Prevalence and predictors of psychological distress before, during, and after a COVID-19 pandemic wave in Switzerland, 2021

Stephanie Schrempft [a,*], Nick Pullen [a], Hélène Baysson [a,b], Ania Wisniak [a], María-Eugenia Zaballa [a], Francesco Pennacchio [a], Peter Vollenweider [d], Pedro Marques-Vidal [d], Martin Preisig [e], Idris Guessous [a,b], Silvia Stringhini [a,c,f], on behalf of the Specchio-COVID19 study group[1]

[a] Division of Primary Care, Unit of Population Epidemiology, Geneva University Hospitals, Geneva, Switzerland
[b] Department of Health and Community Medicine, Faculty of Medicine, University of Geneva, Geneva, Switzerland
[c] Institute of Global Health, Faculty of Medicine, University of Geneva, Geneva, Switzerland
[d] Department of Medicine, Internal Medicine, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[e] Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland
[f] University Centre for General Medicine and Public Health, University of Lausanne, Lausanne, Switzerland

ARTICLE INFO

ABSTRACT

There are concerns about acute and long-term mental health effects of the COVID-19 pandemic. This study examined the prevalence and predictors of psychological distress before, during, and after a pandemic wave in Switzerland, 2021. Prevalence of psychological distress was estimated in adults aged 35–96 years using the General Health Questionnaire-12 administered in June 2021 (Specchio-COVID19 cohort, N = 3965), and compared to values from 2003 to 2006 (CoLaus|PsyCoLaus cohort, N = 5667). Anxiety and depression were assessed from February to June 2021 using the Generalised Anxiety Disorder scale-2 and the Patient Health Questionnaire-2, respectively. Prevalence of psychological distress in June 2021, after the pandemic wave (16.0% [95% CI, 14.6%–17.4%]) was comparable to pre-pandemic levels (15.1% [14.0%–16.2%]). Anxiety and depression were highest at the start of the pandemic wave in February 2021, and declined from February to June with the relaxation of measures. Predictors of psychological distress included being younger, female, a single parent, unemployed, a change in working hours or job loss in the past 6 months, greater perceived severity and contagiousness of COVID-19, and self-reported post COVID-19. By June 2021, following a pandemic wave, prevalence of psychological distress in Switzerland was closer to pre-pandemic levels. These findings highlight the need for additional mental health support during times of stricter government policies relating to COVID-19; yet they also suggest that individuals can adapt relatively quickly to the changing context.

1. Introduction

There are concerns about acute and long-term mental health effects of the novel coronavirus (COVID-19) pandemic. Research in Europe, the US, and China demonstrated that mental health deteriorated in the early stages of the pandemic (Fiorillo et al., 2020; McGinty et al., 2020; Pierce et al., 2020; C. Wang et al., 2020). For example, prevalence of psychological distress in the UK rose from 18.9% in 2018–2019 to 27.3% in April 2020, one month into lockdown; a stronger increase than previous upward trends (Pierce et al., 2020).

Acute distress during the COVID-19 pandemic may lead to long-term mental health problems. Measures of psychological distress predict mental illness (Goldberg et al., 1997), and experiences during a pandemic can have long-term mental health effects (Brooks et al., 2020). For example, elevated levels of anxiety, depression, and post-traumatic stress symptoms among SARS patients, quarantined people, and healthcare workers during the 2003 SARS epidemic persisted years later (Lee et al., 2007; Liu et al., 2012; Maunder et al., 2006). Research suggests that COVID-19 can be considered a traumatic stressor event capable of eliciting traumatic stress reactions (Bridgland et al., 2021).

Research tracking changes in mental health during the early stages of the COVID-19 pandemic suggests mental health improves as measures are eased (Robinson et al., 2022). In England, anxiety and depression declined across the first 20 weeks following lockdown (March–August 2020), with the fastest decreases during lockdown easing measures (Fancourt et al., 2021). A similar trend was seen in Germany (March–June 2020; Bendau et al., 2021). In Switzerland, 2020 was marked by the first and second pandemic waves. A considerable proportion of Swiss participants reported that their mental health had been adversely affected during the first pandemic wave (Hernandez et al., 2021). Prevalence of distress was reported to increase further during the second wave of autumn and winter 2020, which coincided with a retightening of restrictions to contain the pandemic (de Quervain et al., 2020). Just one known previous study examined trajectories of mental health at a later stage of the pandemic in Switzerland (August 2020–May 2021). In a sample of 732 people living in the Ticino region of Switzerland, depression, anxiety, and stress increased from August 2020 to May 2021, with the greatest increases during the second wave of the pandemic, and little differences after the second wave (Piumatti et al., 2022). The third pandemic wave in early 2021 (February to May) was less severe than the first and second in terms of hospitalisations and deaths (Federal Office of Public Health, 2021). By June 2021, there were few cases, and government measures were less stringent than earlier in the year (University of Oxford, 2021). Mental health may have been generally better at this stage of the pandemic, although this has not yet been examined. As the situation has evolved, monitoring mental health throughout the pandemic, with comparisons to pre-pandemic data, is needed to inform future public health measures.

Pre-pandemic factors, such as demographics and life circumstances, likely remain important predictors of psychological distress throughout the pandemic. Being female and younger predicted psychological distress, and greater increases in distress, during the early stages of the pandemic (Fancourt et al., 2021; Kwong et al., 2021; Pierce et al., 2020). COVID-19-specific factors, such as a diagnosis of COVID-19 (Taquet et al., 2021), changes in work circumstances and unpaid care at home (McDowell et al., 2021; Xue and McMunn, 2021), high perceived risk of dying from COVID-19, and social distancing (Kämpfen et al., 2020), also contributed to people's mental health during the early stages of the pandemic.

The main aim of this study was to examine the prevalence of general psychological distress, as well as symptoms of anxiety and depression, during and following the third wave of the COVID-19 pandemic in Switzerland (February–June 2021), with comparisons to pre-pandemic levels of distress. A second aim was to examine a range of pre-pandemic and COVID-19-specific predictors of psychological distress at this stage of the pandemic.

2. Participants

Information on psychological distress and potential predictors during the pandemic was from Specchio-COVID19, a population-based digital study launched in December 2020 to follow up serosurvey participants in Geneva, Switzerland (Baysson et al., 2022). Serosurvey participants were randomly selected from the Bus Santé population-based study, and from Geneva registries (Stringhini et al., 2020; Stringhini et al., 2021). Adult serosurvey participants were invited to take part in the Specchio-COVID19 study after a baseline serologic test. From the 10 616 adult serosurvey participants invited, 6394 enrolled in Specchio-COVID19 (participation rate 60%, not taking into account participants unreachable owing to false email addresses). Non-specific psychological distress was assessed via questionnaire in June 2021. Anxiety and depression were assessed through monthly questionnaires administered from February to June 2021. Of the 6394 participants enrolled in Specchio-COVID19, 4636 individuals (73%; mean age = 51 years (range = 18–96 years)) completed the measure of psychological distress in June 2021 (see Supplementary Fig. S1).

3538/4636 (76%) completed the measures of anxiety and depression in June 2021.

Information on pre-pandemic psychological distress was from the CoLaus|PsyCoLaus cohort, a population-based study of individuals aged 35–75 years at baseline living in Lausanne, Switzerland (Firmann et al., 2008). Psychological distress was assessed once before the pandemic (2003–2006); anxiety and depression were assessed at follow-up, closer to the time of the pandemic (2014–2018). Supplementary analyses therefore included pre-pandemic measures of anxiety and depression to complement the pre-pandemic assessment of psychological distress in 2003–2006. Participants were aged 35 years and above at the psychological distress assessment (2003–2006), and 45 years and above at the depression and anxiety assessment (2014–2018). Prevalence estimates for each cohort were therefore examined in adults aged 35 years and above (psychological distress), and in adults aged 45 years and above (anxiety and depression). In CoLaus|PsyCoLaus, 5667 individuals (mean age = 53 years (range = 35–75 years)) completed the psychological distress questionnaire at baseline (2003–2006); 3663 individuals (mean age = 63 years (range = 45–88 years)) completed the diagnostic interviews at follow-up (2014–2018). In Specchio-COVID19, 3965 individuals aged 35 years and above completed the psychological distress questionnaire in June 2021; 2507 individuals aged 45 years and above completed the anxiety and depression questionnaires in June 2021. See Table S1 for an overview of the measures and assessment points in CoLaus|PsyCoLaus and Specchio-COVID19.

