is infeasible when most of the activities have moved online. Making people sit in front of their computers for extensive periods of time might cause overfatigue and negatively affect their psychophysical well-being. Employers and school leaders should rethink the organization of working/studying hours. A simple recommendation is to implement a more flexible schedule allowing employees/students for more frequent breaks, avoiding situations of several online meetings in a row, and encouraging physical activity.

A working schedule which is overly flexible may lead to disorganization of daily routines and distortion of circadian rhythms. Our observations revealed that stability of weekly patterns was a factor positively influencing the mood of our respondents. In contrast, long episodes of sleep and rest during the day and extensive time spent on entertainment and culture were connected with lower mood. We relate these results to the qualitative accounts of our participants who reveal disorganization of daily routines and unclear distinction between day and night and work time and leisure time. This can be mitigated with individual planning strategies, such as allocating time in advance for household chores or entertainment (see also, Hou et al., 2020).

Interestingly, family contacts had a positive influence on mood, but their impact disappeared when the contacts were electronically mediated. This finding can be explained by the fact that online intimacy differs from offline intimacy with respect to its effect on mental well-being (Lomanowska & Guitton, 2016). One important difference is the lack of physical contact, which is vital in health care provision and parent–child interactions. If physical contact is absent in these contexts, it might cause sadness and distress. Indeed, participants of a

qualitative study reported that inability to touch or hug brought a measure of discomfort into online interactions with their close ones. Therefore, people isolating themselves in single households might be especially vulnerable.

Applicability of our findings is limited by the composition of our sample, consisting mostly of young people, well-educated, and childless. Comparison with studies focusing on other social groups is needed to build a more comprehensive picture.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

J. Zubek, K. Ziembowicz, M. Pokropski, M. Denkiewicz, and P. Gwiaździński developed the study concept and contributed to the study design. Data collection was performed by J. Zubek and A. Boros. J. Zubek and M. Denkiewicz performed quantitative analyses. M. Pokropski and P. Gwiaździński performed qualitative analyses. J. Zubek, K. Ziembowicz, M. Pokropski, M. Denkiewicz, and P. Gwiaździński interpreted the results and drafted the manuscript. A. Boros provided corrections to the manuscript. All authors approved the final version of the manuscript for submission.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in figshare at https://doi.org/10.6084/m9.figshare.14925351.v2.

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REFERENCES

Ammar, A., Chtourou, H., Boukhris, O., Trabelsi, K., Masmoudi, L., Brach, M., Bouaziz, B., Bentlage, E., How, D., & Ahmed, M. (2020). COVID-19 home confinement negatively impacts social participation and life satisfaction: A worldwide multicenter study. *International Journal of Environmental Research and Public Health*, *17*(17), 6237. https://doi.org/10.3390/ijerph17176237

Chtourou, H., Trabelsi, K., H'mida, C., Boukhris, O., Glenn, J. M., Brach, M., Bentlage, E., Bott, N., Shephard, R. J., & Ammar, A. (2020). Staying physically active during the quarantine and self-isolation period for controlling and mitigating the COVID-19 pandemic: A systematic overview of the literature. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.01708

Clark, L. A., & Watson, D. (1988). Mood and the mundane: Relations between daily life events and self-reported mood. *Journal of Personality and Social Psychology*, *54*(2), 296–308. https://doi.org/10.1037//0022-3514.54.2.296

de Lima, C. V. C., Cândido, E. L., da Silva, J. A., Albuquerque, L. V., de Menezes Soares, L., do Nascimento, M. M., de Oliveira, S. A., & Neto, M. L. R. (2020). Effects of quarantine on mental health of populations affected by Covid-19. *Journal of Affective Disorders*, *275*, 253–254. https://doi.org/10.1016/j.jad.2020.06.063

Debowska, A., Horeczy, B., Boduszek, D., & Dolinski, D. (2020). A repeated cross-sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland. *Psychological Medicine*, 1–4. https://doi.org/10.1017/S003329172000392X

