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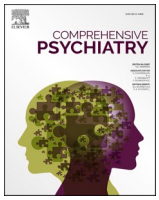

Long-term trajectories of densely reported depressive symptoms during an extended period of the COVID-19 pandemic in Switzerland: Social worries matter

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ABSTRACT

Previous mental health trajectory studies were mostly limited to the months before access to vaccination. They are not informing on whether public mental health has adapted to the pandemic. The aim of this analysis was to 1) investigate trajectories of monthly reported depressive symptoms from July 2020 to December 2021 in Switzerland, 2) compare average growth trajectories across regions with different stringency phases, and 3) explore the relative impact of self-reported worries related to health, economic and social domains as well as socio-economic indicators on growth trajectories. As part of the population-based Corona Immunitas program of regional, but harmonized, adult cohorts studying the pandemic course and impact, participants repeatedly reported online to the DASS-21 instrument on depressive symptomatology. Trajectories of depressive symptoms were estimated using a latent growth model, specified as a generalised linear mixed model. The time effect was modelled parametrically through a polynomial allowing to estimate trajectories for participants' missing time points. In all regions level and shape of the trajectories mirrored those of the KOF Stringency-Plus Index, which quantifies regional Covid-19 policy stringency. The higher level of average depression in trajectories of those expressing specific worries was most noticeable for the social domain. Younger age, female gender, and low

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household income went along with higher mean depression score trajectories throughout follow-up. Interventions to promote long-term resilience are an important part of pandemic preparedness, given the observed lack of an adaptation in mental health response to the pandemic even after the availability of vaccines in this high-income context.

1. Introduction

Depression symptoms increased in the first two months after the start of the Covid-19 pandemic. Evidence across longitudinal, population-based studies on trajectories of depression symptoms after the initial months of the pandemic is erratic. The marked methodological and quality heterogeneity across studies make evidence on mental health trajectories arduous to consolidate [1–3].

Most of the previous trajectory studies covered only the first pandemic year, are limited to the months before broad access to vaccination, or in the case of longer-term follow-up are not population-based [2,4]. Longer-term population-based studies are needed to improve our understanding of whether public mental health has adapted to the pandemic or whether the pandemic impact on mental health is more persistent. Because depression is a major contributor to the burden of disease, the public health implications of even slight increases in depressive symptomatology in the general population may have detrimental individual and societal implications [5].

It is also relevant to identify population subgroups exhibiting trajectories of depressive symptoms that call for targeted prevention or treatment. Prototypical mental health trajectories are generally observed in response to stressors: resilient trajectories with consistently low levels of symptoms – usually the most common trajectory; chronic trajectories with consistently elevated symptoms; emerging trajectories with symptom increase over time; and improving trajectories with initially elevated symptoms that gradually decrease [6]. Latent class approaches used across few longitudinal studies support that three to five mental health trajectory classes exist in the general population during the early phase of the COVID-19 pandemic, with the "resilient" trajectory being the most common. Nonetheless, up to 30% of individuals may belong to "emerging" trajectories with worsening mental health symptoms or severely affected mental health [7–12].

So far only few trajectory-based studies benefitted from densely sampled data collected over more than one pandemic year and covering all adult age groups from the general population [4,13]. In our digital cohort study embedded into the population-based Swiss-wide Corona Immunitas research program, participants reported on depressive symptomatology on a monthly basis from the pandemic onset until well after broad access to vaccination. The aim of this analysis was to 1) investigate trajectories of monthly reported depressive symptoms from July 2020 to December 2021, 2) compare average growth trajectories across regions with different stringency phases, and 3) explore the relative impact of self-reported worries related to health, economic and social domains as well as socio-economic indicators on average growth trajectories.

2. Methods

2.1. Study design and population

Corona Immunitas, a longitudinal population-based study in Switzerland, studied the temporal course of SARS-CoV-2 infections and broad societal impacts of the pandemic in regional (cantonal), but harmonized, adult cohorts [14]. Participants were recruited based on age and canton-stratified random inhabitant samples provided by the Swiss Federal Office of Statistics. Diplomats, persons with a foreign address, in asylum procedure, with a short-term residence permit, or living in nursing homes were not included in the samples. By design, most cantons recruited 50% of the sample in the younger subgroup (20–64 years) and 50% in the older subgroup (65 years and older). Basel-Stadt and Basel-Landschaft recruited one third of their sample in each of the following age categories: 18 to 49 years; 50 to 64 years; 65 years and older [15]. St.Gallen and Graubünden only recruited persons aged younger than 65 years [14]. Participation rate at study entry ranged between 16 and 26%. Compared with official cantonal population statistics, the age group of 65 years and older was overrepresented by design; women were slightly over-represented and the proportion of participants without Swiss citizenship was lower when compared with official population statistics (ranging from 22.8% in Fribourg to 28.6% in Basel). Persons aged 65+, of female gender, with Swiss citizenship, of higher than mandatory educational level and with higher household income were more likely to answer to at least 1 follow-up questionnaire [14].

