

Bachelor Thesis

Mental Health Across Borders: A Global Investigation of the COVID-19 Pandemic

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Abstract

This thesis investigates how mental health has changed over the course of the COVID-19 pandemic. For this purpose, we use a large dataset from social media based on a worldwide online survey on the individuals' symptoms and their preventive behavior during the pandemic. In our context, we particularly focus on the questions regarding the feelings of anxiety and depression. Apart from this, the dataset includes information on the respondents' residence, age and gender. Overall, the dataset covers 237 countries between April 2020 to June 2022 and encompasses about 70 million observations at the individual level.

Empirically, we apply a descriptive analysis to illustrate the trajectories of anxiety and depression over continents, countries, age and gender. Our findings suggest that the pandemic did not change feelings about anxiety and depression substantially. However, we observe some systematic differences across continents, countries, age groups and gender. Our findings are broadly in line with previous research, in particular a meta-analysis provided by Castaldelli-Maia et al. (2021).

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1 Introduction

In the course of human history, pandemics have occurred time and again, costing the lives of millions of people. Prominent instances include the Black Death in the 14th century, the Cholera pandemic in the 19th century or the Spanish flu hundred years ago (e.g., Piret & Boivin 2021). Pandemics are characterized by significantly increased mortality rates, causing widespread panic and a general sense of risk to personal safety and health. Moreover, the forces of globalization, climate change and rapid mobility of the population have facilitated the global transmission of viruses, which has led to pervasive concern based on both external sources and uncertainty (Gupta, Rouse & Sarangi 2021; Jeanne et al. 2023). In addition, the fear of unintentionally transmitting infections to others can foster conditions conducive to social phobia (Heitzman 2020). Taken together, these sources of stress and tension can contribute to feelings of anxiety and depression among individuals.

In late 2019, the first cases of SARS-CoV-2 were detected in the Chinese city of Wuhan (e.g., Kumar et al. 2021). Then, the virus swiftly disseminated across the globe. Faced with the absence of medical treatments or vaccinations, the majority of governments responded with strict measures such as contact restrictions, lockdowns, and the closure of non-essential enterprises (e.g., Brauner et al. 2021; The Royal Society 2023). This period extended for approximately two years, during which the entire world grappled with this unprecedented disruption to daily life. The radical change in social life presented distinct challenges for individuals across various age groups. Children and young adults found themselves unable to adhere to their usual school and university routines (e.g., Liang et al. 2020). A significant portion of the workforce transitioned to online meetings and remote work, while certain professional sectors, notably healthcare workers and supermarket employees, faced dire circumstances amounting to a state of emergency (e.g., Spoorthy, Pratapa & Mahant 2020; Okuyan & Begen 2022). Among the elderly population, many endured profound isolation, driven by an overwhelming fear of infection (e.g., Daoust 2020). These extraordinary circumstances underscored the potential for adverse mental health outcomes, including feelings of anxiety and depression, as individuals struggled with disruptions in their daily routines.

This thesis aims to contribute to the research on the effects of the COVID-19 pandemic on mental health. For this purpose, we rely on a large dataset retrieved from social media, covering nearly 240 countries worldwide over a time period from April 2020 to June 2022. The dataset encompasses a questionnaire asking people about their feelings and motions during the pandemic. In particular, the survey relates to anxiety and depression which are seen as important components of mental health. Further, the survey includes

information on age, gender and the individuals' residence. We use these variables to provide a descriptive analysis how anxiety and depression proceeded over the course of the pandemic across continents, countries, gender and age groups. Then, we relate our findings to previous studies, particularly to the one of Castaldelli-Maia et al. (2021) who have published a comprehensive meta-analysis on the effects of the COVID-19 pandemic on mental health.

The thesis is organized as follows. In Chapter 2, we provide a definition of mental health and give an overview of the previous research regarding the impact of the COVID-19 pandemic on mental health. In particular, we discuss the Castaldelli-Maia et al. (2021) study, which represents an interesting reference in our context. Chapter 3 introduces the data and describes the main characteristics of the sample. Chapter 4 presents the empirical findings and compares these results to the ones of Castaldelli-Maia et al. (2021). Chapter 5 summarizes our results and discusses limitations of the thesis.

2 Background

The first part of this chapter provides a working definition of mental health and discusses how it is measured in this thesis (Section 2.1). In the second part, we briefly summarize the previous literature regarding the impact of the COVID-19 pandemic on mental health (Section 2.2).

2.1 Measuring Mental Health

Mental health is a major component of a person's well-being, and it plays a crucial role in an individual's quality of life and functioning (Prince et al. 2007; Lombardo et al. 2018). However, measuring mental health in empirical applications poses several challenges due to its complex and multifaceted nature.¹ First, mental health encompasses a wide range of emotional, cognitive and behavioral dimensions (Peterson 2017; Wakefield & Schmitz 2017). Second, it is inherently subjective as it involves an individual's feelings, thoughts and experiences, which, in turn, implies that individuals experience various mental health issues differently (Lefley 2017). Third, an individual's mental health is typically influenced by external factors such as socio-economic status or cultural background (Horwitz 2017; Thoits 2017). Finally, a person's mental health may change over time due to factors like personal circumstances or life events (e.g., Dalgard, Bj & Tambs 1995). Without doubt, the COVID-19 pandemic marked a serious event in many peoples' lives (e.g., Alzueta et al. 2021). Therefore, it is reasonable to suspect that the pandemic had an influence on mental health, a hypothesis that will be examined in this thesis.

Mental health can be assessed through clinical diagnoses or surveys. While the first approach is based on the expertise of physicians and psychiatrists, the second relies on questionnaires in which the respondents themselves give a personal assessment of possible mental disorders. One may suspect that such self-reported measures are less objective than a clinical diagnosis and are, in this sense, prone to a possible measurement error (Penninx et al. 2022). Furthermore, due to space constraints it is often impractical to take into account the aforementioned multidimensional nature of mental health adequately in a survey, so that a researcher is often forced to focus on single aspects such as anxiety, stress, eating disorders or depression (Wakefield & Schmitz 2017). However, clinical data on mental health are generally difficult to access (Penninx et al. 2022). Therefore, surveys appear to be a reasonable alternative to examine how mental health has varied over time and what factors appear to be important for those changes.

¹Aneshensel, Phelan & Bierman (2017) provides a comprehensive article collection on various aspects of mental health, including chapters on the measurement of mental disorders. In this section, we mainly take reference to selected chapters of this source.

In this thesis, we rely on an online survey and use anxiety and depression to specify mental health for two reasons. First, the questionnaire underlying our dataset (presented in Chapter 3) only includes items related to these components of mental health. While anxiety is characterized by excessive fear and worry to challenges in everyday life, a depressed person typically feels sad, irritable or empty and is not able to handle the daily routines with pleasure or interest (e.g., Dobson 1985). Second, anxiety and depression are frequently used in the previous literature (see, e.g., the chapters in Aneshensel, Phelan & Bierman 2017) and also in Castaldelli-Maia et al. (2021), whose results we would like to compare with ours in this thesis.

2.2 Previous Literature

The unforeseeable outbreak of the COVID-19 pandemic is perhaps the most serious global crisis since World War II (Tsamakis et al. 2021). Particularly in the early days of the pandemic when medical treatments were not available for containing the spread of the virus, most of the countries reacted with non-pharmaceutical interventions (NPI) such as mask wearing orders, stay-at-home regulations, closures of non-essential businesses including workplaces and schools, or cancellations of mass gatherings. Although these measures seemed to be successful in containing the spread of the virus (e.g., Brauner et al. 2021; The Royal Society 2023), adherence to NPIs may induce restrictions on daily routines, interruptions in social life or, in extreme cases, social isolation (Brooks et al. 2020; Venkatesh & Edirappuli 2020). This, in turn, creates psychological stress and impairment of mental health, which are often reinforced by economic losses due to absenteeism and business disruption (e.g., The Royal Society 2023).