This study was carried out in accordance with the latest version of the Declaration of Helsinki. The Specchio-COVID19 study was approved by the Cantonal Research Ethics Commission of Geneva (CCER project ID 2020–00881); the physical and psychiatric investigations of CoLaus|PsyCoLaus were approved by the Institutional Ethics Committee of the University of Lausanne (project reference numbers: 16/03, 33/09, 26/14 and 134/05, 239/09, respectively), which later became the Ethics Commission of Canton Vaud. All participants provided written informed consent.

3. Measures

Upon registration, Specchio-COVID19 participants completed a questionnaire assessing sociodemographic factors and pre-existing chronic disease. Self-reported SARS-CoV-2 infections, perceived COVID-19 severity and contagiousness, COVID-19-related quarantine, changes in work circumstances, and loneliness, were assessed through monthly questionnaires. Self-reported post COVID-19, need for psychological support, suicidal ideation, and psychosocial factors including perceived stress and social support were assessed by questionnaire in June 2021.

3.1. Mental health outcomes

In Specchio-COVID19 and CoLaus|PsyCoLaus, the 12-item General Health Questionnaire (GHQ-12) measured non-specific psychological distress (Goldberg et al., 1997; Lundin et al., 2016). Respondents rate the extent to which they have experienced each symptom in the past two weeks compared to their usual state. Responses for each symptom were dichotomised (0-0-1-1) and summed into an index (range 0–12). A score of 4 or more indicates clinically significant levels of psychological distress (Pierce et al., 2020).

In Specchio-COVID19, the General Anxiety Disorder-2 scale (GAD-2) and the Patient Health Questionnaire-2 (PHQ-2) assessed anxiety and depression. Respondents indicate how often they experienced each symptom over the past 2 weeks. Scores are summed (range 0–6); a total score of 3 or higher indicates probable depression or anxiety disorder (Kroenke et al., 2003, 2007). The PHQ-2 and GAD-2 have acceptable sensitivity and specificity for any depressive and anxiety disorder, respectively, at a threshold of ≥3 (Plummer et al., 2016; Staples et al., 2019). In CoLaus|PsyCoLaus, depression and anxiety disorder were

assessed using the Diagnostic Interview for Genetic Studies (Nurnberger et al., 1994). Depressive disorder included diagnosed current major depressive disorder or dysthymia. Anxiety disorder included diagnosed current generalised anxiety disorder, panic disorder, agoraphobia, social phobia, specific phobias, posttraumatic stress disorder, or obsessive compulsive disorder.

In Specchio-COVID19, participants were asked whether they had felt a new need for psychological help or to contact a listening and psychological support unit since the beginning of the pandemic (yes/no). Suicidal ideation over the past month was assessed using the following question from the Columbia-Suicide Severity Rating Scale (Posner et al., 2011): 'In the past month, have you wished you were dead or wished you could go to sleep and not wake up?' (yes/no).

3.2. Sociodemographic factors and living circumstances

Sociodemographic factors included biological sex (male, female), age (years), and ethnicity (white European or other). Education level was primary (none or compulsory education), secondary (high school diploma or vocational training), or tertiary (university level qualification). Employment status was employed, self-employed, retired, unemployed, or other economically inactive (not working and not looking for work, such as students, and people unable to work for health reasons or disability). Household income was categorised according to household composition, using information from the Cantonal Office of Statistics of Geneva for 2015–2017 (low (below the first quartile of the income distribution), medium (between the first and third quartiles), or high (above the third quartile)). Living arrangement was living alone, as a single parent, as a couple with children, as a couple without children, or with other adults. Household density was the ratio of people to bedrooms, and categorised as overcrowded (>2), or not overcrowded (≤2). Housing conditions were house with outdoor space, appartment with outdoor space, or appartment without outdoor space. Urbanicity was rural, urban outskirts, or urban.

3.3. Work conditions

Each month (January–June 2021), participants reported their employment situation, and whether their working conditions had changed. This information was used to create three binary variables: 1) change to telework in the last 6 months, 2) change in working hours (increased or decreased) in the last 6 months, 3) job loss in the last 6 months. For each variable, employees whose working conditions had not changed was the reference category.

3.4. Health and psychosocial factors

Participants were asked if they had any long-standing chronic illness, and to select their illness(es) from a list, which included mental health conditions. These responses were used to create a variable indicating presence or absence of a mental health condition. Participants were also asked if they were receiving any psychological support from a health professional (psychologist, psychiatrist, or psychotherapist) prior to the pandemic, and whether this support was maintained during the pandemic. This information was combined to create a variable with three categories: no psychological support prior to pandemic, psychological support prior to and during pandemic, and psychological support prior to but not during pandemic.

Loneliness, perceived stress, and social support were assessed using the 3-item Revised UCLA Loneliness Scale (Hughes et al., 2004), Perceived Stress Scale (Cohen, 1988), and 3-item Oslo Social Support Scale (Bøen et al., 2012), respectively. For each scale, higher scores indicate greater loneliness, perceived stress, and social support. Internal consistency of the scales was high (Cronbach's α range = 0.6–0.9). Adverse life events in the past 6 months (yes/no) included death of a loved one, illness of a loved one, separation/divorce/family problems,

violence at home, violence outside the home, job loss (own or partner), bankruptcy and/or financial difficulties, new or worsened diseases and accidents, and other events considered negative.

3.4.1. COVID-19-specific factors

To examine potential short- and longer-term effects of COVID-19 on mental health, previous SARS-CoV-2 infection (natural) was measured as: 1) a positive PCR test result in the last 6 months (January–June 2021), and 2) a positive serology test result since March 2020 (Stringhini et al., 2020; Stringhini et al., 2021a; Stringhini et al., 2021b). Other COVID-19-specific factors included self-reported post COVID ('are you currently or have you suffered from long-term COVID, that is, long-term manifestations of COVID-19 (such as symptoms that persist beyond three weeks)?' Yes/no), having to quarantine due to contact with a person who tested positive for SARS-CoV-2 in the last 6 months (yes/no), perceived severity of COVID-19, and perceived contagiousness of COVID-19 (1 = not at all, 5 = extremely).

4. Statistical analysis

Statistical analyses were conducted using R version 4.1.0 (R Foundation for Statistical Computing, Vienna, Austria). Proportions and 95% confidence intervals (CIs) were calculated for the measure of psychological distress in the Specchio-COVID19 and CoLaus|PsyCoLaus cohorts separately. Analyses of both data sets incorporated survey sampling weights (for age, sex, and education using statistics from the Swiss Federal Statistical Office) to generate nationally representative estimates of psychological distress. Mean scores, with standard deviation bounds, on the GAD-2, PHQ-2, and UCLA-Loneliness Scale were reported from February to June 2021 in the Specchio-COVID19 cohort. Supplementary analysis examined prevalence (proportions and 95% CIs) of anxiety and depression in the Specchio-COVID19 and CoLaus|PsyCoLaus cohorts. A second supplementary analysis examined prevalence of psychological distress, anxiety, and depression in CoLaus|PsyCoLaus in winter and summer months separately.

Logistic regression was used to examine pre-pandemic and COVID-19-specific predictors of psychological distress (GHQ-12 score ≥4) in the total Specchio-COVID19 cohort (N = 4636). Univariable and minimised multivariable regression models were ran to identify groups at risk for psychological distress, which could be further examined in future research, for example in a structural equation model with more specific confounding structures. Age, sex, education level, and pre-existing mental health condition were included as covariates in the multivariable regression models. Cluster robust standard errors were used to account for potentially nested data within households. Of the total sample, 1544 (33%) shared a household with another participant. The majority of these participants (90%) indicated that they were living as a couple, and were therefore biologically unrelated. A p value of <0.05 was considered statistically significant.