The present study is restricted to a sub-set of German- and French-speaking Corona Immunitas cohorts with participants answering baseline and at least one monthly digital questionnaire. Between 75 and 93% of baseline participants answered at least one digital follow-up.

Corona Immunitas has been approved by the responsible ethics committees (Basel-Stadt & Basel- Landschaft: BASEC 2020–00927; Eastern Switzerland (Graubünden & St. Gallen), Bern Fribourg, Luzern, Neuchâtel, Winterthur and Zürich: BASEC 2020–01247). All participants have provided written informed consent.

2.2. Study procedures and data collection

Participants responding positively to a mailed Corona Immunitas invitation letter entered the study between June and September 2020 (Basel-Stadt, Basel-Landschaft, Fribourg, Neuchâtel, Zürich) and December 2020 and January 2021 (Bern, Graubünden, Luzern, St. Gallen). They repeatedly obtained invitations to answer harmonized online questionnaires by email. At study entry they answered a longer baseline questionnaire and subsequently monthly questionnaires until December 2021 in their preferred language among German, French, Italian and English, given the multilingual background of people living in Switzerland. All cantons switched to tri-monthly questionnaires starting March 2021, except for BS and BL, where the monthly routine was maintained. However, the dates that questionnaires were answered covered the entire period between two questionnaire rounds, because it was at participant's discretion when to respond. Data was collected using the survey option in REDCap (*Research Electronic Data Capture*) (https://www.project-redcap.org/), a secure, web-based software platform designed to support data capture for research studies. REDCap allows for the management and automatic scheduling of invitations to online questionnaires. [16,17]

2.3. Variables of interest

2.3.1. Outcome

2.3.1.1. Depressive symptoms score. Depressive symptoms were measured in the repeated online questionnaires with the Depressive Anxiety Stress Scale (DASS-21) [18]. Each of the 21 items is scored on a 0–3 Likert scale: '*never = 0, sometimes = 1, often = 2, and (almost) always = 3*. The score for each domain (depression; anxiety; stress) is calculated by summing up the scores for the corresponding seven items and multiplying the total by 2. While the depression scores can be classified into domain-specific categories (normal = 0–9, mild = 10–13, moderate = 14–20, severe = 21–27 and extremely severe = 28+), the current

study a priori focused on the depression score on its original discrete scale as endpoint (possible score range 0–42).

2.3.2. A priori selected non-individual level trajectory predictors

Time was included in the analysis as "number of days since the beginning of the study", ranging from the 1st of July 2020 (one month after the start of Corona Immunitas as only one canton (ZH) started in June 2020) to the 21st of December 2021, for a total of 539 days.

2.3.2.1. Stringency index. The KOF Stringency-Plus Index (Konjunkturforschungsstelle, ETH Zürich) was not included as a model predictor, but was superimposed to the plot of depression trajectories. It quantifies the Swiss canton-specific stringency of Covid-19 policy measures by adapting the Oxford Stringency Index and was updated daily [19,20]. The index ranges from 0 (= no measures) to 100 (= full lockdown) and is updated daily since January 2020 based on 10 original indicators available at the level of cantons: school closing, workplace closing, cancellation of public events, restrictions on gatherings, closure of public transport, stay-at-home requirements, restrictions on internal movement, international travel controls, public info campaigns, facial coverings requirements.

2.3.3. A priori selected individual level effect modifiers

Socio-demographic information was obtained at study entry in the baseline questionnaire. **Age** in years and **gender** were self-reported. Age was categorized into three categories: below 30, [30–65], and [65+] years. Self-reported monthly **household income** was classified into three categories: below 6000, [6000–15,000], and [15000+] Swiss Francs (CHF)/month. **Canton of residence** was recorded and included Bern (BE), Basel-Landschaft (BL), Basel-Stadt (BS), Fribourg (FR), Graubünden (GR), Luzern (LU), Neuchatel (NE), St.Gallen (SG), Zürich (ZH).

2.3.3.1. Worries about the impact of the pandemic on different domains. Worries in different domains were measured in the repeated online questionnaires asking: "How much do you worry about the following aspect as a result of the current Corona virus situation": **health worries** (impact on my own health; impact on the health of relatives and friends; risk of getting infected; risk of infecting others); **economic worries** (own work or financial situation; economic situation of Switzerland); **social worries** (quality of my family relationships; quality of my personal relationships (e.g. with friends; colleagues)). Each of the eight questions were answered on a 5-point Likert scale ranging from "not at all worried=0" to "extremely = 4" worried. Each worry was dichotomized (no/yes) and the category "yes" was assigned if at least one of the two (economic / social worries) resp. two out of the four (health worries) corresponding questions have been answered with "very" or "extreme".

