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Trends of perceived disruption in healthcare services during the pandemic: findings from the COVID-19 National Resilience Cohort in Iceland

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Background: Coronavirus disease 2019 (COVID-19) caused major disruptions in healthcare services worldwide. Yet, little is known about the association between perceived disruption in healthcare services and socio-demographic factors, pre-existing health conditions as well as concurrent physical and psychological symptoms. **Methods:** Leveraging data from the Icelandic COVID-19 National Resilience Cohort, we performed a repeated measure analysis among 15 754 participants who responded to the question on perceived disruption in healthcare services from December 2020 to July 2021, to explore its association with socio-demographic factors, health indicators and conditions. Furthermore, we performed a longitudinal analysis among 7848 participants with two repeated measures to explore the association between timing and duration of perceived disruption in healthcare services and changes in depression, anxiety, sleep quality and somatic symptoms. **Results:** The prevalence of perceived disruption in healthcare services slightly decreased over time ($P < 0.01$). Perceived disruption in healthcare services was more prevalent among individuals with pre-existing health conditions, i.e. history of psychiatric disorders (prevalence ratio = 1.59, 95% confidence interval 1.48–1.72) and chronic somatic conditions [1.40 (1.30–1.52)]. However, no increase in the prevalence of perceived disruption in healthcare services was observed among individuals diagnosed with COVID-19 [0.99 (0.84–1.18)]. Moreover, we found that emerging perceived disruption in healthcare services was associated with an increase in symptoms of mental illness during the pandemic (βs 0.06–0.68). **Conclusions:** A disruption in healthcare services during the COVID-19 pandemic was reported by vulnerable groups, while the Icelandic healthcare system managed to maintain accessible services to individuals with COVID-19.

Introduction

Backlogs and delays in healthcare services caused by the coronavirus disease 2019 (COVID-19) pandemic left millions of people without care worldwide. Indeed, nearly 93% of countries worldwide faced mental health services disruption in the early stages of the pandemic.[1] On average, 26% of healthcare services remained disrupted when the pandemic progressed across the European region in 2021.[2]

Negative effects of the disruption in healthcare services may have disproportionately affected populations across socio-demographic groups during the COVID-19 pandemic.[3] Indeed, several studies indicated that young adults,[4] ethnic minorities[5] and low-income groups[4] are more likely to suffer from the adverse effects of healthcare disruption during the pandemic. Furthermore, individuals with underlying health conditions were more likely to delay seeking health care due to fear of being infected, especially those with immunosuppressive conditions,[3] chronic somatic diseases[3] and mental disorders.[6] As these comorbidities have been associated with the risk of severe COVID-19,[7] the disruption in healthcare services could be particularly problematic for patients with pre-existing health conditions. Yet, little is known about the prevalence of perceived disruption in healthcare services during the COVID-19 pandemic period, and a more in-depth characterization of vulnerable populations affected by the pandemic is needed.

Delayed and deferred healthcare services may indeed negatively influence the mental health of those in need of services.[8–10] Moreover, a recent qualitative review indicates that people with

pre-existing psychiatric disorders faced risks of relapse, further deterioration and even death during the pandemic.[11] However, to what extent deterioration of mental health is related to perceived disruption in healthcare services awaits to be further studied.

To this end, leveraging the rich data collected for the Icelandic COVID-19 National Resilience Cohort, we set out to investigate trends of perceived disruption in healthcare services during the COVID-19 pandemic period and to explore its association with socio-demographic factors, pre-existing health conditions as well as concurrent physical and psychological symptoms.

Methods

Study population and design

The Icelandic COVID-19 National Resilience (C19-resilience) cohort was established to explore the long-term impact of the COVID-19 pandemic in Iceland.[12] This nationwide study was open to all Icelandic-speaking individuals 18 years or older with an Icelandic electronic identification number. Recruitment was mainly through media and invitations to participants in ongoing cohort studies in Iceland, namely the SAGA (Stress-And-Gene-Analysis) cohort, the iStopMM (Iceland Screens, Treats or Prevents Multiple Myeloma) study, and the Health and Well-Being of Icelanders cohort (Supplementary references). In addition, all individuals in Iceland who tested positive for SARS-CoV-2 by RT-PCR through 2020 received an invitation in January and February of 2021. In total, 23 960 participants were recruited at baseline (97.1% recruited from April 2020 to December 2020) and two waves of follow-up were completed by July 2021 (Follow-up Wave 1: December 2020 to May 2021; Follow-up Wave 2: May 2021 to July 2021). The participants of the C19-resilience cohort had a similar distribution of residency to that of the general Icelandic population but were on average older and more likely to be female and have higher education compared with the general Icelandic population (Supplementary table S1).