5. Results

5.1. Sample characteristics

Characteristics of adults aged 35 years and above in the Specchio-COVID19 and CoLaus|PsyCoLaus cohorts are shown in Table 1. The cohort samples were similar in terms of age and sex distribution, employment status, and most were white Europeans. A greater proportion of Specchio-COVID19 participants were educated to tertiary level than CoLaus|PsyCoLaus participants (66% vs. 21%). Characteristics of the total Specchio-COVID19 sample, including potential predictors of psychological distress, are shown in Table 2. Participants were on average 51 years old (range 18–96 years), 57% were women, and 65% were educated to tertiary level. In comparison with the general population of Switzerland, there was an over-representation of 45–55 year olds, and those with tertiary level education (see Table S2). Compared

Table 1
Characteristics of adults aged 35 years and above in the Specchio-COVID19 and CoLaus|PsyCoLaus cohorts (% (n), unless stated otherwise).

	Specchio-COVID19 (N = 3965)	CoLaus|PsyCoLaus (N = 5667)
Age (years), mean (SD)	55.1 (11.8)	53.0 (10.7)
Sex		
Male	44.2 (1757)	47.7 (2701)
Female	55.8 (2217)	52.3 (2966)
Ethnicity		
White European	92.7 (3664)	99.6 (5610)
Other	7.3 (287)	0.4 (25)
Education level		
Primary	3.8 (151)	19.5 (1103)
Secondary	30.6 (1219)	60.0 (3402)
Tertiary	65.6 (2609)	20.5 (1162)
Employment status		
Employed	65.6 (2617)	68.5 (3881)
Not employed	34.4 (1370)	31.5 (1786)
Living circumstances		
Alone	14.7 (588)	25.8 (1464)
Couple with children	46.4 (1850)	38.4 (2178)
Couple without children	32.0 (1276)	28.7 (1628)
Single parent	6.9 (274)	7.0 (397)

with non-responders, participants who completed the measure of psychological distress in June 2021 were older (mean age 51 years vs. 43 years), more highly educated (4% vs. 7% had no formal education), had a higher income (18% vs. 23% had low income), a greater proportion were white Europeans (92% vs. 86%), a greater proportion were retired (22% vs 8%), and a smaller proportion were living as a couple with children (43% vs. 53%) (see Table S3).

5.2. Prevalence of psychological distress

Fig. 1 shows the weighted prevalence of psychological distress among adults aged 35 years and above in the Specchio-COVID19 and CoLaus|PsyCoLaus cohorts.

In June 2021, 16.0% (95% CI, 14.6%–17.4%) of adults aged 35 years and above (N = 3965) reported symptoms of psychological distress, relative to 15.1% (14.0%–16.2%; N = 5667) in 2003–2006. Among the subgroups examined, in June 2021, psychological distress was highest among those aged 35–45 years (22.2% [19.2%–25.6%]). The corresponding prevalence estimate for this group in 2003–2006 was 19.1% (17.0%–21.4%). The lowest prevalence of psychological distress among the subgroups examined in June 2021 was observed in adults aged 65 years or older (9.8% [7.6%–12.7%]), which had a corresponding prevalence estimate of 10.4% (8.3%–12.9%) in 2003–2006. Estimates of psychological distress in June 2021 (Specchio-COVID19 cohort) were even higher among those younger than 35 years: 18–24 year olds (30.4% [24.2%–37.4%]); 25–34 year olds (22.6% [18.8%–27.0%]).

Depression and anxiety symptoms, as well as loneliness, declined from February–June 2021 in the total sample (see Fig. 2). Including all age groups, the weighted prevalence of probable depressive disorder in February 2021 was 13.5% (11.9%–15.2%; N = 3082); the weighted prevalence of probable anxiety disorder was 15.9% (14.2%–17.7%; N = 3082).

In June 2021, 12.6% (477/3771) reported they had felt a new need for psychological help or to contact a counseling and psychological support unit since the start of the pandemic. 5.3% (200/3771) reported having had suicidal thoughts in the past month; an additional 2.9% (110/3771) did not wish to respond.

Supplementary analyses showed that in June 2021, 6.8% (5.5%–8.3%) of adults aged 45 years and above (N = 2507) had probable depressive disorder, and 8% (6.5%–9.7%) had probable anxiety disorder, relative to 8.1% (7.2%–9.1%; N = 3663) with diagnosed depressive disorder, and 10.6% (9.6%–11.6%; N = 3652) with diagnosed anxiety

Table 2
Specchio-COVID19 total sample profile.

	N	Percent (N), unless stated otherwise
Demographic factors and living circumstances		
Age (years), mean (SD)		51.2 (14.7)
Sex	4619	
Male		42.8 (1976)
Female		57.2 (2643)
Ethnicity	4599	
White European		92.0 (4229)
Other		8.0 (370)
Education level	4627	
Primary		3.9 (182)
Secondary		30.9 (1432)
Tertiary		65.2 (3013)
Employment status	4635	
Employed		56.8 (2634)
Self-employed		7.5 (346)
Unemployed		3.1 (145)
Retired		21.9 (1013)
Other economically inactive		10.7 (497)
Household income[a]	3772	
Low		17.7 (668)
Mid		64.9 (2449)
High		17.4 (655)
Living circumstances	4636	
Alone		14.6 (679)
Single parent		6.1 (281)
Couple with children		42.7 (1979)
Couple without children		28.0 (1297)
With other adults		8.6 (400)
Household density, ratio of people to bedrooms	4595	
Overcrowded (>2)		12.4 (568)
Not overcrowded (≤2)		87.6 (4027)
Housing conditions	4606	
House with outdoor space		29.5 (1360)
Appartment with outdoor space		58.2 (2682)
Appartment without outdoor space		12.2 (564)
Urbanicity	4636	
Rural		17.4 (805)
Urban outskirts		34.8 (1614)
Urban		47.8 (2217)
Health and psychosocial factors		
Pre-existing mental health condition	4636	
Yes		2.3 (107)
No		97.7 (4529)
Pre-pandemic mental health treatment	3771	
Yes, continued during pandemic		6.8 (257)
Yes, treatment stopped during pandemic		3.4 (127)
No		89.8 (3387)
Adverse health event in the past 6 months, not COVID-19[b]	4366	
Yes		15.4 (674)
No		84.6 (3692)
Adverse life event in the past 6 months[c]	3771	
Yes		33.5 (1264)
No		65.5 (2507)
Loneliness (UCLA, range 3–9), mean (SD)	4356	3.12 (0.49)
Perceived stress (PSS-10, range 0–40), mean (SD)	3771	29.32 (4.10)
Social support (OSSS-3, range 3–14), mean (SD)	3771	10.30 (1.92)
COVID-19-specific factors		
Change to telework in last 6 months	2471	
Yes		16.0 (396)
No change in work circumstances		84.0 (2075)
Change in working hours in last 6 months	2436	
Yes		14.8 (361)
No change in work circumstances		85.2 (2075)
Job loss in last 6 months	2153	
Yes		3.6 (78)
No change in work circumstances		96.4 (2075)
Perceived severity of COVID-19 (range 1–5), mean (SD)	3559	3.02 (0.84)
	3559	3.66 (0.71)

(continued on next page)

Table 2 (*continued*)

	N	Percent (N), unless stated otherwise
Perceived contagiousness of COVID-19 (range 1–5), mean (SD)		
Positive PCR test result in last 6 months	4636	
Yes		5.6 (258)
No		94.4 (4378)
Positive serology result since March 2020[d]	4371	
Yes		19.8 (864)
No		80.2 (3507)
Self-reported post COVID-19	4636	
Yes		6.9 (318)
No		93.1 (4318)
Quarantine in the last 6 months[e]	3573	
Yes		5.6 (200)
No		94.4 (3373)

Notes: PSS-10 = Perceived Stress Scale-10, OSSS-3 = Oslo Social Support Scale-3.