There is an extensive literature on the potential impact of the COVID-19 pandemic on mental health. According to a recent survey by Penninx et al. (2022), this is reflected in more than 35,000 publications on this topic. Despite this considerable output, the reliability of the results is limited due to small sample sizes and data sets that are limited in time and space (Penninx et al. 2022: 2028). To obtain more reliable results, it would be important to consider longer time periods across different countries. Another approach is to assess the overall pandemic impact by combining findings from existing studies, a technique known as meta-analysis.²

A comprehensive meta-analysis on the effects of the COVID-19 pandemic and the related NPIs on mental health has been provided by Castaldelli-Maia et al. (2021). Their study includes 58 articles with 67 different samples from 26 countries around the world, encom-

²A meta-analysis is a statistical method which is frequently used in clinical research to systematically summarize the findings of single independent studies to one compound effect and to analyze which study characteristics are the most influential ones to explain this result (Egger, Smith & Phillips 1997).

passing almost 200,000 individuals from Asia, Africa, America, Europe and Middle East. The data were collected between January 24 and May 31, 2020. This observational period implies that data on mental health has been available before NPIs were implemented. The screening and eligibility criteria of the study are shown in Figure 1.

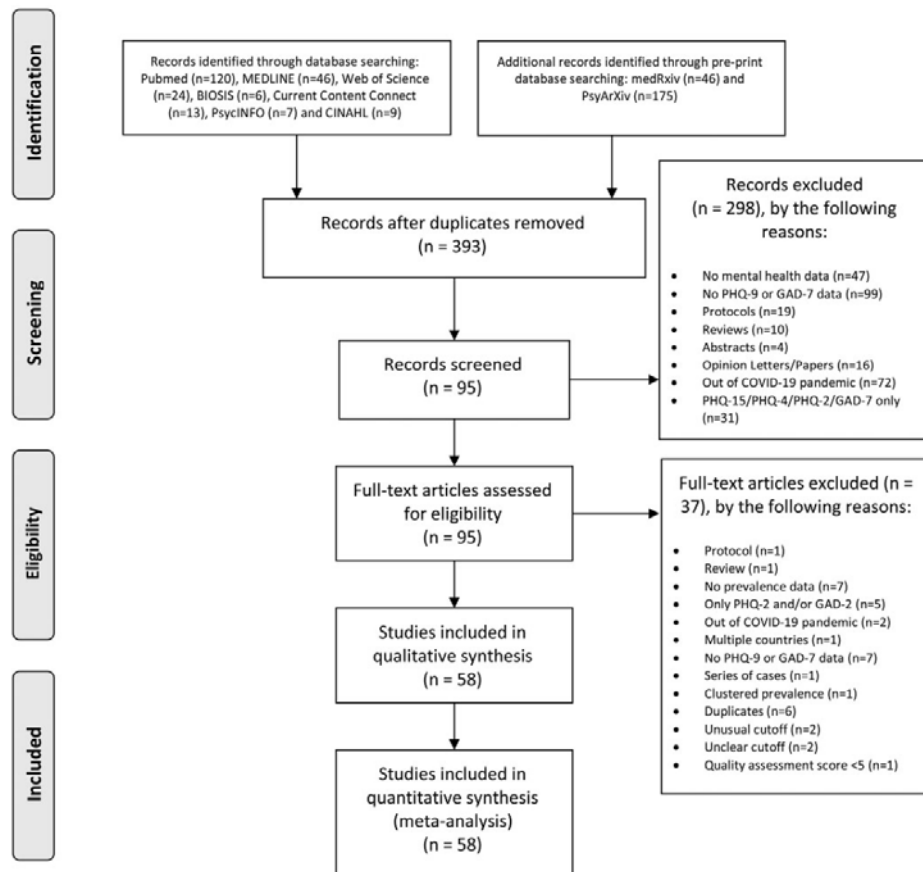


Figure 1: Screening and eligibility criteria of Castaldelli-Maia et al. (2021) (PRISMA Flow Diagram)

Apart from its comprehensiveness, a major strength of the Castaldelli-Maia et al. (2021) study is the standardized approach to measuring mental health. In particular, they focus on anxiety and depression, which are based on self-reported assessments rather than clinical diagnoses. In addition, they only include studies that meet the GAD-7 (Generalised Anxiety Disorder) and the PHQ-9 (Patient Health Questionnaire) standards in the underlying surveys. These standards have proven to be reliable to capture mental health (Stochl et al. 2022).

The GAD-7 score relates to anxiety and includes seven self-reported items on a four-point scale examining the two weeks prior to screening (see Figure 2), resulting in a total score between zero and 21, with a score of 10 or more defined as clinically relevant anxiety. The GAD-7 measure has shown high reliability and cross-cultural validity in describing

depression (Zhong et al. 2015). The PHQ-9 score consists of nine questions based on the DSM-IV³ for diagnostic criteria on major depressive disorders. Since each item can be scored from zero to three, the PHQ-9 score can range from zero to 27, where a score larger than 10 is defined as clinically relevant depression (Kroenke, Spitzer & Williams 2001).

| GAD-7 | | | | |
|--|------------|--------------|-------------------------|------------------|
| Over the last 2 weeks, how often have you been bothered by the following problems? | Not at all | Several days | More than half the days | Nearly every day |
| 1. Feeling nervous, anxious or on edge | 0 | 1 | 2 | 3 |
| 2. Not being able to stop or control worrying | 0 | 1 | 2 | 3 |
| 3. Worrying too much about different things | 0 | 1 | 2 | 3 |
| 4. Trouble relaxing | 0 | 1 | 2 | 3 |
| 5. Being so restless that it is hard to sit still | 0 | 1 | 2 | 3 |
| 6. Becoming easily annoyed or irritable | 0 | 1 | 2 | 3 |
| 7. Feeling afraid as if something awful might happen | 0 | 1 | 2 | 3 |

Total Score — = Add Columns — + — + —

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

| | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Not difficult at all | Somewhat difficult | Very difficult | Extremely difficult |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Figure 2: Anxiety related questions in the GAD-7 survey (Spitzer et al. (2006))

The findings of Castaldelli-Maia et al. (2021) can be summarized as follows. First, the pandemic is associated with a relatively high prevalence of both anxiety and depression (21.3% and 24%, respectively). Second, the lowest rates of anxiety and depression are observed in Asia, especially in China with a prevalence of about 15%. Europe is in the middle with around 26%, while in the other non-Asian countries 39% of the respondents reported depressive symptoms. Finally, closing public transport had the highest impact, whereas school- and workplace closures, cancellation of public events and restrictions on gatherings had a much lower effect on mental health.

In this thesis, we use a large dataset retrieved from social media to assess the effects of the COVID-19 pandemic on mental health and to compare our results with the ones of Castaldelli-Maia et al. (2021). Apart from this, we are also interested on possible heterogeneous effects of the pandemic on mental health. Regarding this, we are particularly interested in age and gender. As mental health conditions are often developed during adolescence (Tsamakis et al. 2021), we would presume that the disruption of daily life caused by school and university closures, loss of social connections and leisure activities might

³The DSM-IV represents a classification system of the American Psychiatric Association.