2.4. Statistical analysis

Individual trajectories of depression score were modelled with Latent Growth Models (LGMs), which were previously used to analyze the effects of enforced isolation due to COVID-19 measures on mental health over time [13]. The basic idea underlying LGMs is that each subject has his/her own trajectory consisting of three components:

1. A fixed average trajectory, possibly dependent on covariates, which the subject shares with all other subjects having the same covariates configuration. In our analysis, the trajectory of depression score over time could be influenced by a priori selected covariates: canton of residence; gender; age; income; and worries (economic, health, social);
2. A subject specific random deviation from that average trajectory, which accommodates the heterogeneity of individual trajectories which is not captured by the fixed, average trajectory predicted by the covariates;
3. An error component, which accounts for the deviation between the average (fixed+random) trajectory and the observed individual trajectory.

LGMs can be specified either as a special case of Structural Equation Models (SEM) or as Multilevel Mixed Models [21]. As the SEM assumptions (normal distribution and linear effects of the covariates) were not fulfilled (depression score is a discrete response; effects plausibly non-linear), we specified a LGM as a Generalised Linear Mixed Model (GLMM) with Poisson response distribution and logarithmic link as follows:

$$log\ (\mathrm{E}[\mathrm{Y_{it}}]) = \boldsymbol{x}_t^T\boldsymbol{\beta} + f(t,\boldsymbol{b})$$

where: $\boldsymbol{x_t}$ is a vector of covariates, containing the time index variable t and possibly interactions.

$\boldsymbol{\beta}$ is a vector of fixed unknown parameters.

$f(t,\boldsymbol{b})$ is a specified function of time t and random parameters $\boldsymbol{b}$; such random parameters are assumed to be drawn from a Normal distribution $b \sim N(\mathbf{0},\boldsymbol{\Sigma}_{b.})$

The time effect was included by using "number of days" as time index t and modelled as a polynomial in time $f(t,\boldsymbol{b}) = \left(b_0 + b_1 t + b_2 t^2 + \ldots + b_d t^d\right)$, of degree d to be estimated from the data.

As for the a priori selected covariates to be included in the analysis, we started from a maximal model containing all main effects and first-order interactions of canton, gender, age, income, economic worries, health worries, social worries with number of days. Worries were considered as time-varying predictors. Both the degree d of the polynomial effect of time and the set of main effects and, in particular, of interactions to be included in the final model were then selected based on a bi-directional (both forward and backward) selection procedure, using the Bayesian information criterion.

Participants entered the study at different time points. Modelling the time effect parametrically through a polynomial allows estimating the trajectories also for participants' missing time points, by back-extrapolating the polynomial estimated on the available data. The estimation algorithm excluded automatically units with missing values in the predictor variables, i.e. it used only complete cases.

The final GLMM model with the following features was chosen:

- Fixed effects: (a) main effects of canton, gender, age, income, economic worries, health worries, social worries and a cubic polynomial in the time variable number of days; (b) first order interactions of canton, age, economic worries, health worries, social worries with the cubic polynomial in number of days;
- Random effects: all four coefficients of the cubic polynomial in the time variable number of days.

A cubic polynomial effect of number of days was chosen because it best fitted the specific trend of depression over time, characterized by two peaks, corresponding to the second and third waves of the COVID-19 pandemic in the periods October–January 2020 and November–December 2021.

The presence of statistically significant interactions of canton, age and worries (economic, health, social) with the cubic polynomial in time implies that these five covariates significantly modify the reference trajectory, which refers to the canton of Bern (chosen as reference based on alphabetical order of cantonal abbreviations), male gender, lowest level of income (< CHF 6000 per month), youngest age class (<30 years of age) and absence of any of the three worries.

The stringency index which reflects an ecological rather than an individual variable was not included as covariate in the regression model, but was applied to descriptively investigate the parallelism of its temporal course with that of depression symptoms.

A detailed description of the formal specification of the final model, along with an illustrative example, is provided in the Supplementary material.

Results from the final model assuming, instead of Poisson, a Negative Binomial response distribution, which takes into account the possible presence of overdispersion, were not qualitatively different from the results assuming Poisson distribution (Supplementary Tables 2S a-b).

Given the a priori focus on depression scores, the same instead of separately derived models were also applied to the anxiety and stress scores for comparison. Results are presented in Tables 3S a-b and 4S a-b in the Supplementary material.

All statistical analyses were conducted using R 4.0.2 [22]. Latent Growth Models were estimated as Generalised Linear Mixed Models using the libraries lme4 and glmmTMB. The plots were produced using the libraries ggplot2, effects and sjPlot.