We performed a repeated measures analysis among 15 754 participants who responded to the question on perceived disruption in healthcare services at Time point 1 (T1, from December 2020 to February 2021) or/and Time point 2 (T2, from May 2021 to July 2021), to explore its association with socio-demographic factors, health indicators and health conditions. Furthermore, we performed a longitudinal analysis among 7848 participants with two repeated measures on perceived disruption in healthcare services (i.e. those who responded at both T1 and T2) to explore the association between timing and duration of perceived disruption in healthcare services and changes in symptoms of mental illness (i.e. depression, anxiety, sleep quality and somatic symptoms). A detailed flowchart of the study population is presented in Supplementary figure S1.

All participants provided electronic informed consent before answering the web-based questionnaire. The study was approved by the National Bioethics Committee (number 20-073) and the Data Protection Authority in Iceland.

Perceived disruption in healthcare services

The question regarding perceived disruption in healthcare services during the COVID-19 pandemic was added to the questionnaire after December 2020. We used the question 'During the COVID-19 epidemic, have you experienced any inconvenience caused by limited healthcare services, e.g. delayed operations, treatments or diagnoses?' to assess perceived disruption in healthcare services, with five response options: 'no', 'rather little', 'somewhat', 'quite a lot' and 'very much'. We dichotomized the answers as 'No/rather little' and 'Yes, somewhat/quite a lot/very much'. Timing and duration of perceived disruption in healthcare services were derived by combining responses from T1 and T2 to create four categories: 'neither perceived at T1 nor T2', 'perceived at T1 only', 'perceived at T2 only' and 'perceived at both T1 and T2'.

Socio-demographic factors, health indicators and conditions

Information on socio-demographic factors was collected at baseline and included: age (18–39, 40–59 or ≥60 years); sex (male or female); sexual orientation [heterosexual or sexual minority (lesbian or gay, bisexual, pansexual or other)]; residence area [capital region or non-capital region (Southern Peninsula, Southern Region, Western Region, Westfjords, Northwestern Region and Eastern Region)]; highest education completed (primary school, high school, BA/BS degree or master's or PhD degree); monthly income before tax (300 thousand or less, 301–500 thousand, 501–700 thousand, 701–1000 thousand or more than a million ISK). Four health indicators or pre-existing conditions were collected at baseline, including smoking status (never or previous/current); body mass index (<25, 25–30 or >30 kg/m^2); history of psychiatric disorders (no or yes); and chronic medical conditions (defined as high blood pressure, heart disease, lung disease, chronic kidney disease, cancer, diabetes, immunosuppressive state or immunosuppressive therapy; no or yes). Data on three COVID-19-related factors were collected at the same time point as perceived disruption in healthcare services (i.e. at T1 or T2), including history of quarantine (defined according to response to the question 'Have you been in quarantine due to COVID-19'; no or yes); history of COVID-19 testing and diagnosis (defined according to response on questions 'Have you been tested for COVID-19?' and 'Have you been diagnosed with the COVID-19?'; not tested, tested but not diagnosed, or diagnosed with COVID-19) and history of being bedridden due to COVID-19 (defined according to response on question 'Were you bedridden due to the illness?'; no or yes). Participants were also able to answer 'cannot or will not answer' in response to all questions (except age), and these answers were treated as missing.

Symptoms of mental illness

Symptoms of mental illness were assessed at both T1 and T2. We used the 9-item Patient Health Questionnaire (PHQ-9) as the screening instrument for depression (total score ranging from 0 to 27)[13] and the 7-item General Anxiety Disorder (GAD-7) as the screening instrument for anxiety (total score ranging from 0 to 21).[14] One single item from the validated Pittsburgh Sleep Quality Index was used to assess sleep quality (i.e. 'during the past 2 weeks, how would you rate your sleep quality overall?'), with response options ranging from 0 (very bad) to 3 (very good).[15] The Patient Health Questionnaire-15 (PHQ-15) was used to measure somatic symptoms, with response options ranging from 0 (not bothered at all) to 2 (bothered a lot), with a total score ranging from 0 to 30.[16]

Statistical analysis

First, the crude prevalence of perceived disruption in healthcare services by the month response received (i.e. from December 2020 to July 2021) was calculated. Then, for participants who responded to the question on perceived disruption in healthcare services (i.e. at T1 or/and T2), we performed a repeated measure analysis contrasting the population average prevalence (per 100 persons) of perceived disruption in healthcare services among individuals with different socio-demographic characteristics, health indicators and conditions. Binomial logistic regression models were performed to obtain prevalence estimates of perceived disruption in healthcare services. Log-binomial Poisson regression models with robust error variance were applied to estimate prevalence ratios (PRs) with 95% confidence intervals (CIs). We used a classical sandwich estimator with exchangeable working correlation structure in the model to control

for intra-individual correlation across repeated measures.[17,18] We adjusted for month response received in all models and additionally adjusted for socio-demographic factors when exploring the association between health indicators and conditions and perceived disruption in healthcare services. We further examined the role of socio-demographic factors on the association between pre-existing health conditions (i.e. history of psychiatric disorders and chronic medical conditions) and perceived disruption in healthcare services, by introducing an interaction term in the model.