Nine-symptom Checklist

Name _____ Date _____

Over the *last 2 weeks*, how often have you been bothered by any of the following problems?

| | Not at all | Several days | More than half the days | Nearly every day |
|--|------------|-----------------|----------------------------|---------------------|
| 1. Little interest or pleasure in doing things | 0 | 1 | 2 | 3 |
| 2. Feeling down, depressed, or hopeless | 0 | 1 | 2 | 3 |
| 3. Trouble falling or staying asleep, or sleeping too much | 0 | 1 | 2 | 3 |
| 4. Feeling tired or having little energy | 0 | 1 | 2 | 3 |
| 5. Poor appetite or overeating | 0 | 1 | 2 | 3 |
| 6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down | 0 | 1 | 2 | 3 |
| 7. Trouble concentrating on things, such as reading the newspaper or watching television | 0 | 1 | 2 | 3 |
| 8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual | 0 | 1 | 2 | 3 |
| 9. Thoughts that you would be better off dead or of hurting yourself in some way | 0 | 1 | 2 | 3 |

(For office coding: Total Score _____ = _____ + _____ + _____)

If you checked off *any* problems, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?

| | | | |
|--|--|--|---|
| Not difficult at all <input type="checkbox"/> | Somewhat difficult <input type="checkbox"/> | Very difficult <input type="checkbox"/> | Extremely difficult <input type="checkbox"/> |
|--|--|--|---|

Figure 3: Depression related questions in the PHQ-9 survey (Kroenke, Spitzer & Williams 2001)

lead to a development of health problems particularly in this age group. Similarly, people in nursing homes often lost contact with their families because visiting arrangements were required (Çelik & Kiliç 2022). Perhaps more importantly, the elderly population was considered a risk group for whom the SARS-CoV-2 virus could result in severe disease progression (associated with higher exposure of hospitalization and death). In addition, due to contact restrictions many screenings and health check-ups were postponed or canceled for this age group (Heidemann et al. 2022). For example, Kurniawidjaja et al. (2022) found that 13.6% of the elderly population in Indonesia are depressed and 40% are prone to depression. Elderly, frail people who depend on the help of others suffered the most from the effects of contact restrictions. After all, we would therefore expect a different impact of the COVID-19 pandemic on mental health across different age groups.

With regard to gender, previous research has found that females tend to be generally more anxious and depressed than males, with differences between cultures and countries (e.g., Rosenfield & Mouzon 2013). For example, African Americans have a smaller gender gap in mental health problems. One explanation lies in different stress factors that men and women face, their coping strategies, and their different social lives (e.g., Klose & Jacobi 2004). Against this backdrop, it is therefore interesting to investigate whether the pandemic has further increased the gender gap in mental illness.

3 Data

This chapter introduces the data (Section 3.1), gives a first impression on the composition of the sample (Section 3.2) and provides an overview of the data with regard to mental health (Section 3.3).

3.1 CTIS Database

We use the COVID-19 Trends and Impact Survey (CTIS) to analyze the effects of COVID-19 on mental health of individuals. The underlying data were collected through a large cross-sectional survey which ran continuously from April 6, 2020 in the United States and from April 23, 2020 globally until June 26, 2022. Each day, a random sample of active Facebook users was invited to participate anonymously in the survey. Overall, the survey included individuals from 243 countries and territories. Initially, the data was collected to identify so-called hotspots or waves of infections. The survey does not only capture symptoms but also preventive behaviors and risk factors (e.g., mental health, socio-economic factors or contact measurements). Participants who were older than 18 years were recruited via the Facebook app every day and saw an invitation in their feed. Selected users were then taken to the CMU (Carnegie Mellon University) administered survey, hosted on Qualtrics. A person could be sampled as frequently as every month and as infrequently as every five months, depending on a region's population density (Salomon et al. 2021). In total, more than 100 million people completed the survey. The survey was available in six different languages, including English, French and Spanish.

The survey collected data on personal characteristics (e.g., age and gender), the individual health status (e.g., symptoms, diseases or mental health), attitudes towards issues regarding COVID-19 (e.g., vaccination or mandatory contact measures) and socio-economic factors (e.g., education). In this thesis, we focus on the mental health variables and use country- and continent affiliation, gender and age to analyze mental health issues during the pandemic. Table A.1 of the Appendix reports the data codebook including a description of the variables used in our analysis.

3.2 Main Characteristics of CTIS

Our dataset consists of around 240 countries. We assigned them to continents through the geoscheme from the United Nations (UN). Notice that Facebook is not available in some countries (e.g., China and North Korea). We also do not include data from the United States as a slightly modified version of the survey was conducted there. Around

1,960 people stated that their current place of residence lies in the Antarctica. As this is unlikely, we also exclude these entries from the sample (Figure B.1 in the Appendix shows the assigned geoscheme and included countries and Table C.1 reports their names along with the number of observations recorded in each country.). We also remove observations from June 2022, as the survey was no longer conducted in all countries.

Figure 4 shows the sample distribution over continents. Accordingly, we have around 67 million observations in the sample.⁴ Most of the respondents are from America (35%), Asia (32%) and Europe (26%).⁵ Taken together, around 8% of them are living in Africa (6%) or Oceania (2%).

In the dataset, the proportion of females and males is almost equal, i.e., 49.1% and 50.6%, respectively (approximately 0.3% of the respondents are of different gender). The age variable is divided into three groups (Tsamakis et al. 2021): The first group consists of people between 18 and 34 years, who, according to the public debates, are often viewed as the main "victims" of the pandemic due to contact restrictions, school closings and online teaching. Second, respondents aged between 35 and 64 years represent the working population, which is exposed to the virus at workplaces and the related social occasions (e.g., train stations). Finally, people elder than 64 are mostly retired and were often treated as a risk group in the pandemic. Figure 5 shows that approximately 10% of the sample is represented by the group of 64 years and above, which is not surprising as older people typically do not use Facebook or social media very often (Ozimek & Bierhoff 2016). In contrast, 35% of the sample consists of younger people and 54% of the working population. In every age group, we observe a very similar distribution between males and females.

3.3 Mental Health in CTIS: Overview

The survey includes two questions on mental health. The first aims to measure anxiety, and the associated question is:

"During the past 7 days, how often did you feel so nervous that nothing could calm you down?"

The second question captures depression, where people were asked:

"During the past 7 days, how often did you feel so depressed that nothing could cheer you up?"

⁴Notice that the sample size is varying between about 40 to almost 70 million observations, depending on the availability of the variables included in the study.

⁵We use the following color scheme for the continents throughout the subsequent empirical analysis: Violet for America, Green for Asia, Orange for Europe, Yellow for Africa and Red-Brown for Oceania.

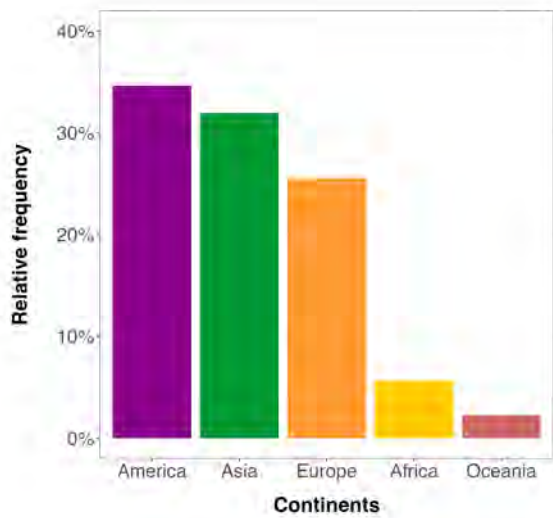


Figure 4: Continent distribution
($n = 67,571,490$)