[a] Categorised according to household composition, using information from the Cantonal Office of Statistics of Geneva for 2015–2017: low = below the first quartile of the income distribution, medium = between the first and third quartiles, and high = above the third quartile.

[b] Accident, surgery, pregnancy, birth, dental conditions, aggravation of a known chronic disease, newly diagnosed disease or allergy (excluding COVID-19 disease), cancer recurrence.

[c] Including death of a loved one, illness of a loved one, separation/divorce/family problems, violence at home, violence outside the home, job loss (own or partner), bankruptcy and/or financial difficulties, new or worsened diseases and accidents, professional and other events considered as negative.

[d] Due to natural infection.

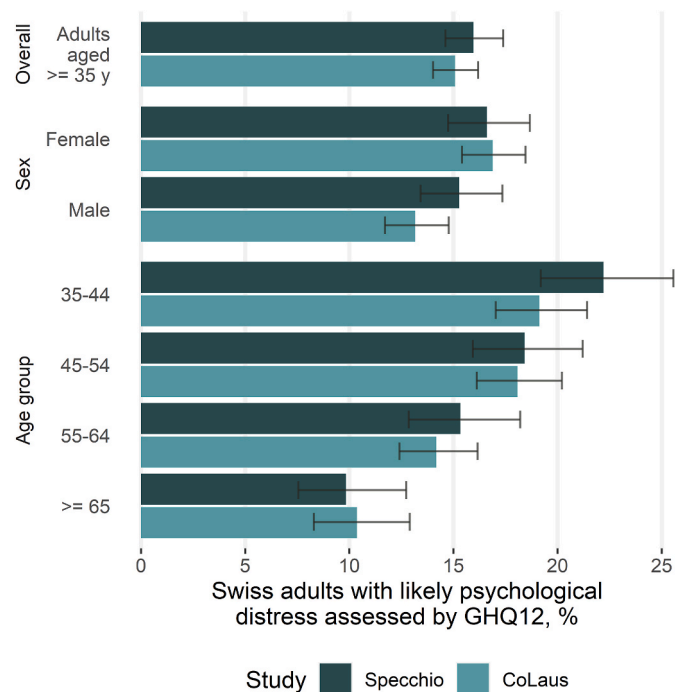[e] Due to contact with a person who tested positive for SARS-CoV-2.

Fig. 1. Weighted prevalence of psychological distress in June 2021 (Specchio-COVID19, N = 3965) and in 2003–2006 (CoLaus|PsyCoLaus, N = 5667) among adults aged 35 years and above. Proportions and 95% confidence intervals are shown for the total sample, and for age and sex sub-groups.

disorder in 2014–2018.

Additional supplementary analyses in CoLaus|PsyCoLaus showed the prevalence of psychological distress, anxiety, and depression was not higher in winter than summer months, respectively: unweighted

estimates for psychological distress (17.3% [15.6%–19.2%] vs. 15.7% [14.7%–17.9%]); anxiety disorder (9.6% [7.8%–11.7%] vs. 12.1% [9.9%–14.9%]); depressive disorder (6.5% [5.1%–8.4%] vs. 8.4% [6.6%–10.8%]).

5.3. Predictors of psychological distress in the Specchio-COVID19 cohort

Predictors of psychological distress in the total Specchio-COVID19 sample are shown in Table 3.

In the univariable models, female sex, non-white ethnicity, unemployment status or other economic inactivity, living in an apartment with or without access to outdoor space, and living alone, as a single parent, as a couple with children, or with others (not children) were demographic factors associated with greater risk of psychological distress (OR range = 1.20–2.54). Older age and retirement was associated with reduced risk of psychological distress. Pre-existing mental health condition, pre-pandemic psychological support, experiencing adverse life events in the past 6 months, greater loneliness, and greater perceived stress were health and psychosocial factors associated with greater risk of psychological distress (OR range = 1.27–2.81). Greater social support was associated with reduced risk of psychological distress. Experiencing a change in working hours in the past 6 months, experiencing a job loss in the past 6 months, greater perceived contagiousness of COVID-19, and self-reported post COVID-19 were COVID-19-specific factors associated with greater risk of psychological distress (OR range = 1.17–2.08).

In the multivariable models, all of the above, apart from non-white ethnicity, living in an apartment with or without access to outdoor space, living alone or as a couple with children, and stopping psychological support during the pandemic, remained statistically significant predictors of psychological distress.

6. Discussion

Overall prevalence of psychological distress among adults aged 35 years and above in June 2021, following a COVID-19 pandemic wave in Switzerland, was comparable to pre-pandemic levels in 2003–2006. Depression, anxiety, and loneliness declined from February to June 2021, along with the progressive relaxation of containment measures in Switzerland. Within the sampled period (February–June 2021), the highest prevalence of probable depression and anxiety disorder was in February 2021, at the start of the wave. Mental health was closer to pre-pandemic levels by the end of the wave in June 2021, but a fair proportion of participants reported a new need for psychological support since the start of the pandemic. Pre-pandemic and COVID-19-specific factors predicted psychological distress. These findings highlight the need for continued monitoring of mental health as the pandemic evolves, alongside efforts to support vulnerable groups.

6.1. Prevalence of psychological distress

In Europe, the US, and China, prevalence of psychological distress during the early stages of the pandemic was higher than before the pandemic (McGinty et al., 2020; Pierce et al., 2020; C. Wang et al., 2020). The uncertainty and sudden change to everyday life, reduced social contact, and health concerns explained this early increase in distress (Robinson and Daly, 2021). The comparatively lower rates of psychological distress seen in June 2021 in the present study, alongside the decline in depression, anxiety, and loneliness, from February to June, coincides with the end of the third wave (Federal Office of Public Health), and a relaxation of government policies in Switzerland (Oxford COVID-19 Government Response Tracker). By the end of the third wave, 66% of the Geneva population had developed SARS-CoV-2 antibodies after vaccination and/or infection (Stringhini et al., 2021b), there was some resumption to pre-pandemic life, and perceived health-related threats may have subsided. These findings concur with research
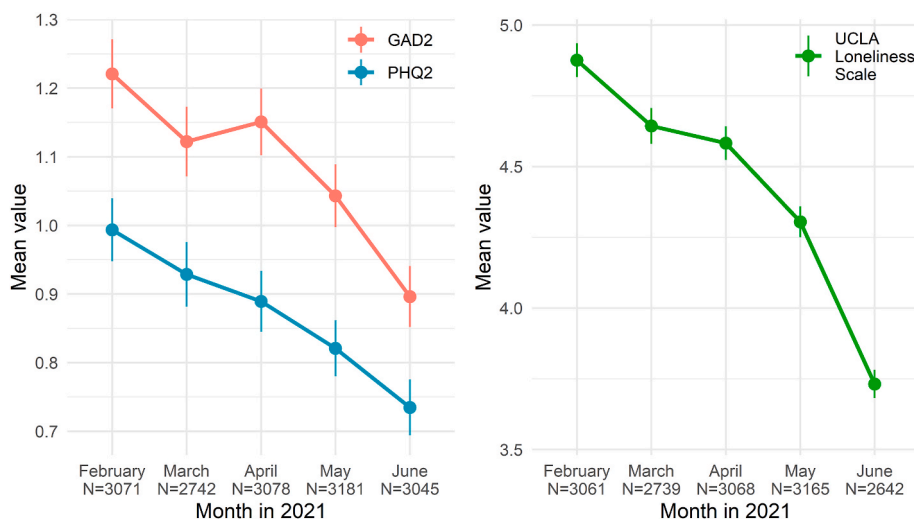
Fig. 2. Left panel shows mean scores (with standard deviation bounds) on the Patient Health Questionnaire-2 (PHQ-2) and the General Anxiety Disorder-2 scale (GAD-2) from February to June 2021 in the Specchio-COVID19 cohort. Right panel shows mean scores (with standard deviation bounds) on the UCLA 3-item Loneliness Scale from February to June 2021 in the Specchio-COVID19 cohort. Samples includes those ages 18 years and above, with data for at least two time points.

during the early stages of the COVID-19 pandemic, which found mental health improved as measures were eased (Robinson et al., 2022), and suggests overall there has been resilience in mental health.