In a subpopulation with two repeated measurements on perceived disruption in healthcare services (i.e. at both T1 and T2), we conducted a longitudinal analysis to investigate the association between timing and duration of perceived disruption in healthcare services (i.e. neither T1 nor T2, T1 only, T2 only and both T1 and T2) and changes in symptoms of mental illness (i.e. difference in the measure scores of T1 and T2). Generalized linear regression models were fitted to estimate effect size, β coefficients (βs) and 95% CIs. We adjusted the estimate for all socio-demographic factors, health indicators and conditions.

We used multiple imputation to replace missing items in socio-demographic factors, health indicators and conditions (proportions of missing values 0–6.0%), as well as symptom measures of mental illness, through predictive mean matching with 20 rounds of imputation.[19,20] For each symptom measure (i.e. PHQ-9, GAD-7 and PHQ-15), we imputed data for individuals who had less than 25% missing items on the scale.[19] Specifically, considering that the PHQ-15 item about menstrual cramps are only possible for women younger than 60 years,[21] we directly imputed 0 (i.e. 'Not bothered at all') for individuals who were male or older than 60 years with missing values for that item. The aforementioned analyses were conducted using the imputed dataset. To test the impact of missing data on our results, we re-ran our analyses using the complete dataset.

We conducted all statistical analyses in R (version 4.2)[22] and reported the study according to the Strengthening the Reporting of Observational Studies in Epidemiology checklist.

Results

Of 15 754 participants responding to the question on perceived disruption in healthcare services, 68.7% were female and the mean (SD) age was 54.8 (13.9) years (Supplementary table S2). The crude monthly prevalence (per 100 persons) of perceived disruption in healthcare services decreased slightly over the study period, from 12.3 in December 2020 to 11.1 in July 2021 ($P < 0.01$; figure 1).

Differences in the prevalence of perceived disruption in healthcare services between groups with different socio-demographic characteristics and health indicators and conditions are shown in table 1. We found higher prevalence of perceived disruption in healthcare services among individuals with incomes of 300 thousand ISK or less per month (vs. more than a million ISK per month, 16.5 vs. 7.3), sexual minorities (vs. heterosexual individuals, 16.5 vs. 10.8) and primary school education (vs. Master's or PhD degree, 13.1 vs. 9.2). The prevalence of perceived disruption in healthcare services during the study period varied across geographic regions and age groups (figure 1). Young adults (i.e. aged 18–39 years) and those residing in the Northwestern Region and the Eastern Region had a relatively high prevalence of perceived disruption in healthcare services.

As for health indicators and conditions, we found that individuals with a history of psychiatric disorders [PR 1.59 (95% CI 1.48–1.72)], obesity 1.48 (1.34–1.62) and chronic medical conditions 1.40 (1.30–1.52) experienced a higher prevalence of perceived disruption in healthcare services compared with individuals without these health conditions. However, no increase in risk was observed among individuals diagnosed with COVID-19 [0.99 (0.84–1.18)], when compared with those not tested for COVID-19.

Moreover, we found that the association between history of psychiatric disorders and perceived disruption in healthcare services was significantly modified by age, residence area, level of education and monthly income ($P < 0.05$; figure 2). Specifically, the increased prevalence of perceived healthcare disruption by history of psychiatric disorders was more pronounced among young adults, individuals living in non-capital areas and those with lower education and monthly income. We also found significant interaction between age, monthly income and chronic medical conditions, indicating stronger association between chronic medical conditions and healthcare services disruption among younger and low-income individuals.

The proportion of individuals reporting that they perceived disruption at neither timepoint, at T1 only, at T2 only or at both timepoints was 83.4%, 6.3%, 4.6% and 5.7%, respectively. Compared to those who did not perceive disruption in healthcare services, results of the linear regression analysis indicated that perceived disruption in healthcare services at T2 only was positively associated with increase in symptom scores of depression [β 0.68 (95% CI 0.28–1.08)] and anxiety [0.58 (0.22–0.94)] as well as poor sleep quality [0.06 (−0.01 to 0.13)] and greater somatic symptoms [0.41 (0.01–0.82)] (figure 3). Except somatic symptoms, we did not identify statistically significant differences between perceived disruption in healthcare services at T1 only (βs −0.12 to −0.07) or at both timepoints (βs −0.23 to <−0.01) and changes in symptoms of mental illness, although all point estimates were negative.