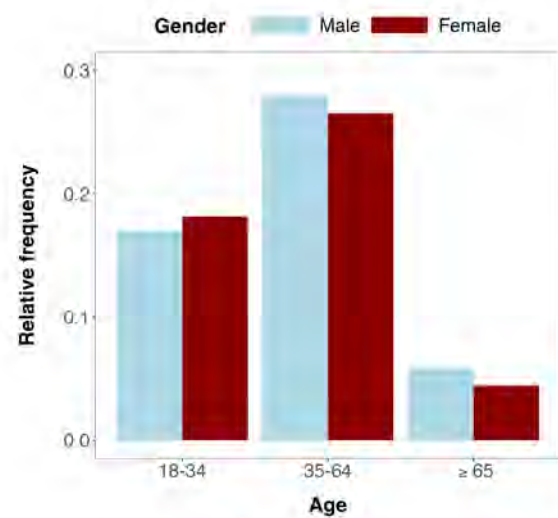
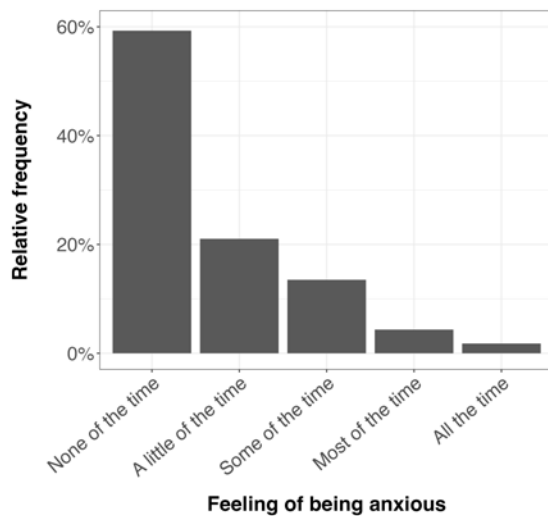


Figure 5: Age and gender distribution
($n = 54,943,766$)

Both, anxiety and depression are measured on a scale from 1 to 5, where 1 indicates "all the time" and 5 "none of the time". In the following, we flipped the scale to get a more intuitive interpretation. Consequently, a higher number on the scale indicates a higher level of anxiety and depression, respectively. Notice that the questionnaire only includes one item each, to capture anxiety and depression, which is a difference to the GAD-7 and PHQ-9 standards described in Chapter 2. In addition, there is one more answer option in the CTIS questionnaire, so that our results are not directly comparable to those of Castaldelli-Maia et al. (2021).

(a) Anxiety ($n = 46,461,625$)



(b) Depression ($n = 46,573,464$)

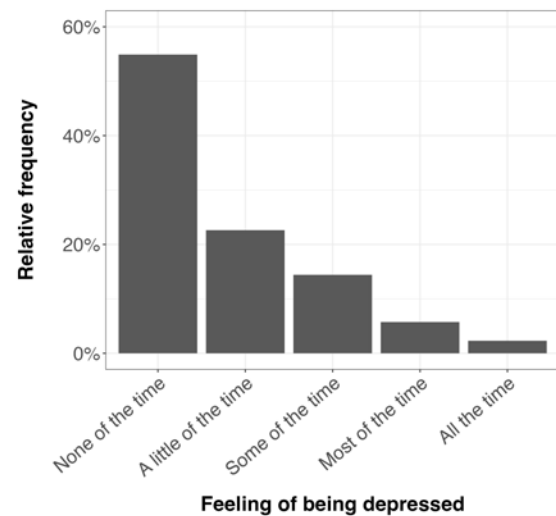


Figure 6: Distribution of anxiety and depression

Panel (b) of Figure 6 illustrates that while most respondents are not feeling depressed at all (55%), 8% feel depressed all or most of the time. Similar holds for anxiety where nearly 60% of the people never feel anxious and stressed, and about 6% feel anxious all or most of the time (panel (a) of Figure 6). In comparison, slightly more of the respondents feel depressed than anxious. In the further analysis, we simplify the classification and subsume for each symptom the answer options *"all of the time"* and *"most of the time"* to *"most of the time"* and *"some of the time"* and *"little of the time"* to *"some of the time"*. In the end, we obtain three classes of feelings: (i) None of the time, (ii) some of the time, and (iii) most of the time. In this chapter, we rely on these three categories when giving an empirical overview over the data.

Figures 7 and 8 give some first insights on how mental health is distributed over gender and age. In panel (a) of Figure 7, we observe that females generally feel slightly more anxious than males. While more than 9% of females feel anxious most of the time, this is only the case for around 5% of males. A similar observation can be made for depression (see panel (b) of Figure 7).

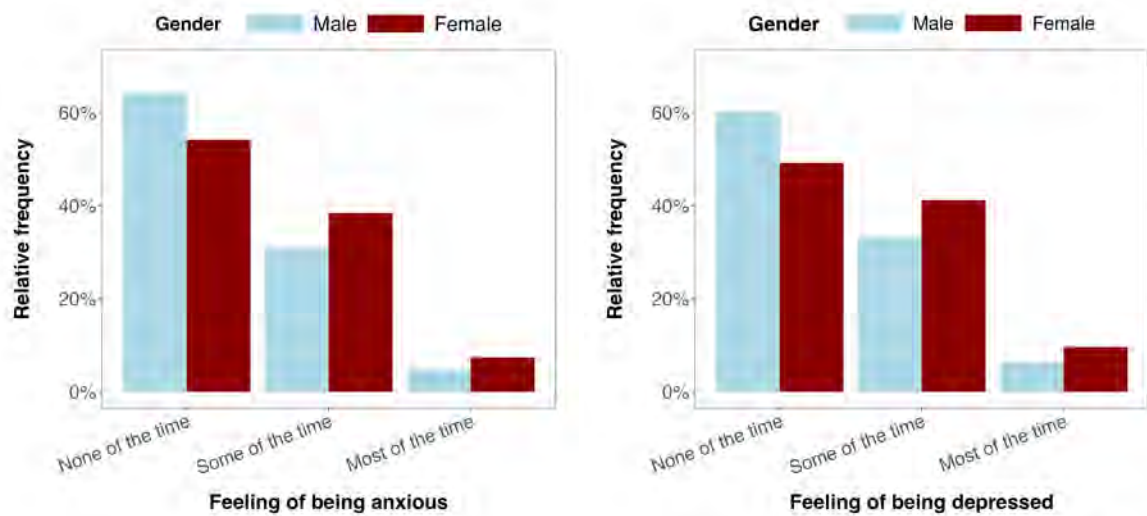
(a) Anxiety ($n = 43,096,483$)(b) Depression ($n = 43,194,702$)

Figure 7: Mental health across gender

In Figure 8, we can see that younger people seem to feel anxious and depressed more often compared to the older ones. The majority of respondents older than 35 years feel neither depressed nor anxious at all, whereas only 45% of young people feel depressed none of the time. The distribution of age is similar for both depression and anxiety.

Figure 9 shows the distribution of anxiety and depression across continents over the whole time period. Generally, we observe that Africa has the largest proportion of people feeling depressed and anxious (around 10%). It is striking that Europe and Oceania has the

smallest share of mentally ill people. In Africa, 50% do not feel anxious or depressed at all, while in Oceania more than 70% never feel anxious and 65% never feel depressed. In Oceania, America and Europe slightly more people feel depressed than anxious. In the Appendix, we provide two maps on the geographical distribution of mentally ill people (Figures B.2 and B.3).