Before and during the pandemic, prevalence of psychological distress was highest among women, and lowest among older adults (≥65 years). These findings concur with those of the latest Swiss Health Survey in 2017 (Schuler et al., 2020). In the Specchio-COVID19 cohort, 30% of 18–34 year olds reported psychological distress in June 2021. In the Swiss Health Survey, 22% of 15–34 year olds in Geneva reported psychological distress (Zufferey, 2020). Although it is not possible to draw firm conclusions due to differences in the age groups, and in the measures used, the higher prevalence of distress among younger participants in Specchio-COVID19 suggests younger people may still be disproportionately affected by the pandemic (Pierce et al., 2020).

6.2. Predictors of psychological distress in the Specchio-COVID19 cohort

Additional pre-pandemic predictors of psychological distress in June 2021 included unemployment, being a single parent, having a pre-existing mental health condition, experiencing adverse life events in the past 6 months, greater loneliness, and greater perceived stress. Retirement and greater social support were associated with reduced risk of psychological distress. These findings corroborate and extend research on psychological distress during the early stages of the pandemic (Fancourt et al., 2021; Kwong et al., 2021; Pierce et al., 2020), and highlight the persistence of social inequalities in mental health. Ensuring safe access to essential services (such as childcare), financial security (for example through government investment in debt respite), free or heavily subsidised mental health services (including online services, where appropriate), and mental health promotion within the community are ways in which vulnerable groups can be supported during and following the pandemic (Aknin et al., 2022; McDaid, 2021). Mental health care providers also play a key role in responding to their patients concerns related to COVID-19 (Ghebreyesus, 2020).

COVID-19-specific predictors of psychological distress in June 2021 included a change in working hours or job loss in the past 6 months, greater perceived severity and contagiousness of COVID-19, and self-reported post COVID-19. Previous research found job loss, but not switching to remote working in April 2020, predicted poorer mental health in US adults (McDowell et al., 2021). The present study corroborates these findings during a pandemic wave in 2021, and confirms that a change in working hours (increase or decrease) may be detrimental for mental health. The impact of changing work circumstances on mental

health likely depends on the duration of change, as well as the individual's personal circumstances, and requires further investigation. Some families may benefit from the flexibility of home working, while others may feel isolated (Birimoglu Okuyan and Begen, 2022).

Worries about the risk of infection and dying from COVID-19 have previously been associated with poorer mental health (Kämpfen et al., 2020). Worries about COVID-19 may worsen mental health, and poorer mental health may lead to rumination and worries about COVID-19. Self-reported post COVID-19, but not previous SARS-CoV-2 infection, predicted psychological distress in the present study. A large-scale US study including 62'354 COVID-19 cases found that a COVID-19 diagnosis was associated with increased risk of psychiatric disorder during the first 14–90 days after diagnosis (Taquet et al., 2021). The present study included 258 cases with a positive PCR/rapid antigen test in the last 6 months, and may not have been sufficiently powered to detect an association, other than in more severe cases with self-reported post COVID-19. Associations between COVID-19 and psychological distress are bidirectional, and could be mediated by biological and behavioural factors (Mazza et al., 2020; Taquet et al., 2021; Wu et al., 2020).

There was no association between quarantine (due to contact with a person who tested positive for SARS-CoV-2) in the past 6 months and psychological distress. This finding contrasts with previously reported adverse effects of quarantine during the COVID-19 pandemic (Shi et al., 2020; Yunhe Wang et al., 2021). However, null associations between quarantine and mental health have been reported (Yongguang Wang et al., 2011). The conditions and duration of quarantine, individual circumstances, and COVID-19-related attitudes play an important role (Brooks et al., 2020; Shi et al., 2020; Yunhe Wang et al., 2021). For example, quarantine is most strongly associated with psychological distress among vulnerable groups (Yunhe Wang et al., 2021); and centralised quarantine in an unfamiliar environment is more strongly associated with adverse outcomes (Shi et al., 2020). Further research is needed to assess the longer-term effects of quarantine during the COVID-19 pandemic.

6.3. Strengths and limitations

Study strengths include the population-level, longitudinal data from two cohorts, and range of potential predictors of psychological distress. The GHQ-12, GAD-2, and PHQ-2 are validated self-report measures, and correlate strongly with clinically diagnosed psychiatric disorder. However, they are not clinical assessments and do not capture all forms of mental distress. The comparison of psychological distress in the pre-

Table 3
Logistic regression models with predictors of psychological distress (unweighted, GHQ-12 score ≥4) in June 2021.

	N	Unadjusted OR (95% CI)	N	Adjusted OR (95% CI)[a]
Demographic factors and living circumstances				
Age in years, per one unit increase	4636	0.98 (0.97, 0.98) ***	4610	··0.98 (0.97, 0.98) ***
Sex (Ref: male)	4619		4610	
Female		1.41 (1.21, 1.65) ***		1.32 (1.13, 1.55) ***
Ethnicity (Ref: white European)	4599		4574	
Non-white		1.32 (1.02, 1.70) *		1.12 (0.87, 1.44)
Education (Ref: tertiary)	4636		4610	
Secondary		0.95 (0.80, 1.11)		0.94 (0.80, 1.11)
Primary		0.88 (0.58, 1.29)		0.83 (0.56, 1.24)
Employment status (Ref: Employed)	4635		4609	
Self-employed		0.88 (0.65, 1.17)		0.99 (0.73, 1.34)
Unemployed		1.93 (1.34, 2.75) ***		1.80 (1.25, 2.61) **
Retired		0.47 (0.37, 0.59) ***		0.70 (0.53, 0.93) *
Other economically inactive		1.31 (1.04, 1.64) *		1.02 (0.80, 1.29)
Household income (Ref: high)	3772		3755	
Mid		0.99 (0.79, 1.25)		1.02 (0.81, 1.29)
Low		1.25 (0.96, 1.65)		1.24 (0.93, 1.65)
Living circumstances (Ref: couple without children)	4636		4610	
Alone		1.39 (1.08, 1.78) *		1.23 (0.95, 1.58)
Single parent		2.54 (1.87, 3.42) ***		2.03 (1.49, 2.77) ***
Couple with children		1.30 (1.07, 1.57) **		0.99 (0.81, 1.23)
With other adults		2.53 (1.94, 3.30) **		1.40 (1.01, 1.95) *
Household density (Ref: not overcrowded)	4595		4570	
Overcrowded		1.03 (0.82, 1.29)		0.91 (0.72, 1.15)
Housing conditions (Ref: house, outdoor space)	4613		4581	
Appartment, outdoor space		1.20 (1.01, 1.43) *		1.09 (0.91, 1.31)
Appartment, no outdoor space		1.30 (1.01, 1.66) *		1.20 (0.93, 1.55)
Urbanicity (Ref: rural)	4636		4610	
Urban outskirts		1.12 (0.90, 1.41)		1.18 (0.94, 1.49)
Urban		1.21 (0.98, 1.50)		1.19 (0.95, 1.47)
Health and psychosocial factors				
Pre-existing mental health condition (Ref: no)	4636		4610	
Yes		2.81 (1.88, 4.16) ***		2.87 (1.92, 4.30) ***
Pre-pandemic psychological support (Ref: no)	3771		3748	
Yes, continued during pandemic		2.72 (2.07, 3.56) ***		2.09 (1.55, 2.83) ***
Yes, treatment stopped during pandemic		1.66 (1.08, 2.48) *		1.41 (0.91, 2.16)
Any adverse health event in the past 6 months, not COVID-19 (Ref: no)	4636		4610	
Yes		1.87 (1.55, 2.26) ***		1.86 (1.54, 2.26) ***
	3771		3748	

Table 3 (*continued*)