Ellis, W. E., Dumas, T. M., & Forbes, L. M. (2020). Physically isolated but socially connected: Psychological adjustment and stress among adolescents during the initial COVID-19 crisis. *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences Du Comportement*, *52*(3), 177–187, 187. https://doi.org/10.1037/cbs0000215

Fisher, K., & Robinson, J. (2010). Daily routines in 22 countries: Diary evidence of average daily time spent in thirty activities. Centre for Time Use Research University of Oxford. https://www.timeuse.org/sites/default/files/public/ctur_technical_paper/869/CTUR_Technical_Paper_2010-01.pdf

Froese, T., Gould, C., & Seth, A. K. (2011). Validating and calibrating first-and second-person methods in the science of consciousness. *Journal of Consciousness Studies*, *18*(2), 38–64.

Goldstein, C. M., Murray, E. J., Beard, J., Schnoes, A. M., & Wang, M. L. (2020). Science communication in the age of misinformation. *Annals of Behavioral Medicine*, *54*(12), 985–990. https://doi.org/10.1093/abm/kaaa088

Gosavi, T. D., Koh, J. S., Rosman, M., Prasad, K., Doshi, K., Lim, E. S., Saffari, S. E., Goh, S. K., Ong, H. S., & Chan, C. Y. (2020). Psychological impact of isolation due to COVID-19 among young and fit dormitory residents. *Psychological Medicine*, 1–2. https://doi.org/10.1017/S0033291720004274

Hasselman, F., & Bosman, A. M. T. (2020). Studying complex adaptive systems with internal states: A recurrence network approach to the analysis of multivariate time-series data representing self-reports of human experience. *Frontiers in Applied Mathematics and Statistics*, *6*, 9. https://repository.ubn.ru.nl/handle/2066/217794

Hou, W. K., Hall, B. J., & Hobfoll, S. E. (2018). Drive to thrive: A theory of resilience following loss. In N. Morina & A. Nickerson (Eds.), *Mental health of refugee and conflict-affected populations: Theory, research and clinical practice* (pp. 111–133). Springer Nature Switzerland AG. https://doi.org/10.1007/978-3-319-97046-2_6

Hou, W. K., Lai, F. T., Ben-Ezra, M., & Goodwin, R. (2020). Regularizing daily routines for mental health during and after the COVID-19 pandemic. *Journal of Global Health*, *10*(2). https://doi.org/10.7189/jogh.10.020315

Ingram, J., Maciejewski, G., & Hand, C. J. (2020). Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Frontiers in Psychology*, *11*, 2328. https://doi.org/10.3389/fpsyg.2020.588604

Jolley, D., & Paterson, J. L. (2020). Pylons ablaze: Examining the role of 5G COVID-19 conspiracy beliefs and support for violence. *British Journal of Social Psychology*, *59*(3), 628–640. https://doi.org/10.1111/bjso.12394

Khan, S., Siddique, R., Li, H., Ali, A., Shereen, M. A., Bashir, N., & Xue, M. (2020). Impact of coronavirus outbreak on psychological health. *Journal of Global Health*, *10*(1). https://doi.org/10.7189/jogh.10.010331

Lades, L. K., Laffan, K., Daly, M., & Delaney, L. (2020). Daily emotional well-being during the COVID-19 pandemic. *British Journal of Health Psychology*, *25*(4), 902–911. https://doi.org/10.31234/osf.io/pg6bw

Lomanowska, A. M., & Guitton, M. J. (2016). Online intimacy and well-being in the digital age. *Internet Interventions*, *4*, 138–144. https://doi.org/10.1016/j.invent.2016.06.005

Marwan, N., Romano, M. C., Thiel, M., & Kurths, J. (2007). Recurrence plots for the analysis of complex systems. *Physics Reports*, *438*(5–6), 237–329. https://doi.org/10.1016/j.physrep.2006.11.001

McGrath, J., & Smith, J. (2005). Qualitative psychology: A practical guide to research methods. *Experimental Psychology - EXP PSYCHOL*, *52*, 80–81. https://doi.org/10.1027/1618-3169.52.1.80