3. Results

The total sample size at study entry was $N = 8396$. Study population characteristics at study entry by canton are summarized in Table 1 (see Table 5S for study population characteristics according to the number of monthly follow-up questionnaires answered). The average age of the cantonal samples ranged from 43.8 years (SG and GR) to 58.4 years (ZH). Participant's individual ages ranged from 18 to 95 years. Between 47.6% (BE) and 57.0% (BS) of participants are of female gender. About one third of participants (35.4%) had a monthly household income of <6′000 CHF, and <10% of participants (9.7%) reported a monthly household income of at least 15′000 CHF.

Table 1
Baseline characteristics of Corona Immunitas participants at study entry, stratified by canton.

	Gender[1]	Age	Household Income[2]	Date of first response
	Female Male	**Mean (SD) Median [Min, Max]**	**< CHF 6000 CHF 6000–15,000 > CHF 15000**	**dd/mm/yyyy**
Bern (BE) ($N = 673$)	320 (47.6%) 353 (52.5%)	56.4 (15.5) 60.0 [20.0, 90.0]	264 (39.2%) 366 (54.4%) 43 (6.4%)	16/12/2020
Basel-Landschaft (BL) ($N = 1076$)	566 (52.6%) 510 (47.4%)	55.0 (15.3) 57.0 [18.0, 93.0]	352 (32.7%) 609 (56.6%) 115 (10.7%)	13/07/2020
Basel-Stadt (BS) ($N = 1133$)	646 (57.0%) 487 (43.0%)	53.5 (15.0) 55.0 [18.0, 90.0]	380 (33.5%) 605 (53.4%) 148 (13.1%)	13/07/2020
Fribourg (FR) ($N = 1101$)	601 (54.6%) 500 (45.4%)	55.1 (15.7) 57.0 [20.0, 86.0]	323 (29.3%) 684 (62.1%) 94 (8.5%)	01/07/2020
Graubünden (GR) ($N = 443$)	243 (54.9%) 200 (45.2%)	43.8 (11.8) 44.0 [20.0, 64.0]	192 (43.3%) 219 (49.4%) 32 (7.2%)	18/01/2021
Luzern (LU) ($N = 873$)	426 (48.8%) 447 (51.2%)	56.6 (17.1) 61.0 [20.0, 95.0]	376 (43.1%) 448 (51.3%) 49 (5.6%)	21/01/2021
Neuchâtel (NE) ($N = 906$)	479 (52.9%) 427 (47.1%)	56.5 (15.8) 59.0 [20.0, 92.0]	285 (31.5%) 534 (58.9%) 87 (9.6%)	10/08/2020
St. Gallen (SG) ($N = 461$)	261 (56.6%) 200 (43.4%)	43.8 (12.7) 44.0 [20.0, 65.0]	188 (40.8%) 237 (51.4%) 36 (7.8%)	30/11/2020
Zürich (ZH) ($N = 1730$)	859 (49.7%) 871 (50.4%)	58.4 (16.5) 65.0 [20.0, 92.0]	612 (35.4%) 911 (52.7%) 207 (12.0%)	01/07/2020

[1] Nine participants not self-reporting as being of male or female gender were combined with the group of females given that their depression trajectories closely matched those of females, but could not be estimated with sufficient precision given their low sample size.

[2] Participants lacking income information were excluded from models selecting income as relevant covariate.

The results of the GLMM are summarized in detail in Supplementary Table 1S. Insight into the meaning of the numerical estimates reported in Table 1S can be achieved by the graphical representation of the covariates' effects (Supplementary Fig. 2S; Fig. 1–3).

Figures. 1 and 2S depict the trajectories of predicted mean depression by canton, which are averaged over the sample distribution of the other covariates (age, sex, income and worries). The patterns of depression in time were qualitatively the same in all cantons: an increase leading to a peak in October–November 2020, followed by a decrease which led to a minimum in summer 2021, which was higher than the minimum recorded in Summer 2020. Finally, there were signs of a resurgence of the mean levels of depression in November–December 2021 despite access to vaccination, which presumably continued after the final date for which data are available (21/12/2021). There were also some quantitative differences in shape and height of curves as evidenced by statistically significant differences in Table 1S: cantons had statistically different trajectories in time that differed with respect to Bern as reference; shapes were similar except in Zürich, which has the flatter trajectory; Basel Stadt, Neuchatel and Fribourg had higher mean levels; and the final upswing in Autumn 2021 was stronger in Luzern, Basel Stadt and Bern than in other cantons.