The results of the complete case analyses were similar to those of the main analyses using multiple imputation in terms of effect size and CIs (see Supplementary table S3 and figure S2).

Discussion

The findings of this study suggest that perceived disruption in healthcare services during the COVID-19 pandemic in Iceland was most prevalent among individuals with pre-existing psychiatric and other chronic medical conditions. Building and expanding on previous findings, we also identified certain vulnerable sub-groups (e.g. younger adults, individuals with lower levels of education and those residing in non-capital areas) where history of mental illness was associated with greater rise in prevalence of perceived disruption. On the other hand, we observed no increase in prevalence of perceived disruption in healthcare services among individuals diagnosed with COVID-19, when compared with those not tested for COVID-19, indicating efficient clinical management of the groups directly affected by the pandemic.

Access to healthcare services was disrupted by the COVID-19 pandemic worldwide and the disruption remains to some extent to date in some countries.[23] A systematic review including nine studies using time-trend data reported a median reduction of 37% in healthcare utilization during the pandemic period up to May 2020.[24] In comparison with countries such as Italy,[25] China[26] and the UK,[27] the reported prevalence of perceived disruption in healthcare services was relatively low in Iceland, which may be explained by the actions of the Icelandic government which implemented less stringent infection-control measures during the pandemic (e.g. school closures, workplace closures and travel bans)[28] and the fact that we measured perceived disruption in healthcare services later than other studies (i.e. December 2020–July 2021). Indeed, measures of perceived disruption in healthcare services during the pandemic may be viewed as informative of how governments manage to respond to such crises whilst maintaining resources and capacity in the healthcare system.

Our study did not observe any increased disruption in healthcare services among individuals diagnosed with COVID-19, suggesting that the Icelandic healthcare system seems to have maintained accessible services to this patient group during the unprecedented time. However, as the healthcare resources were concentrated on managing patients with COVID-19, there is a concern that other