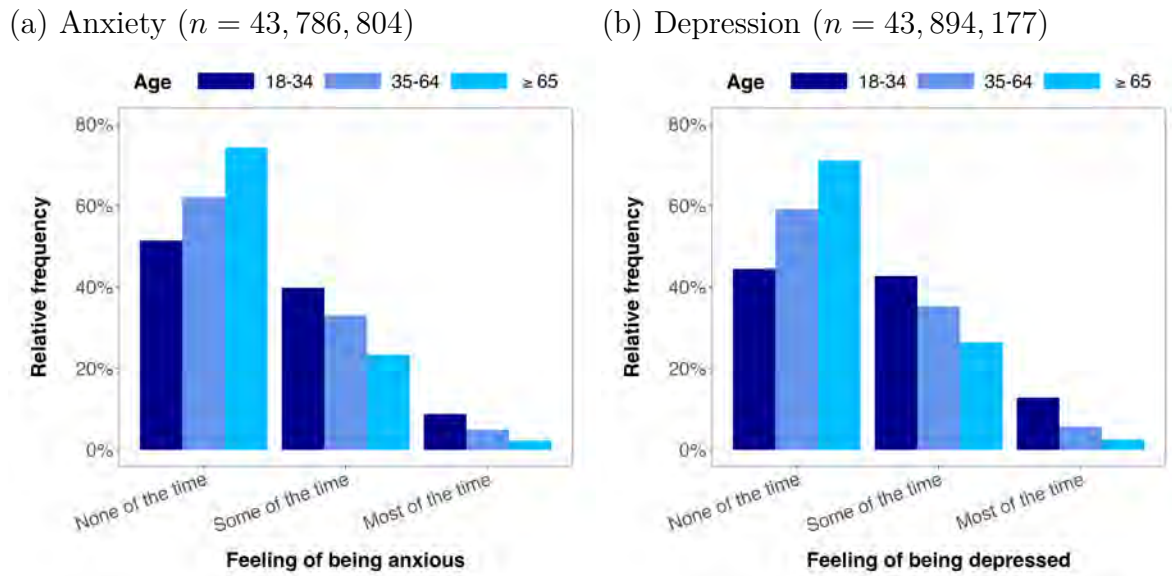


Figure 8: Mental health across age groups

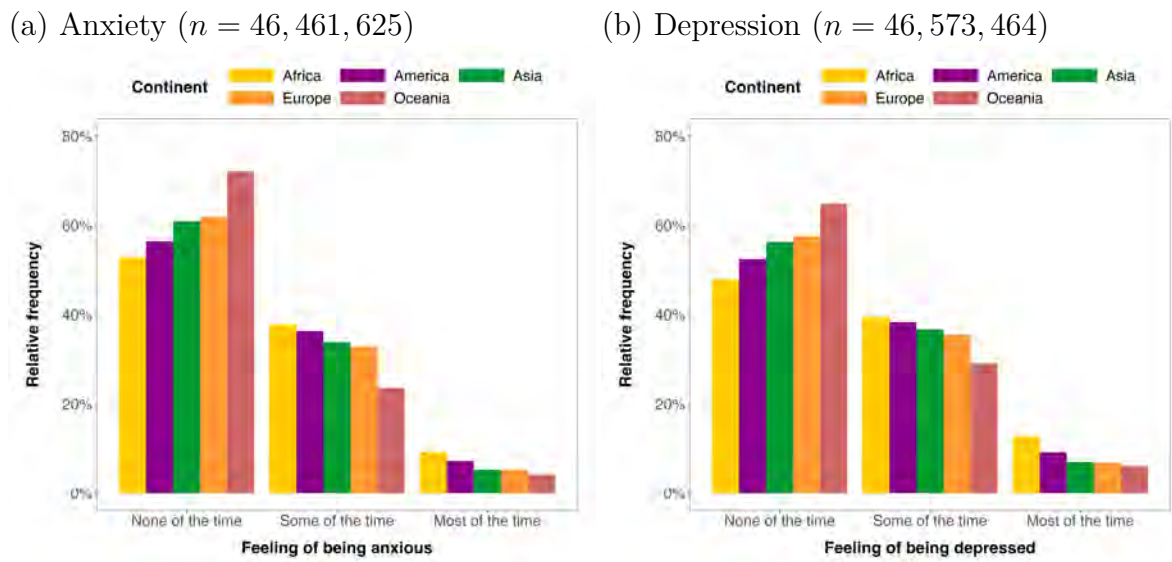


Figure 9: Mental health across continents

Figure 10 presents a scatterplot of the relative frequency of anxiety against the relative frequency of depression. In particular, these frequencies are calculated as the share of

respondents who feel anxious or depressed most of the time (category (iii) from above) to the total number of respondents in a country. The entries in the scatterplot indicate mean frequency values for each country (colored by continental assignment as described in footnote 5). The vertical and horizontal dashed lines represent the overall means of anxiety and depression, respectively. Entries above (below) the 45-degree line point to countries where depression is more (less) widespread than anxiety. Three features stand out from the figure. First, although depression seems a slightly bigger problem than anxiety viewed over all countries and time periods (the mean value of depression is around 0.12, while for anxiety it is about 0.10), the entries for both components of mental health are fairly distributed along the 45-degree line, which is reflected in a correlation coefficient of around 0.66. Interestingly, there are countries where neither anxiety nor depression seems a real problem (e.g., the Scandinavian countries (DNK, NOR, SWE), but also Vietnam (VNM) or Indonesia (IDN)), and ones where the opposite is true (e.g., Andorra (AND), Bermuda (BMU) or Burundi (BDI)).⁶

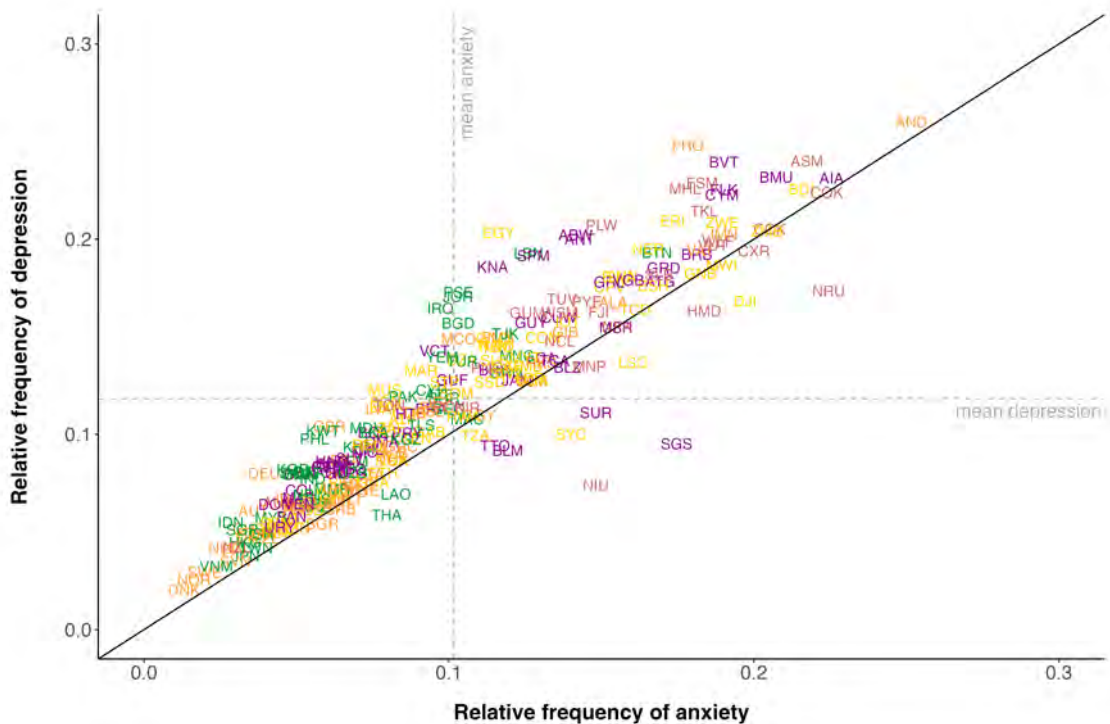


Figure 10: Relative anxiety versus relative depression frequencies ($n = 46, 356, 898$)

Second, and in line with Figure 9, we can see a clustering of continents. In particular, the African (yellow) and American countries (violet) are generally clustered at the north-east

⁶Notice that most of the entries at the far north-east and very distant from the 45-degree line of the figure are represented by very small countries, in most cases islands, e.g., Anguilla (AIA), Cook Islands (COK) or Bouvet Island (BVT).

of the figure, while the Asian (green), European (orange) and Ozeanic countries (red-brown) are located in the south-west of the graph. Finally, countries like Egypt (EGY) and the Faroe Islands (FRO) are far above the 45-degree line, indicating that illness from depression is much more severe than from anxiety. The opposite holds true for countries like Suriname (SUR) or the Seychelles (SLE), which are in the south-east part of Figure 10.