Nakagawa, S., Johnson, P. C., & Schielzeth, H. (2017). The coefficient of determination R 2 and intra-class correlation coefficient from generalized linear mixed-effects models revisited and expanded. *Journal of the Royal Society Interface*, *14*(134), 20170213. https://doi.org/10.1098/rsif.2017.0213

Oleksy, T., Wnuk, A., Maison, D., & Łyś, A. (2020). Content matters. Different predictors and social consequences of general and government-related conspiracy theories on COVID-19. *Personality and Individual Differences*, *168*, 110289. https://doi.org/10.1016/j.paid.2020.110289

Orso, D., Federici, N., Copetti, R., Vetrugno, L., & Bove, T. (2020). Infodemic and the spread of fake news in the COVID-19-era. *European Journal of Emergency Medicine.*, *27*, 327–328. https://doi.org/10.1097/MEJ.0000000000000713

Pietkiewicz, I., & Smith, J. A. (2014). A practical guide to using interpretative phenomenological analysis in qualitative research psychology. *Psychological Journal*, *20*(1), 7–14. https://doi.org/10.14691/CPPJ.20.1.7

Saitz, R., & Schwitzer, G. (2020). Communicating science in the time of a pandemic. *Jama*, *324*(5), 443–444. https://doi.org/10.1001/jama.2020.12535

Seabold, S., & Perktold, J. (2010). Statsmodels: Econometric and statistical modeling with python. *Proceedings of the 9th Python in Science Conference*, *57*, 61.

Serafini, G., Parmigiani, B., Amerio, A., Aguglia, A., Sher, L., & Amore, M. (2020). The psychological impact of COVID-19 on the mental health in the general population. *QJM: An International Journal of Medicine*, *113*(8), 531–537. https://doi.org/10.1093/qjmed/hcaa201

Terry, P. C., Parsons-Smith, R. L., & Terry, V. R. (2020). Mood responses associated with COVID–19 restrictions. *Frontiers in Psychology*, *11*, 3090. https://doi.org/10.3389/fpsyg.2020.589598

Tull, M. T., Edmonds, K. A., Scamaldo, K. M., Richmond, J. R., Rose, J. P., & Gratz, K. L. (2020). Psychological outcomes associated with stay-at-home orders and the perceived impact of COVID-19 on daily life. *Psychiatry Research*, *289*, 113098. https://doi.org/10.1016/j.psychres.2020.113098

van Rijsbergen, G. D., Burger, H., Hollon, S. D., Elgersma, H. J., Kok, G. D., Dekker, J., de Jong, P. J., & Bockting, C. L. H. (2014). How do you feel? Detection of recurrent major depressive disorder using a single-item screening tool. *Psychiatry Research*, *220*(1), 287–293. https://doi.org/10.1016/j.psychres.2014.06.052

Weinstein, S. M., & Mermelstein, R. (2007). Relations between daily activities and adolescent mood: The role of autonomy. *Journal of Clinical Child and Adolescent Psychology*, *36*(2), 182–194. https://doi.org/10.1080/15374410701274967

WHO. 2020. 'Call for action: Managing the infodemic'. https://www.who.int/news/item/11-12-2020-call-for-action-managing-the-infodemic

Wiederhold, B. K. (2020). Using social media to our advantage: Alleviating anxiety during a pandemic. *Cyberpsychology, Behavior and Social Networking*, *23*(4), 197–198. https://doi.org/10.1089/cyber.2020.29180.bkw

Yu, S.-C., Chen, H.-R., Liu, A.-C., & Lee, H.-Y. (2020). Toward COVID-19 information: Infodemic or fear of missing out? *Healthcare*, *8*(4), 550. https://doi.org/10.3390/healthcare8040550

Zarocostas, J. (2020). How to fight an infodemic. *The Lancet*, *395*(10225), 676. https://doi.org/10.1016/S0140-6736(20)30461-X

Zubek, J., Ziembowicz, K., Pokropski, M., Gwiaździński, P., Denkiewicz, M., & Boros, A. (2021). EMA_data.csv [dataset]. https://doi.org/10.6084/m9.figshare.14925351.v2

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