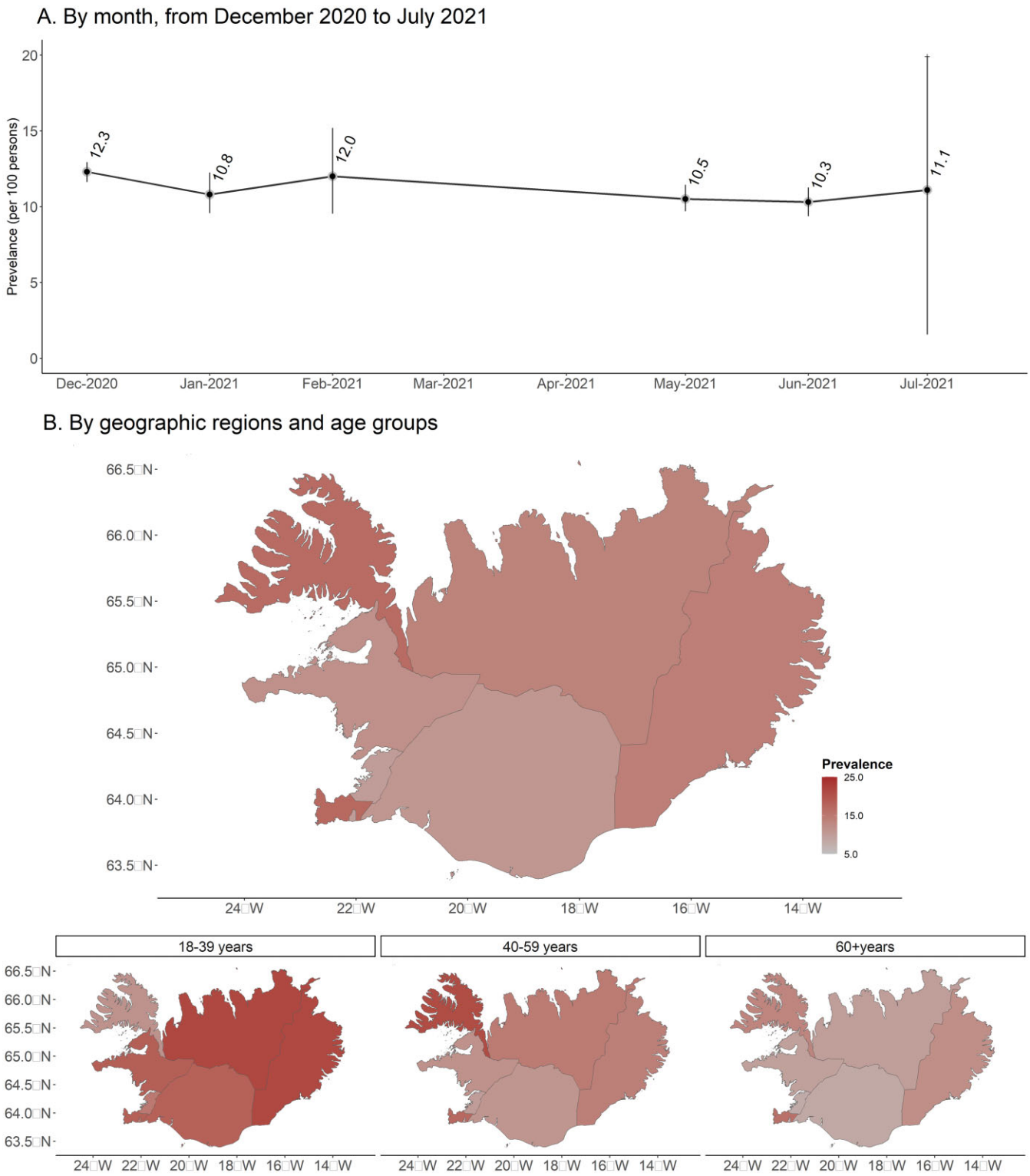

Figure 1 Prevalence (per 100 persons) of perceived disruption in healthcare services in Iceland, by month (A) and by geographic regions and age groups (B).

patients may have been neglected during the pandemic.[34] Multiple studies have indeed reported poor access to health care during the pandemic among patients with diabetes,[35] chronic kidney disease[3] and tuberculosis.[36] Of note, both the current and previous studies demonstrate a substantially higher risk of perceived disruption in healthcare services among individuals with pre-existing psychiatric disorders.[6] Due to the negative effects of lockdown as well as reduced social contact and healthcare services, patients with pre-existing psychiatric disorders experienced adverse health consequences during the pandemic.[11] For example, Robillard *et al.*[8] found increased suicidal ideation among patients who reported a reduction in the frequency of mental health appointments, when compared to patients who did not experience changes in the frequency of appointments. However, it is noteworthy that there may exist a

Table 1 Prevalence of perceived disruption in healthcare services by socio-demographic factors and pre-existing health conditions, among 15 754 participants who responded to the question on perceived disruption in healthcare services during the study period (December 2020–July 2021)

	Prevalence per 100 persons[a] (95% CI)	Prevalence ratios[b] (95% CI)
Socio-demographic factors[c]		
Age, years		
18–39	15.6 (14.4–16.9)	Ref.
40–59	11.5 (10.8–12.1)	0.74 (0.67–0.81)
≥60	9.0 (8.4–9.6)	0.58 (0.53–0.64)
Sex		
Male	9.3 (8.7–10.1)	Ref.
Female	11.8 (11.2–12.3)	1.26 (1.16–1.37)
Sexual orientation		
Heterosexual	10.8 (10.4–11.3)	Ref.