4 Empirical Findings

To analyze how mental health has changed over the course of the COVID-19 pandemic, we firstly provide descriptive time series on the respondents answers to the CTIS's questions on anxiety and depression. As discussed in previous chapters, the dataset is evaluated according to four dimensions: continents (Section 4.1), countries (Section 4.2), age cohorts (Section 4.3), and gender (Section 4.4). Secondly, we discuss our results, mainly comparing our findings on continents and countries with those of Castaldelli-Maia et al. (2021) (Section 4.5).

4.1 Continents

4.1.1 Anxiety

Figure 11 plots a heatmap for anxiety levels over continents and time. For this purpose, we use weekly aggregated data and calculate the mean anxiety levels over all individuals of a continent.⁷ Low levels of anxiety are colored in blue, high levels in red and medium levels in yellow. Again, and in line with panel (a) of Figure 9, we generally observe that Africa has the highest level of anxiety while Oceania has the lowest. In Africa, we observe a progression in anxiety levels, initially rising from approximately 1.7 to nearly 2.0 until January 2021. Subsequently, this increase stabilizes during the winter months, gradually declining to approximately 1.75 by June 2022. In contrast, Europe is characterized by a pronounced upward trajectory in anxiety levels at the onset of the pandemic. By December 2020, it experiences a sharp drop of anxiety levels, ultimately settling at a value of 1.5 by June 2021.

America starts the pandemic with an anxiety level of 1.8 in April 2020, reaching its maximum in March 2021, and subsequently decreasing to 1.6 by June 2022. Meanwhile, Asia reports a mean anxiety level of 1.7 in April 2020, steadily increasing to 1.85 by April 2021, before receding to 1.6 until the end of the observed time period. Both Oceania and Asia maintain a relatively consistent level of anxiety throughout the entire observational period.

Overall, Figure 11 suggests that severe feelings of anxiety are not observed in any continents and time periods. Even Africa with the highest levels of anxiety has an average anxiety level of about 2.3. However, simply looking at the mean may not contain enough information to capture the real extent of mental illness. Therefore, we propose an alternative approach that focuses on how many respondents of the survey exhibit symptoms

⁷Figure B.4 in the Appendix shows the results for monthly data, which basically contains the same information as the weekly plot, but at a higher level of aggregation.

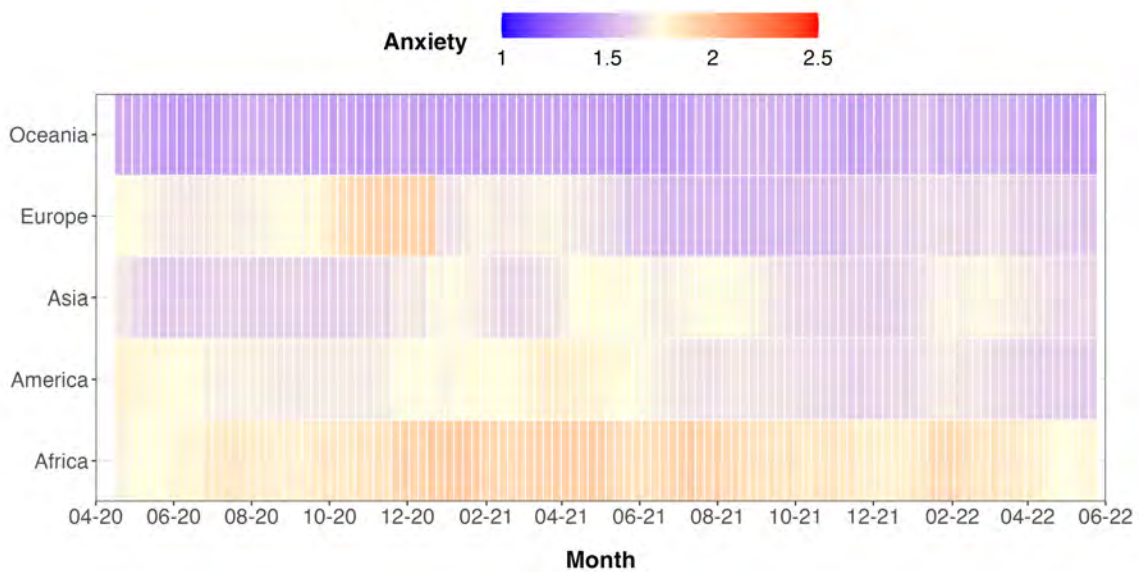


Figure 11: Weekly aggregated anxiety level across continents ($n = 46, 461, 625$)

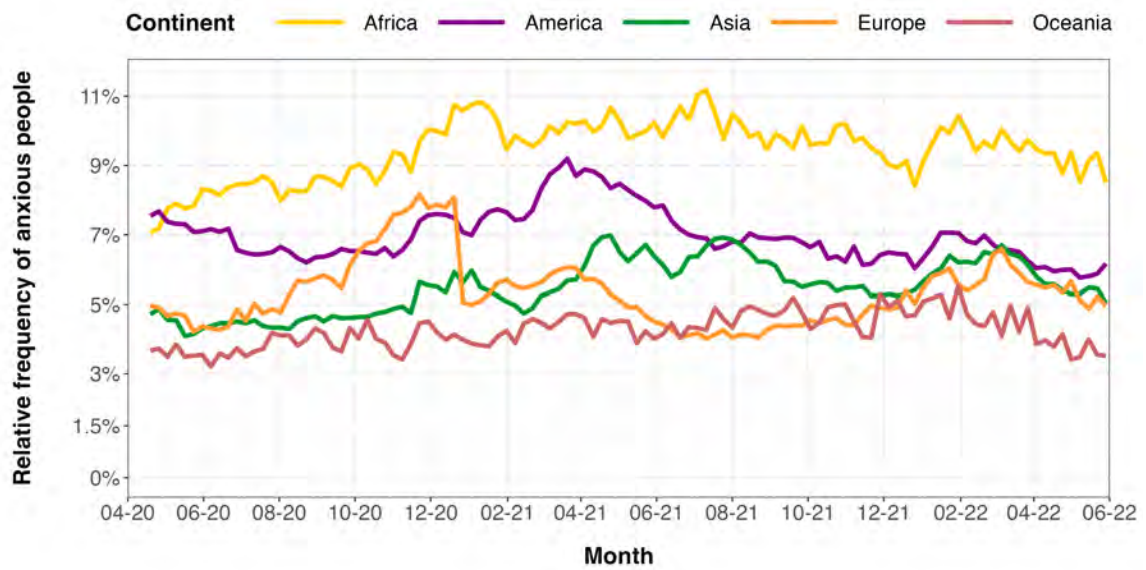
of anxiety. In particular, Figure 12 depicts the relative frequency of anxious people across the continents, and can be therefore interpreted as prevalence of mental health (Wakefield & Schmitz 2017). Panel (a) of the figure relates to a narrow definition of anxiety focusing on respondents who feel anxious *“all the time”* and *“most of the time”*, while panel (b) indicates a broader definition also including people who feel anxious *“some of the time”*.