In Fig. 1 we plotted the predicted trajectories of mean depression for each canton along with the trajectories of the KOF Stringency-Plus Index for that canton. Level and shape of the depression symptoms trajectories mirrored those of the KOF Stringency-Plus Index. Hence, they could be seen as a "response" to the adopted containment measures. In some cantons (Basel Stadt, Neuchatel, Fribourg, Zürich) the peak of depression preempted by one or two weeks the peak of the Stringency-Plus Index. Although the relaxation of containment measures in Spring and Summer 2021 was mirrored by a decrease in mean depression, the two processes differed in magnitude. The stringency of the containment measures went down to the levels of Spring-Summer 2020, while the mean depression never dropped to the levels of one year before.

Next, we found that, compared to the `absence of worries` group, the presence of all three worries went along with higher mean depression score trajectories throughout the observation period. Additionally the differences in mean depression scores varied over time as evidenced by statistically significant differences in the shape of trajectories (Table 1S and Fig. 2). The difference between the trajectory of those with and without experiencing worries was more noticeable for the social worries class than for other classes of worries. The difference was the weakest for economic worries. These differences were not altered after vaccination became available.

Younger age, female gender, and low household income also went along with higher mean depression score trajectories throughout the observation period. Equivalent to the observation for worries, the differences in mean depression scores varied over time as evidenced by statistically significant differences in the shape of trajectories (Table 1S and Fig. 3).

4. Discussion

Trajectories of depressive symptoms were similar across cantons and mirrored the temporal course of the canton-specific stringency of COVID-19 policy measures. In all cantons, and irrespective of age, gender, household income and types of worries, depression symptoms increased towards the end of 2021. In some cantons in the phase of