Sexual minority	16.5 (14.2–19.1)	1.52 (1.31–1.77)
Residential area		
Capital region	9.9 (9.4–10.4)	Ref.
Non-capital region	13.4 (12.6–14.3)	1.35 (1.25–1.45)
Western Region	11.7 (9.8–13.9)	1.17 (0.98–1.40)
Westfjords	16.8 (13.5–20.6)	1.68 (1.36–2.09)
Northwestern Region	13.5 (12.2–14.9)	1.36 (1.22–1.51)
Eastern Region	14.2 (11.6–17.2)	1.42 (1.16–1.74)
Southern Region	10.8 (9.4–12.3)	1.08 (0.94–1.25)
Southern Peninsula	17.1 (15.0–19.5)	1.72 (1.50–1.97)
Highest education completed		
Primary school	13.1 (11.9–14.4)	Ref.
High school	12.3 (11.5–13.1)	0.94 (0.84–1.04)
BA/BS degree	10.3 (9.6–11.0)	0.79 (0.70–0.88)
Master's or PhD degree	9.2 (8.4–10.0)	0.70 (0.62–0.79)
Monthly income before tax, ISK		
300 thousand or less	16.5 (15.4–17.7)	Ref.
301–500 thousand	12.2 (11.4–13.0)	0.74 (0.67–0.81)
501–700 thousand	9.5 (8.7–10.3)	0.58 (0.52–0.64)
701–100 thousand	8.0 (7.2–8.9)	0.48 (0.43–0.55)
More than a million	7.3 (6.3–8.5)	0.45 (0.38–0.53)
Health indicators and conditions[d]		
Smoking status		
Never	11.4 (10.4–12.6)	Ref.
Current/previous	13.5 (12.3–14.8)	1.18 (1.09–1.27)
Body mass index, kg/m^2		
<25	10.4 (9.3–11.6)	Ref.
25–30	11.6 (10.4–12.8)	1.11 (1.01–1.23)
>30	15.4 (14.0–16.9)	1.48 (1.34–1.62)
History of psychiatric disorders		
No	10.3 (9.4–11.4)	Ref.
Yes	16.5 (15.0–18.1)	1.59 (1.48–1.72)
Chronic medical conditions (somatic only)		
No	10.9 (9.9–12.0)	Ref.
Yes	15.3 (13.9–16.8)	1.40 (1.30–1.52)
History of quarantine		
No	11.4 (10.4–12.6)	Ref.
Yes	14.2 (12.9–15.6)	1.25 (1.16–1.34)
History of COVID-19 testing and diagnosis		
Not tested	11.6 (10.5–12.9)	Ref.
Tested but not diagnosed	13.4 (12.2–14.7)	1.15 (1.07–1.25)
Diagnosed with COVID-19	11.5 (9.7–13.7)	0.99 (0.84–1.18)
History of being bedridden due to COVID-19		
No	12.6 (11.5–13.7)	Ref.
Yes	13.6 (11.2–16.4)	1.08 (0.90–1.29)