	N	Unadjusted OR (95% CI)	N	Adjusted OR (95% CI)[a]
Any adverse life events in the past 6 months (Ref: no)				
Yes		2.41 (2.03, 2.86) ***		2.36 (1.98, 2.81) ***
Loneliness, per one unit increase	4356	1.60 (1.52, 1.68) ***	4330	1.58 (1.50, 1.66) ***
Perceived stress, per one unit increase	3771	1.27 (1.24, 1.29) ***	3748	1.26 (1.23, 1.29) ***
Social support, per one unit increase	3771	0.79 (0.76, 0.82) ***	3748	0.78 (0.75, 0.82) ***
COVID-19-specific factors				
Change to telework in last 6 months (Ref: no change in work circumstances)	2471	1.22 (0.93, 1.59)	2457	1.19 (0.91, 1.57)
Change in working hours in last 6 months (Ref: no change in work circumstances)	2436	1.86 (1.44, 2.39) ***	2424	1.91 (1.47, 2.47) ***
Job loss in last 6 months (Ref: no change in work circumstances)	2153	1.99 (1.19, 3.22) **	2141	1.88 (1.14, 3.11) *
Perceived severity of COVID-19, per one unit increase	3559	1.08 (0.98, 1.20)	3537	1.21 (1.08, 1.36) ***
Perceived contagiousness of COVID-19, per one unit increase	3559	1.17 (1.03, 1.32) *	3537	1.18 (1.04, 1.34) **
Positive serology result since March 2020	4371	1.11 (0.92, 1.34)	4347	0.98 (0.81, 1.20)
Positive PCR test result in last 6 months	4636	0.95 (0.68, 1.30)	4610	0.98 (0.70, 1.37)
Self-reported post COVID-19 (Ref: no)	4636		4610	
Yes		2.08 (1.61, 2.66) ***		1.95 (1.50, 2.53) ***
Quarantine in the last 6 months (Ref: no)	3573		3550	
Yes		1.07 (0.74, 1.53)		0.98 (0.66, 1.45)

* p < 0.05, ** p < 0.01, *** p < 0.001.
[a] Adjusted for age, sex, education level, and pre-existing mental health condition.

pandemic and Specchio-COVID19 cohorts was limited to adults aged 35 years and above, and cannot be generalised to younger age groups, who may be particularly impacted by the pandemic (Pierce et al., 2020). The pre-pandemic measure of psychological distress was assessed in 2003–2006, many years before the pandemic. Although various aspects of society have changed since this time, some studies found no secular change in the prevalence of anxiety and depression from the early 2000s until prior to the pandemic (e.g. Baxter et al., 2014; Bebbington and McManus, 2020). Other studies have reported an increase in the prevalence of anxiety and depression, especially in young adults aged 18–35 years (Gagné et al., 2022; Goodwin et al., 2020). Given that previous research suggests anxiety and depression may have remained stable or increased over time prior to the pandemic, we can be confident that the prevalence of psychological distress that we measured one year into the pandemic was not higher than pre-pandemic estimates. The decline in anxiety and depression in Specchio-COVID19 was observed from winter to summer. However, the results suggest effects greater than usual seasonal variations (Winthorst et al., 2011); and supplementary analysis in CoLaus|PsyCoLaus showed no difference in the prevalence of psychological distress, anxiety, and depression in winter and summer months. Specchio-COVID19 participants had a higher education level than CoLaus|PsyCoLaus participants. Although weights were applied to make the sample representative of the Swiss population, it is still possible that there was some selection bias due to other factors associated with survey participation not accounted for by weighting (e.g. topic interest). The data were from French-speaking regions in Switzerland, and vulnerable individuals with poor mental health are less likely to

participate in surveys; therefore, the findings may not generalise to all regions in Switzerland, or to more vulnerable groups. During the development of the Specchio-COVID19 study, post COVID-19 was defined as symptoms lasting longer than 3 weeks, but it is currently defined as usually occurring 3 months from the onset of COVID-19, with symptoms lasting for at least 2 months (Soriano et al., 2021). Further research is therefore needed to examine associations between post-COVID19 and mental health. Since June 2021, there have been further pandemic waves, containment measures, and the recent lifting of measures in March 2022. It will be important to examine mental health during this time, as well as potential longer-term effects in vulnerable groups.

6.4. Practical implications and conclusions

Acute distress during the COVID-19 pandemic may lead to long-term mental health problems, therefore it is important to monitor how mental health, including symptoms of psychological distress evolve during the pandemic, as well as predictors of distress. This study suggests that psychological distress was highest at the start of the third pandemic wave in Switzerland, but by the end of the wave in June 2021, overall prevalence was comparable with pre-pandemic levels. These findings highlight the need for additional mental health support during times of stricter government policies relating to COVID-19; yet these data also suggest that individuals can adapt relatively quickly to the changing context. This study also identified a range of pre-pandemic and COVID-19-specific predictors of distress at the end of the third wave, highlighting the persistence of inequalities in mental health. These findings therefore highlight the need for ongoing monitoring of mental health as the pandemic evolves, with efforts from the government and healthcare practitioners to support vulnerable groups.

Author contributions

S. Schrempft, N. Pullen, H. Baysson, A. Wisniak, and S. Stringhini contributed to the conception and design of the study. H. Baysson, F. Pennacchio, M. E. Zaballa, P. Vollenweider, P. Marques-Vidal, M. Preisig, I. Guessous, and S. Stringhini collected the data. N. Pullen analysed the data, with guidance from S. Schrempft. S. Schrempft wrote the first and successive drafts of the manuscript. All authors revised the manuscript for important intellectual content. S. Stringhini, I. Guessous, P. Vollenweider, and M. Preisig acquired funding for the studies.

Data availability statement

The data are available on request from the corresponding author. The ethics protocols under which the data were collected do not permit public data deposition.

Role of the funding source

Declaration of competing interest

None.

Acknowledgments

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2022.12.042.

References

Aknin, L.B., De Neve, J.-E., Dunn, E.W., Fancourt, D.E., Goldberg, E., Helliwell, J.F., Jones, S.P., Karam, E., Layard, R., Lyubomirsky, S., Rzepa, A., Saxena, S., Thornton, E.M., VanderWeele, T.J., Whillans, A.V., Zaki, J., Karadag, O., Ben Amor, Y., 2022. Mental health during the first year of the COVID-19 pandemic: a review and recommendations for moving forward. Perspect. Psychol. Sci. 17, 915–936. https://doi.org/10.1177/17456916211029964.

Baysson, H., Pennacchio, F., Wisniak, A., Zaballa, M.-E., Pullen, N., Collombet, P., Lorthe, E., Joost, S., Balavoine, J.-F., Bachmann, D., Azman, A.S., Pittet, D., Chappuis, F., Kherad, O., Kaiser, L., Guessous, I., Stringhini, S., Group, on behalf of the S.C. study, 2022. The Specchio-COVID19 cohort study: a longitudinal follow-up of SARS-CoV-2 serosurvey participants in the canton of Geneva, Switzerland (Study protocol). BMJ Open 12, e055515. https://doi.org/10.1136/bmjopen-2021-055515.

Baxter, A.J., Scott, K.M., Ferrari, A.J., Norman, R.E., Vos, T., Whiteford, H.A., 2014. Challenging the myth of an "epidemic" of common mental disorders: trends in the global prevalence of anxiety and depression between 1990 and 2010. Depress. Anxiety 31, 506–516. https://doi.org/10.1002/da.22230.

Bebbington, P.E., McManus, S., 2020. Revisiting the one in four: the prevalence of psychiatric disorder in the population of England 2000–2014. Br. J. Psychiatry 216, 55–57. https://doi.org/10.1192/bjp.2019.196.

Bendau, A., Kunas, S.L., Wyka, S., Petzold, M.B., Plag, J., Asselmann, E., Ströhle, A., 2021. Longitudinal changes of anxiety and depressive symptoms during the COVID-19 pandemic in Germany: the role of pre-existing anxiety, depressive, and other mental disorders. J. Anxiety Disord. 79, 102377. https://doi.org/10.1016/j.janxdis.2021.102377.

Birimoglu Okuyan, C., Begen, M.A., 2022. Working from home during the COVID-19 pandemic, its effects on health, and recommendations: the pandemic and beyond. Perspect. Psychiatr. Care 58, 173–179. https://doi.org/10.1111/ppc.12847.