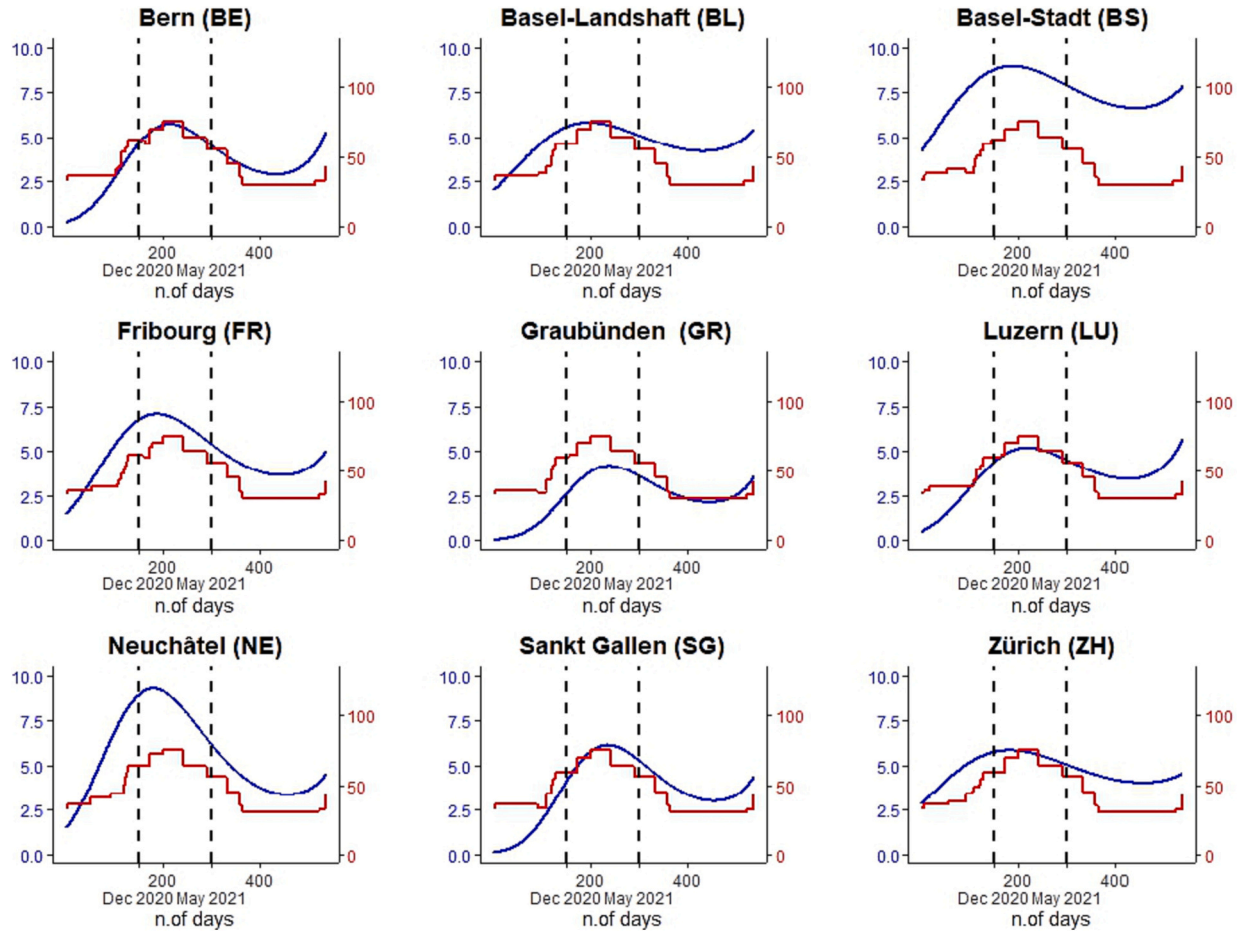

Fig. 1. Trajectories[1] of predicted mean depression score (blue) and trajectories of Stringency Index Plus (red) by canton. Vertical dashed lines refer to the beginning of the vaccination campaign (Dec 2020) and to the month when a significant portion of the population was vaccinated (May 2021) [33].
[1]"n.days" is the number of days since the beginning of the study, ranging from the 1st of July 2020 (n.days = 0) to the 21st of December 2021 (n.day = 539). Trajectories for Cantons which entered later into the study are estimated back-extrapolating the third order polynomial estimated with the available data. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

restrictive sanitary measures, and in all cantons towards the end of 2021, the surge in depressive symptoms preceded the implementation of restrictions, presumably as a result of media announcement of containment measures two or more weeks before enforcement. The study with the longest and most frequent mental health follow-ups reported similar depression trajectories and relation to policy measures in England over two pandemic years [4]. As in our and other studies [13] it also observed that mental health deteriorated before the start of stay-at-home orders.

Average depression symptom scores remained mostly in the "normal" range during follow-up. They were below 4 after the first restriction phase, peaked in the second containment phase towards the end of 2020, decreased again in spring and summer of 2021, and resurged towards the end of 2021. The mental health adaptation observed in some studies including this one after the first stringency phase was therefore not maintained [13]. Depressive symptoms after the second wave of restrictions remained higher on average than after the first wave. This suggests a sustained adverse public health impact of the pandemic on mental wellbeing. The results mirror findings of the UK based panel study of over 57,000 adults covering two pandemic years with monthly follow-up surveys, but they are in contrast to the observed decline of depression symptoms by April 2022 in a not population-based Italian cohort with only three follow-ups [2]. Our observed slight increase in depressive symptoms, albeit in the normal range on average, can ultimately augment the burden of clinical depression by shifting persons close to the non-normal symptom cutoff and putting them at higher risk for clinical depression [5].

The observed trajectory of depressive symptoms showed heterogeneity with regards to intensity of symptoms by age, gender, household income as well as worries in different domains. Yet, the average temporal course over the pandemic phases was remarkably similar, pointing to a considerable percentage of the general population's mental health not being resistant to the pandemic's impact over longer periods.

According to our study, relaxation of stringency measures due to vaccination induced no rapid improvement in mental health in most persons. This is coherent with our observation that self-reported worries about social life were more strongly contributing to heterogeneity in the depression trajectory than worries about health, possibly reflecting the sustainable pandemic challenge for the cohesion of many families [23]. But we cannot exclude that the relative contribution of health worries may depend on participant's COVID-19 infection history. A meta-analysis of population-based data from six Northern-European cohorts found that non-hospitalized patients with SARS-CoV-2 experienced subsequent adverse mental health effects only if being bedridden for at least 7 days [24].

The higher levels of depressive symptoms in younger age groups, female gender and lower household income during COVID-19 are supported by previous results [25]. They reflect commonly observed inequalities in clinical depression [26]. Goldman and Galea [27] found that being young, being a woman, having a low socioeconomic status, or experiencing job loss was associated with a higher probability of experiencing less favorable mental health trajectories in situations of man-