a: Obtained adjusted prevalence per 100 people using binomial logistic regression.
b: Obtained adjusted prevalence ratio using log-binomial Poisson regression.
c: Adjusted for month response received (i.e. December 2020, January–February 2021, May 2021, June–July 2021).
d: Adjusted for age, sex, sexual orientation, residential area, highest education completed, monthly income before tax and month response received (i.e. December 2020, January–February 2021, May 2021, June–July 2021).
CI., confidence interval. Ref., reference.

bidirectional relationship between disruption in mental health services and mental illness, where patients suffering from suicidal ideation or depression may subjectively reduce their service utilization due to diminished motivation. Additionally, pre-existing health conditions have been associated with increased risk of COVID-19-related events (e.g. COVID-19 diagnosis, hospitalization and death).[37,38] Patients with pre-existing health conditions may therefore have been forced to self-quarantine and minimize healthcare service visits to avoid infection. These patients were battling with a double disease burden (i.e. their pre-existing health condition and

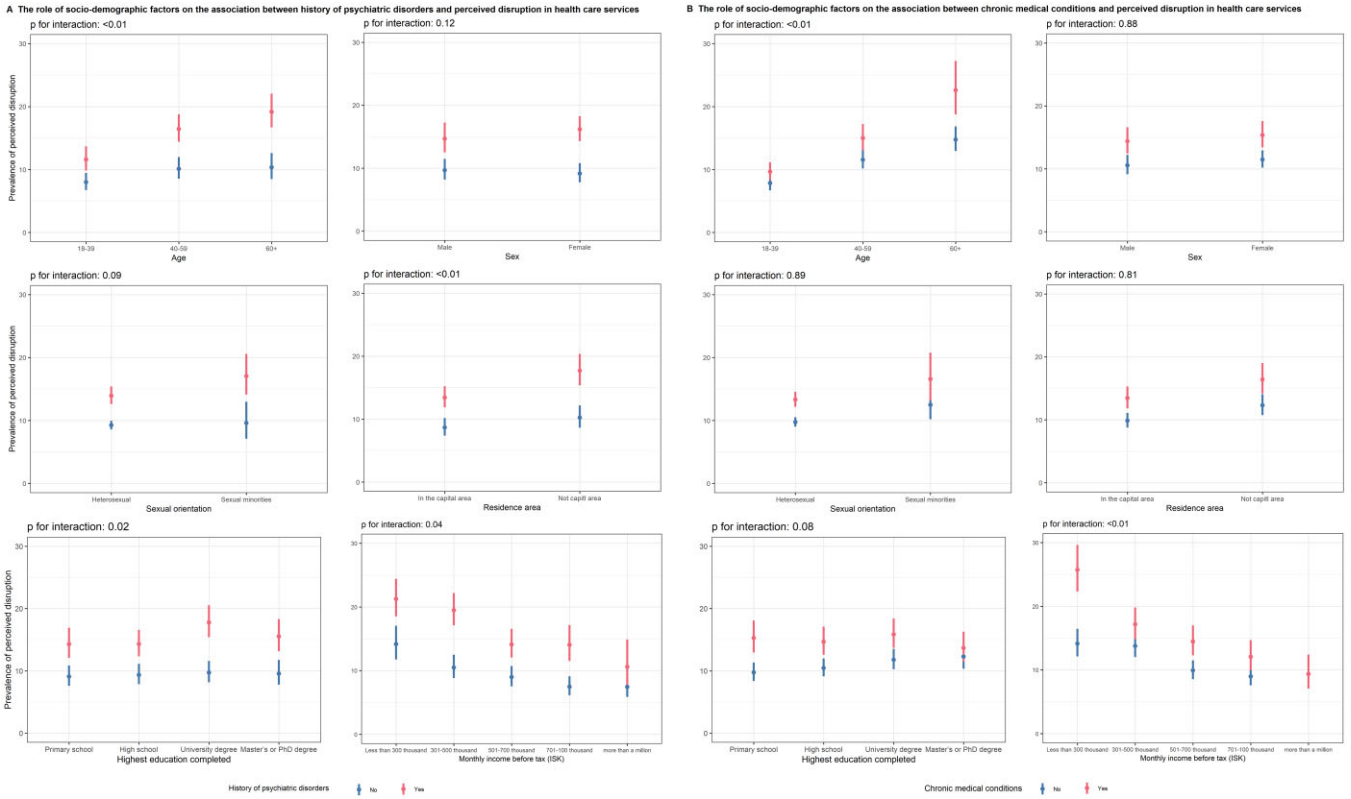

Figure 2 The role of socio-demographic factors on the association between pre-existing health conditions (i.e. history of psychiatric disorders (A) and chronic medical conditions (B)) and perceived disruption in healthcare services. *Note*: Model were adjusted for age, gender, sexual orientation, residence area, highest education completed, monthly income before tax and month response received (i.e. December 2020, January–February 2021, May 2021, June–July 2021).

added risk of severe COVID-19 outcomes) and accessible healthcare services are important for them.

In line with previous studies,[4,5] our results suggested that the negative effects of the pandemic were disproportionately distributed across social strata and pertain mainly to vulnerable groups, such as younger adults, individuals with lower levels of education and those residing in rural areas. Barriers such as financial, social and organizational factors may contribute to the reduction in healthcare utilization by these vulnerable populations.[29] A US study found that younger patients delayed seeking care largely due to financial reasons, although this may not be generalizable to countries with universal health coverage.[30] Additionally, findings from the UK suggest that young adults and those with lower levels of education were more likely to suffer job loss during the pandemic.[31] Moreover, the impact of the pandemic on perceived healthcare disruption among individuals with history of psychiatric disorders was greater among non-capital area residents than capital region residents. Shortages of non-capital healthcare personnel during the pandemic, particularly in psychiatry, may be a key factor behind these results.[32] By contrast, several studies also documented that these vulnerable groups already suffered inequalities and lower access to health care before the pandemic[33] and that the pandemic unraveled or exacerbated these disparities.[4,5]

A major strength of this study is the use of a large nationwide cohort to investigate the temporal trend of perceived disruption in healthcare services during the COVID-19 pandemic in Iceland. Furthermore, leveraging the rich data on socio-demographic factors and health conditions, we provide an in-depth characterization of the vulnerable populations who were more likely to be affected by the disruption in healthcare services during the pandemic. The study also has several limitations. First, the question on perceived disruption in healthcare services is not a validated measure and was used for the first time in this study. Thus, the study may not accurately capture perceived shortage of healthcare services or that the prevalence of perceived disruption in healthcare services was over- or underestimated. However, this measurement error should be similar across the groups, and thus would not be expected to affect the noted association between socio-demographic factors, health conditions and the prevalence of perceived disruption in healthcare services. Also, we have no data on the purpose (e.g. mental health services, dental care or cancer treatment) or type (e.g. primary care, emergency services or hospitalization) of the needed healthcare services, which limits the ability to address the research questions according to different healthcare domains. In addition, the C-19 resilience cohort is overrepresented by women, older and more educated individuals which may have influenced our results. Finally, our study is limited to an adult population in a Nordic welfare society that experienced a relatively favorable course of the pandemic, and thus limits the generalizability of our findings.

In conclusion, our findings suggest that perceived disruption in healthcare services during the COVID-19 pandemic was pronounced among individuals with pre-existing health conditions, particularly in vulnerable socio-demographic groups, such as younger adults, those with lower levels of education, living in and residing in non-capital areas. By contrast, these data suggest that the Icelandic healthcare system managed to maintain accessible services to individuals diagnosed with COVID-19.

Supplementary data

Supplementary data are available at *EURPUB* online.