In Africa, we observe a notable increase in the prevalence of mental illness, initially ranging from approximately 7% (according to a broader definition, 20%) in April 2020 to a peak of about 11% (30%) at the onset of 2021. Subsequently, this rate stabilizes and experiences a slight decline until June 2022, settling at approximately 9% (23%). Conversely, Europe, America, and Oceania report nearly equivalent or marginally lower rates of individuals experiencing anxiety in June 2022 compared to the beginning of the pandemic.

In the case of Asia, we also document an uptick in anxiety levels, rising from around 5% to 5.5%, with a maximum in mid-2021 at roughly 7%. Meanwhile, in Europe, the prevalence of anxious individuals increase from about 5% to approximately 8% between the middle and end of 2020, as depicted in panel (a) of Figure 12. Subsequently and corresponding to Figure 11, it exhibits a rapid decline, returning to a level of 5%. In America, 8% of the population reported feeling anxious at the beginning of the pandemic. The highest point is reached during the winter of 2020/21, with a peak of 9%, after which the frequency of anxiety receded to 6% by June 2022.

Comparing these trends to the broad definition of anxiety in panel (b) of Figure 12, Europe demonstrates a substantial decrease in the prevalence of anxious individuals, de-

(a) Narrow definition: Anxious most of the time



(b) Broad definition: Anxious most or some of the time

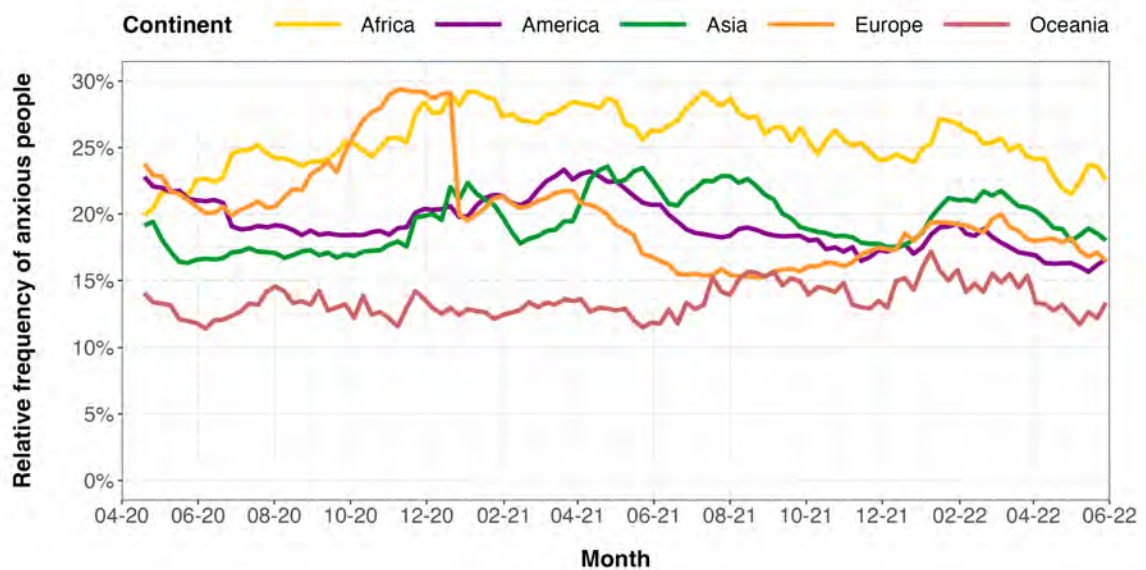


Figure 12: Prevalence of anxious people over time (weekly aggregated) ($n = 46, 461, 625$)

clining from approximately 24% to 17%. A similar pattern is evident for America, with a nearly 5% reduction, while Oceania and Asia maintain nearly constant rates between the beginning and end of the observational period.

4.1.2 Depression

Figure 13 shows a heatmap on the mean levels of depression across continents. Again, we report the results of the weekly representation (Figure B.5 in the Appendix provides a graph for monthly aggregated data). In line with Figures 9 and 10 of Chapter 3, we can see that the entries for depression are generally higher than for anxiety, implying that depression appears more widespread than anxiety.

As in the case of anxiety, Africa has the highest level of depression with values of around 2.0 throughout. In America, depression levels slightly decrease over time from around 1.9 to nearly 1.7. In Europe not only anxiety but also depression levels increase at the beginning of the pandemic (from around 1.8 to 2.1 until January 2021), and then continuously go down to 1.6 in the summer of 2022. Asia has a quite stable level with a slight decrease over the time period from around 1.8 to 1.7. Oceania's depression levels are nearly at the same level (around 1.6) at the beginning and end of the time period. In between, it reaches a peak in summer 2021 at around 1.7. The highest entries are around 2.4 (in Africa), which, similar to anxiety, lies at the lower end of the scale.

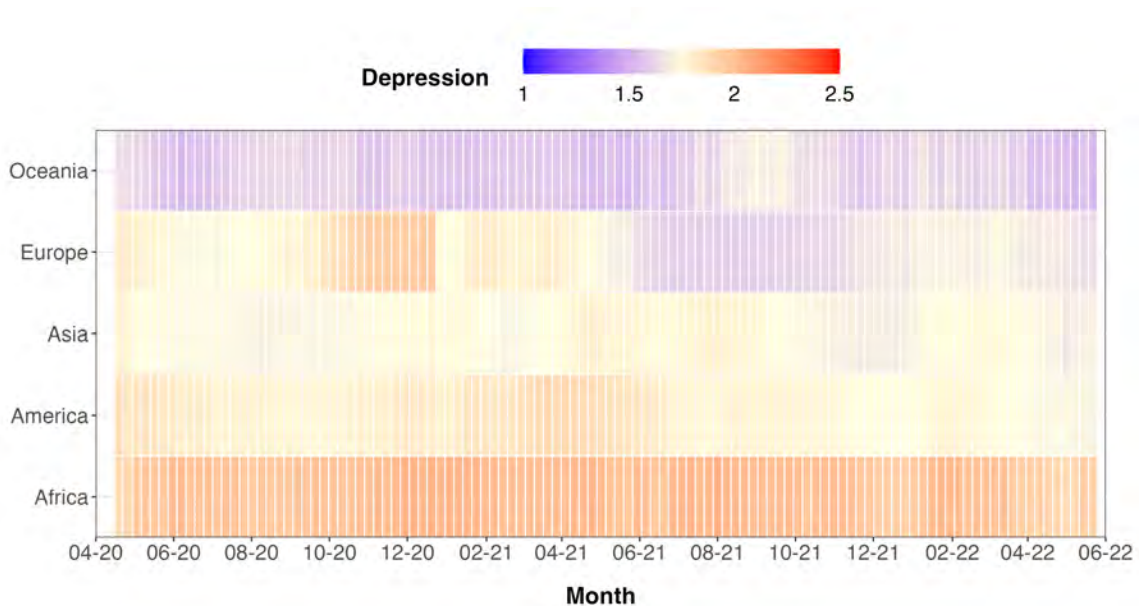
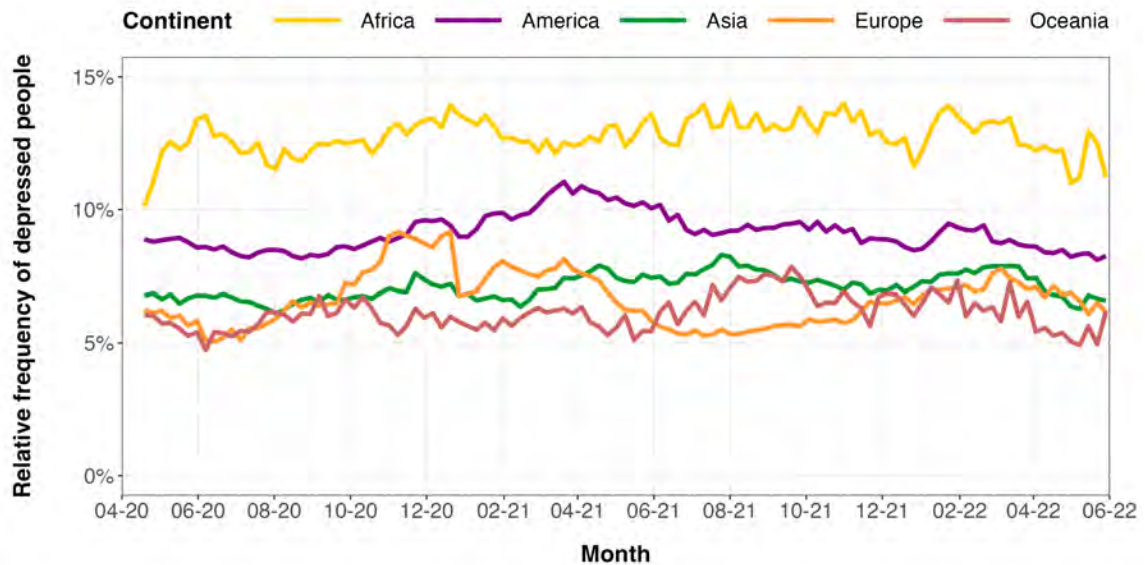