Bøen, H., Dalgard, O.S., Bjertness, E., 2012. The importance of social support in the associations between psychological distress and somatic health problems and socio-economic factors among older adults living at home: a cross sectional study. BMC Geriatr. 12, 27. https://doi.org/10.1186/1471-2318-12-27.

Bridgland, V.M., Moeck, E.K., Green, D.M., Swain, T.L., Nayda, D.M., Matson, L.A., Hutchison, N.P., Takarangi, M.K., 2021. Why the COVID-19 pandemic is a traumatic stressor. PLoS One 16, e0240146. https://doi.org/10.1371/journal.pone.0240146.

Brooks, S.K., Webster, R.K., Smith, L.E., Woodland, L., Wessely, S., Greenberg, N., Rubin, G.J., 2020. The psychological impact of quarantine and how to reduce it:

rapid review of the evidence. Lancet 395, 912–920. https://doi.org/10.1016/S0140-6736(20)30460-8.

Cohen, S., 1988. Perceived stress in a probability sample of the United States. In: Spacapan, S., Oskamp, S. (Eds.), The Social Psychology of Health, the Claremont Symposium on Applied Social Psychology. Sage Publications, Inc, Thousand Oaks, CA, US, pp. 31–67.

December 16) de Quervain, D., Aerni, A., Amini, E., Bentz, D., Coynel, D., Freytag, V., Gerhards, C., Papassotiropoulos, A., Schicktanz, N., Schlitt, T., Zimmer, A., Zuber, P., 2020. The Swiss Corona Stress Study: Second Pandemic Wave. https://doi.org/10.31219/osf.io/6cseh. November 2020.

Fancourt, D., Steptoe, A., Bu, F., 2021. Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in England: a longitudinal observational study. Lancet Psychiatr. 8, 141–149. https://doi.org/10.1016/S2215-0366(20)30482-X.

Federal Office Federal Office of public health of the Swiss confederation COVID-19 Switzerland. https://www.covid19.admin.ch/en/epidemiologic/case?time=total&geo=CH (accessed September 2021).

Fiorillo, A., Sampogna, G., Giallonardo, V., Del Vecchio, V., Luciano, M., Albert, U., Carmassi, C., Carrà, G., Cirulli, F., Dell'Osso, B., Nanni, M.G., Pompili, M., Sani, G., Tortorella, A., Volpe, U., 2020. Effects of the lockdown on the mental health of the general population during the COVID-19 pandemic in Italy: results from the COMET collaborative network. Eur. Psychiatr. 63, e87. https://doi.org/10.1192/j.eurpsy.2020.89.

Gagné, T., Schoon, I., McMunn, A., Sacker, A., 2022. Mental distress among young adults in Great Britain: long-term trends and early changes during the COVID-19 pandemic. Soc. Psychiatr. Psychiatr. Epidemiol. 57, 1261–1272. https://doi.org/10.1007/s00127-021-02194-7.

Ghebreyesus, T.A., 2020. Addressing mental health needs: an integral part of COVID-19 response. World Psychiatr. 19, 129–130. https://doi.org/10.1002/wps.20768.

Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, M., Gureje, O., Rutter, C., 1997. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. Psychol. Med. 27, 191–197. https://doi.org/10.1017/S0033291796004242.

Goodwin, R.D., Weinberger, A.H., Kim, J.H., Wu, M., Galea, S., 2020. Trends in anxiety among adults in the United States, 2008–2018: rapid increases among young adults. J. Psychiatr. Res. 130, 441–446. https://doi.org/10.1016/j.jpsychires.2020.08.014.

Hernandez, L.D., Giezendanner, S., Fischer, R., Zeller, A., 2021. The effect of COVID-19 on mental well-being in Switzerland: a cross-sectional survey of the adult Swiss general population. BMC Fam. Pract. 22, 181. https://doi.org/10.1186/s12875-021-01532-7.

Hughes, M.E., Waite, L.J., Hawkley, L.C., Cacioppo, J.T., 2004. A short scale for measuring loneliness in large surveys: results from two population-based studies. Res. Aging 26, 655–672. https://doi.org/10.1177/0164027504268574.

Kämpfen, F., Kohler, I.V., Ciancio, A., Bruin, W.B. de, Maurer, J., Kohler, H.-P., 2020. Predictors of mental health during the Covid-19 pandemic in the US: role of economic concerns, health worries and social distancing. PLoS One 15, e0241895. https://doi.org/10.1371/journal.pone.0241895.

Kroenke, K., Spitzer, R.L., Williams, J.B.W., 2003. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med. Care 41, 1284–1292. https://doi.org/10.1097/01.MLR.0000093487.78664.3C.

Kroenke, K., Spitzer, R.L., Williams, J.B.W., Monahan, P.O., Löwe, B., 2007. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. Ann. Intern. Med. 146, 317–325. https://doi.org/10.7326/0003-4819-146-5-200703060-00004.

Kwong, A.S.F., Pearson, R.M., Adams, M.J., Northstone, K., Tilling, K., Smith, D., Fawns-Ritchie, C., Bould, H., Warne, N., Zammit, S., Gunnell, D.J., Moran, P.A., Micali, N., Reichenberg, A., Hickman, M., Rai, D., Haworth, S., Campbell, A., Altschul, D., Flaig, R., McIntosh, A.M., Lawlor, D.A., Porteous, D., Timpson, N.J., 2021. Mental health before and during the COVID-19 pandemic in two longitudinal UK population cohorts. Br. J. Psychiatry 218, 334–343. https://doi.org/10.1192/bjp.2020.242.

Lee, A.M., Wong, J.G., McAlonan, G.M., Cheung, V., Cheung, C., Sham, P.C., Chu, C.-M., Wong, P.-C., Tsang, K.W., Chua, S.E., 2007. Stress and psychological distress among SARS survivors 1 year after the outbreak. Can. J. Psychiatry 52, 233–240. https://doi.org/10.1177/070674370705200405.

Liu, X., Kakade, M., Fuller, C.J., Fan, B., Fang, Y., Kong, J., Guan, Z., Wu, P., 2012. Depression after exposure to stressful events: lessons learned from the severe acute respiratory syndrome epidemic. Compr. Psychiatry 53, 15–23. https://doi.org/10.1016/j.comppsych.2011.02.003.

Lundin, A., Hallgren, M., Theobald, H., Hellgren, C., Torgén, M., 2016. Validity of the 12-item version of the General Health Questionnaire in detecting depression in the general population. Publ. Health 136, 66–74. https://doi.org/10.1016/j.puhe.2016.03.005.

Maunder, R.G., Lancee, W.J., Balderson, K.E., Bennett, J.P., Borgundvaag, B., Evans, S., Fernandes, C.M.B., Goldbloom, D.S., Gupta, M., Hunter, J.J., Hall, L.M., Nagle, L.M., Pain, C., Peczeniuk, S.S., Raymond, G., Read, N., Rourke, S.B., Steinberg, R.J., Stewart, T.E., Coke, S.V., Veldhorst, G.G., Wasylenki, D.A., 2006. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. Emerg. Infect. Dis. 12, 1924–1932. https://doi.org/10.3201/eid1212.060584.

Mazza, M.G., De Lorenzo, R., Conte, C., Poletti, S., Vai, B., Bollettini, I., Melloni, E.M.T., Furlan, R., Ciceri, F., Rovere-Querini, P., Benedetti, F., 2020. Anxiety and depression in COVID-19 survivors: role of inflammatory and clinical predictors. Brain Behav. Immun. 89, 594–600. https://doi.org/10.1016/j.bbi.2020.07.037.

McDaid, D., 2021. Investing in strategies to support mental health recovery from the COVID-19 pandemic. Eur. Psychiatr. 64 (1), e32. https://doi.org/10.1192/j.eurpsy.2021.28.

McDowell, C.P., Herring, M.P., Lansing, J., Brower, C.S., Meyer, J.D., 2021. Associations between employment changes and mental health: US data from during the COVID-19 pandemic. Front. Psychol. 12, 255. https://doi.org/10.3389/fpsyg.2021.631510.