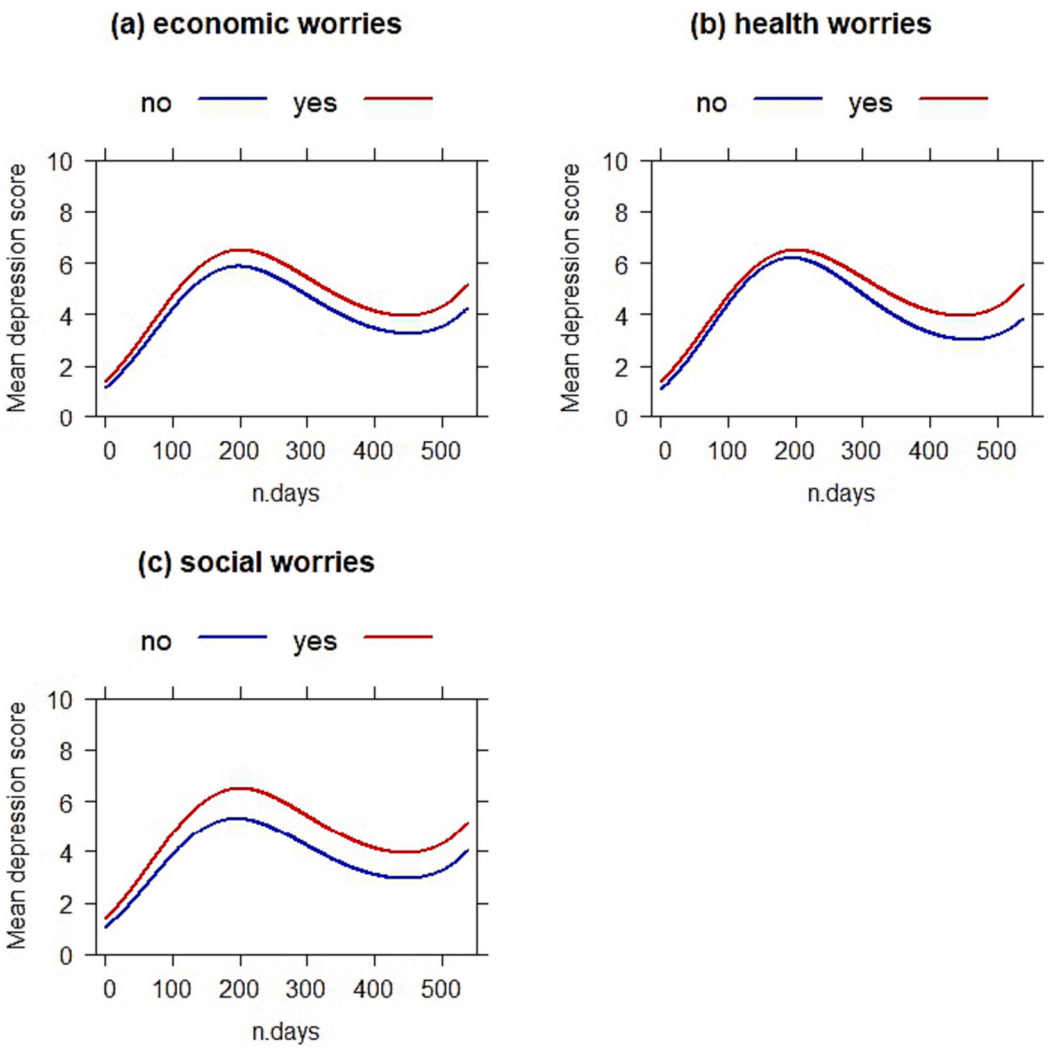

Fig. 2. Differences in the trajectories[1] of predicted depression symptom score by a) economic worries, b) health worries, c) social worries ("worst" scenario[2]).

made or natural disasters. Women react in a biologically different way to stressors, have different social experiences and societal roles as well as job situations predisposing them to higher susceptibilty [28]. In Switzerland, we have previously observed a higher prevalence of low income households in highly affected depression trajectories [12]. In contrast, the perceived risk of poverty was not associated with latent class trajectories of mental health in Austria, a country with similarities in economic status and health care system to Switzerland [29].

Strengths of the study include the random sampling from the general population residential registry, the harmonized cohort protocols in different regions, the large sample size, densely spaced repeated reporting of depression symptoms assessed with a previously validated tool (including validation in the 4 languages used in this study), and the extended pandemic period covered.

Limitations of the study include lack of information on depressive symptoms in the pre-pandemic and first lockdown phases. Data from the initial months were lacking for some cantons and therefore predicted by back-extrapolating the third-order polynomials estimated on available time occasions. This resulted in lower precision for estimating the shape of depression trajectories in the early months in these cantons. As worries and depression symptoms were obtained at the same repeated time points, the directionally of their association remains unclear. The correlation of different stringency measures and their similarity across cantons did not allow investigating the association of depression with single measure. The similarity of depression symptom trajectories with the temporal trend of stringency of containment measures could in part be explained by seasonality as both, depressive symptoms and phases of restrictions are more common during cold seasons. In addition, it could be explained by infection rates as increasing infection rates led to more stringent containment measures and an increase in the stringency of containment measures induced relevant reductions in infection growth [19]. Low participation rates at study inception and loss to digital follow-up possibly introduced selection bias in both directions. More depressive participants may be less likely to participate or to stay in the study; but very healthy and busy persons may be less interested in the study. Overrepresentation of older, female, and in particular well educated and financially well-off participants with Swiss citizenship among participants at baseline and follow-up possibly contributed to an underestimation of severe depression symptom trajectories. Not offering questionnaires in the language of all migrant group limits the generalizability of results to all persons living in Switzerland. Detailed information on modifiable personal factors with a potential impact on heterogeneity in depression trajectories was not available.