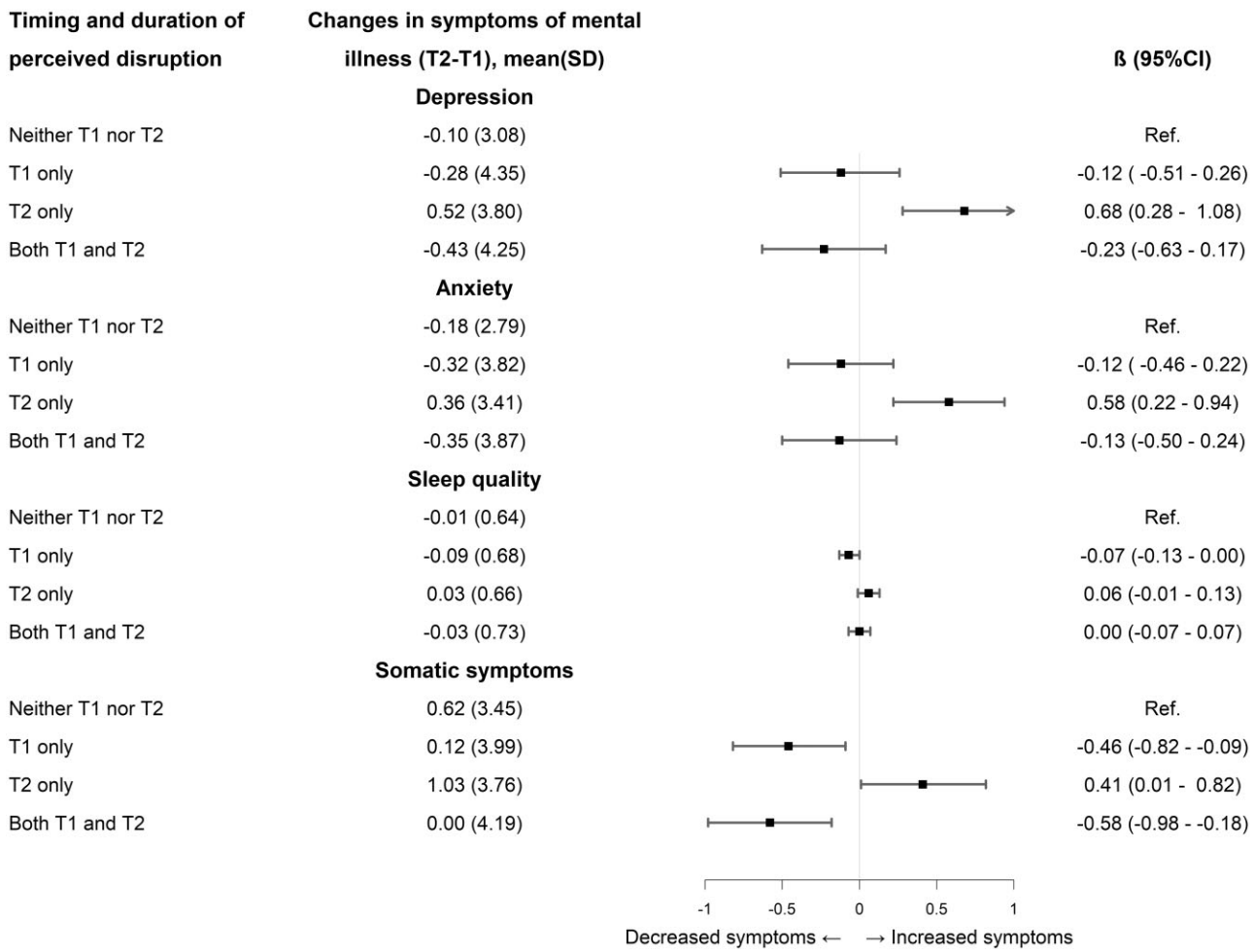

Figure 3 The association between timing and duration of perceived disruption in healthcare services and changes in symptoms of mental illness, among 7848 participants with two repeated measures. *Note*: T1, from December 2020 to February 2021; T2, from May 2021 to July 2021; changes in symptoms of mental illness was calculated by subtracting the measure score of T1 from T2 (i.e. difference in the measure scores of T1 and T2); linear regression adjusted for age, sex, sexual orientation, residence area, highest education completed, monthly income before tax, smoking status, body mass index, history of psychiatric disorders, chronic medical conditions (somatic only), history of quarantine, history of COVID-19 testing and diagnosis and history of bedridden due to COVID-19.

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Author contributions

Y.W., T.A. and U.A.V. designed the study. Y.W. did the data analyses, with support from U.A.V., T.A., A.B.U., and I.M. Y.W. and U.A.V. drafted the article, and all authors contributed to data interpretation. All authors approved the final article as submitted and agree to be accountable for all aspects of the work.

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Conflicts of interest: None declared.

Data availability

The individual-level data underlying this article were subject to ethical approval and cannot be shared publicly due to data protection laws in Iceland.

Key points

- The prevalence of perceived disruption in healthcare services in Iceland attenuated slightly during the pandemic period.
- Patients with pre-existing health conditions, particularly in vulnerable socio-demographic groups (e.g. younger adults, individuals with lower levels of education and those residing in non-capital areas), may have experienced healthcare services disruption to a greater extent than others during the pandemic.
- Individuals infected with COVID-19 did not report elevated prevalence of healthcare service disruption, indicating that the Icelandic healthcare system managed to maintain accessible services to this patient population.
- Emerging perceived disruption in healthcare services was associated with an increase in symptoms of mental illness during the pandemic.

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