McGinty, E.E., Presskreischer, R., Anderson, K.E., Han, H., Barry, C.L., 2020. Psychological distress and COVID-19–related stressors reported in a longitudinal cohort of US adults in April and July 2020. JAMA 324, 2555–2557. https://doi.org/10.1001/jama.2020.21231.

Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R., Wessely, S., McManus, S., Abel, K.M., 2020. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. Lancet Psychiatr. 7, 883–892. https://doi.org/10.1016/S2215-0366(20)30308-4.

Piumatti, G., Levati, S., Amati, R., Crivelli, L., Albanese, E., Corona Immunitas Ticino Working Group., 2022. Trajectories of depression, anxiety and stress among adults during the COVID-19 pandemic in Southern Switzerland: the Corona Immunitas Ticino cohort study. Publ. Health 206, 63–69.

Plummer, F., Manea, L., Trepel, D., McMillan, D., 2016. Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. Gen. Hosp. Psychiatr. 39, 24–31. https://doi.org/10.1016/j.genhosppsych.2015.11.005.

Posner, K., Brown, G.K., Stanley, B., Brent, D.A., Yershova, K.V., Oquendo, M.A., Currier, G.W., Melvin, G.A., Greenhill, L., Shen, S., Mann, J.J., 2011. The Columbia–Suicide Severity Rating Scale: initial validity and internal consistency findings from three multisite studies with adolescents and adults. Am. J. Psychiatr. 168, 1266–1277. https://doi.org/10.1176/appi.ajp.2011.10111704.

Robinson, E., Daly, M., 2021. Explaining the rise and fall of psychological distress during the COVID-19 crisis in the United States: longitudinal evidence from the Understanding America Study. Br. J. Health Psychol. 26, 570–587.

Robinson, E., Sutin, A.R., Daly, M., Jones, A., 2022. A systematic review and meta-analysis of longitudinal cohort studies comparing mental health before versus during the COVID-19 pandemic in 2020. J. Affect. Disord. 296, 567–576.

Schuler, D., Tuch, A., Peter, C., 2020. La santé psychique en Suisse. Monitorage 2020. Obsan Rapport 15/2020).

Shi, L., Lu, Z.-A., Que, J.-Y., Huang, X.-L., Liu, L., Ran, M.-S., Gong, Y.-M., Yuan, K., Yan, W., Sun, Y.-K., Shi, J., Bao, Y.-P., Lu, L., 2020. Prevalence of and risk factors associated with mental health symptoms among the general population in China during the coronavirus disease 2019 pandemic. JAMA Netw. Open 3, e2014053. https://doi.org/10.1001/jamanetworkopen.2020.14053.

Soriano, J.B., Murthy, S., Marshall, J.C., Relan, P., Diaz, J.V., 2021. A clinical case definition of post-COVID-19 condition by a Delphi consensus. Lancet Infect. Dis. 22, e102–e107. https://doi.org/10.1016/S1473-3099(21)00703-9.

Staples, L.G., Dear, B.F., Gandy, M., Fogliati, V., Fogliati, R., Karin, E., Nielssen, O., Titov, N., 2019. Psychometric properties and clinical utility of brief measures of depression, anxiety, and general distress: the PHQ-2, GAD-2, and K-6. Gen. Hosp. Psychiatr. 56, 13–18. https://doi.org/10.1016/j.genhosppsych.2018.11.003.

Stringhini, S., Wisniak, A., Piumatti, G., Azman, A.S., Lauer, S.A., Baysson, H., De Ridder, D., Petrovic, D., Schrempft, S., Marcus, K., Yerly, S., Arm Vernez, I., Keiser, O., Hurst, S., Posfay-Barbe, K.M., Trono, D., Pittet, D., Gétaz, L., Chappuis, F., Eckerle, I., Vuilleumier, N., Meyer, B., Flahault, A., Kaiser, L., Guessous, I., 2020. Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): a population-based study. Lancet 396, 313–319. https://doi.org/10.1016/S0140-6736(20)31304-0.

Stringhini, S., Zaballa, M.-E., Perez-Saez, J., Pullen, N., de Mestral, C., Picazio, A., Pennacchio, F., Wisniak, A., Richard, A., Baysson, H., Loizeau, A., Balavoine, J.-F., Trono, D., Pittet, D., Posfay-Barbe, K., Flahault, A., Chappuis, F., Kherad, O., Vuilleumier, N., Kaiser, L., Azman, A.S., Guessous, I., Specchio-COVID19 Study Group, 2021a. Seroprevalence of anti-SARS-CoV-2 antibodies after the second pandemic peak. Lancet Infect. Dis. 21, 600–601. https://doi.org/10.1016/S1473-3099(21)00054-2.

Stringhini, S., Zaballa, M.-E., Pullen, N., Perez-Saez, J., Mestral, C. de, Loizeau, A.J., Lamour, J., Pennacchio, F., Wisniak, A., Dumont, R., Baysson, H., Richard, V., Lorthe, E., Semaani, C., Balavoine, J.-F., Pittet, D., Vuilleumier, N., Chappuis, F., Kherad, O., Azman, A.S., Posfay-Barbe, K., Kaiser, L., Guessous, I., on behalf of the Specchio-COVID19 cohort study, 2021b. Seroprevalence of anti-SARS-CoV-2 antibodies 6 months into the vaccination campaign in Geneva, Switzerland, 1 June to 7 July 2021. Euro Surveill. 26, 2100830 https://doi.org/10.2807/1560-7917.ES.2021.26.43.2100830.

Taquet, M., Luciano, S., Geddes, J.R., Harrison, P.J., 2021. Bidirectional associations between COVID-19 and psychiatric disorder: retrospective cohort studies of 62 354 COVID-19 cases in the USA. Lancet Psychiatr. 8, 130–140. https://doi.org/10.1016/S2215-0366(20)30462-4.

University of Oxford, 2021. Oxford Covid-19 Government Response Tracker accessed September 2021). https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R.S., Choo, F.N., Tran, B., Ho, R., Sharma, V.K., Ho, C., 2020. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. Brain Behav. Immun. 87, 40–48. https://doi.org/10.1016/j.bbi.2020.04.028.

Wang, Yunhe, Shi, L., Que, J., Lu, Q., Liu, L., Lu, Z., Xu, Y., Liu, J., Sun, Y., Meng, S., Yuan, K., Ran, M., Lu, L., Bao, Y., Shi, J., 2021. The impact of quarantine on mental health status among general population in China during the COVID-19 pandemic. Mol. Psychiatr. 26, 4813–4822. https://doi.org/10.1038/s41380-021-01019-y.

Wang, Yongguang, Xu, B., Zhao, G., Cao, R., He, X., Fu, S., 2011. Is quarantine related to immediate negative psychological consequences during the 2009 H1N1 epidemic? Gen. Hosp. Psychiatry 33, 75–77. https://doi.org/10.1016/j.genhosppsych.2010.11.001.

Winthorst, W.H., Post, W.J., Meesters, Y., Penninx, B.W., Nolen, W.A., 2011. Seasonality in depressive and anxiety symptoms among primary care patients and in patients with depressive and anxiety disorders; results from The Netherlands Study of Depression and Anxiety. BMC Psychiatr. 11, 198. https://doi.org/10.1186/1471-244X-11-198.

Wu, Y., Xu, X., Chen, Z., Duan, J., Hashimoto, K., Yang, L., Liu, C., Yang, C., 2020. Nervous system involvement after infection with COVID-19 and other coronaviruses. Brain Behav. Immun. 87, 18–22. https://doi.org/10.1016/j.bbi.2020.03.031.

Xue, B., McMunn, A., 2021. Gender differences in unpaid care work and psychological distress in the UK Covid-19 lockdown. PLoS One 16, e0247959. https://doi.org/10.1371/journal.pone.0247959.

Zufferey, J., 2020. La santé dans le canton de Genève. Résultats de l'Enquête suisse sur la santé 2017. Obsan Rapport 04/2020).