5. Conclusions

We observed a lack of an adaptation in mental health response to the pandemic even after the broad availability of vaccines in the high-income country of Switzerland. Furthermore, it is astonishing that in a pandemic caused by a life-threatening virus social worries have a

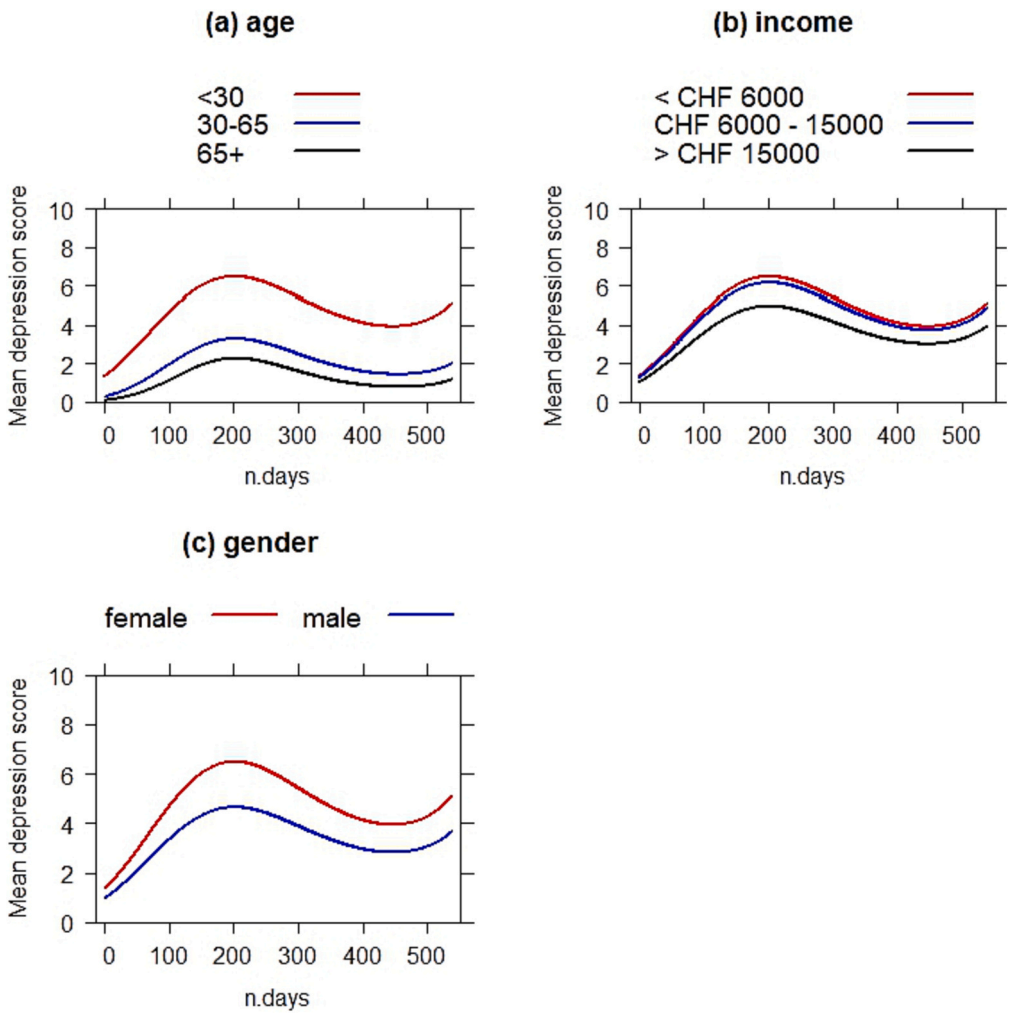

Fig. 3. Differences in the trajectories[1] of predicted depression symptom score by a) age, b) income and c) gender ("worst" scenario[2]).
[1] "n.days" is the number of days since the beginning of the study, ranging from the 1st of July 2020 (n.days = 0) to the 21st of December 2021 (n.day = 539). Trajectories for Cantons which entered later into the study are estimated back-extrapolating the third order polynomial estimated with the available data.
[2]The "worst" scenario refers to the combination of categories which is associated with higher levels of depression, i.e. female gender and lowest level of income (< CHF 6000 per month) in (a); youngest age class (<30 years of age) and female gender in (b); youngest age class (<30 years of age) and lowest level of income (< CHF 6000 per month). The estimated trajectories are averaged over Cantons.

stronger association with depressive symptoms trajectories than health worries. These results send an important message for future pandemic preparedness. Interventions that promote long-term resilience, particularly in those at highest mental health risk, are needed [5]. Promoting psychological flexibility is a promising intervention to favor resilient trajectories at the level of individuals [30,31]. Such interventions may not only serve public mental health, but also COVID-19 and long-COVID patients [32].

The continuation of longitudinal studies offers the opportunity to estimate the full mental health burden attributable to the COVID-19 pandemic, including the burden of clinical depression or suicide ideation that are not well understood [5].

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.comppsych.2024.152457.

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