Figure 13: Weekly aggregated depression level across continents ($n = 46,573,464$)

Figure 14 presents the trajectories of relative frequencies of depressed people across continents. Again, we report weekly aggregated data and results for the narrow (panel (a)) and broader definition of depression (panel (b), including respondents who feel depressed "some of the time").

Our conclusions drawn from Figure 14 are very similar to the ones for anxiety (Figure 12). The pattern shown in the figure reveals that Africa exhibits the highest prevalence of

(a) Narrow definition: Anxious most of the time



(b) Broad definition: Anxious most or some of the time

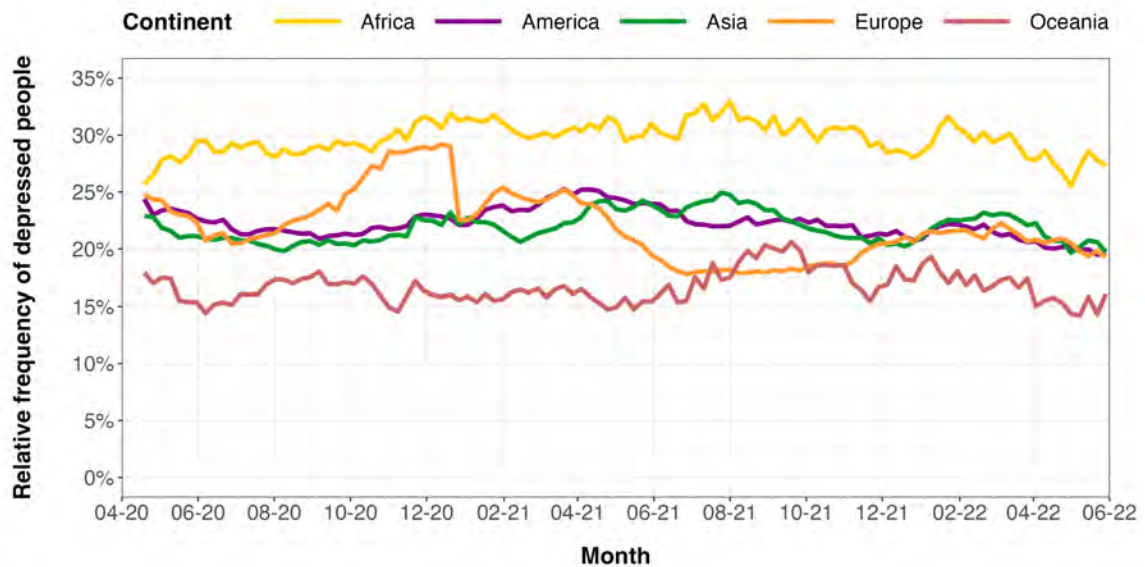


Figure 14: Prevalence of depressed people over time (weekly aggregated) ($n = 46,573,464$)

individuals experiencing depression. The depression frequency witnessed an approximate 1.5% increase during the pandemic. In a broader context, most continents generally maintain a relatively consistent rate of depression among their populations. America demonstrates a range of 8% to 9%, peaking at 11% in February 2021. In Asia, the prevalence of depression remains relatively stable at approximately 7% throughout the

entire time period. In contrast, Europe’s depression rate exhibits more variability. It commences at around 6% at the onset of the pandemic, raises to approximately 9% during the winter of 2020, decreases to roughly 5% in the summer of 2021, and experiences a slight resurgence during the winter of 2021. By December 2020 we observe a sharp decrease in depression frequencies, although the drop in the prevalence is not as large as in the case of anxiety. Oceania registers the lowest depression rate at the pandemic’s outset, which persists until approximately August 2021, after which it undergoes a gradual increase of approximately 2.5%. If we use the broader definition of depression instead of the narrower one (panel (b)), we find very similar results, although the up and down movements of the series are somewhat larger.

Overall, we do not find systematic differences in trajectories between anxiety and depression. Interestingly, our findings do not provide compelling evidence to suggest that the pandemic exerted a pronounced influence on mental health. However, we observe differences when considering the various continents. Africa stands out with the highest prevalence of anxiety and depression, which may not be directly attributable to COVID-19, but perhaps on other factors such as poverty or famines. In contrast, Oceania and Asia exhibit the lowest rates of both depression and anxiety. In both America and Europe, individuals experienced higher mental distress more frequently at the onset of the pandemic compared to its later stages. Perhaps, this trend could be linked to the availability of vaccinations as the pandemic progressed, accompanied by the implementation of milder regulatory measures.

4.2 Countries

Tables 1 and 2 show the country-specific means of anxiety and depression levels along with the corresponding variances over time and the interquartile range (IQR). The entries in the tables are sorted in descending order of the IQR, and we only report the countries in the upper and lower end of this ranking. Notice that we exclude all countries with less than 5,000 respondents, which is the case for 124 out of the 237 countries enclosed in the dataset. Table C.1 in the Appendix reports the corresponding figures for all 237 countries in the sample. Further, Figures B.6 to B.15 provide country-specific heatmaps per continent, which allow to obtain a more detailed picture on how anxiety and depression levels have changed over time in specific countries.

Our conclusions drawn from the tables might be summarized as follows. First, the variance as well as the IQR over time is relatively small, suggesting that feelings of anxiety and depression did not change significantly during the pandemic period. This evidence is consistent with the findings from the continents. Second, we observe a high concordance

Table 1: Anxiety over countries

| | Country | <i>n</i> | Mean | Variance | IQR |
|-----|--------------------|-----------|-------------|-----------------|------------|
| 1 | Thailand | 817,505 | 1.99 | 0.08 | 0.48 |
| 2 | Uzbekistan | 52,329 | 1.82 | 0.04 | 0.40 |
| 3 | American Samoa | 5,268 | 2.19 | 0.08 | 0.33 |
| 4 | Laos | 15,267 | 1.91 | 0.05 | 0.30 |
| 5 | Nicaragua | 152,820 | 1.76 | 0.02 | 0.28 |
| 6 | Tanzania | 24,096 | 1.83 | 0.03 | 0.27 |
| 7 | Benin | 10,346 | 1.71 | 0.02 | 0.25 |
| 8 | Azerbaijan | 42,023 | 1.94 | 0.02 | 0.25 |
| 9 | Côte d'Ivoire | 41,727 | 1.53 | 0.02 | 0.25 |
| 10 | Kyrgyzstan | 34,593 | 1.93 | 0.05 | 0.24 |
| ∴ | ∴ | ∴ | ∴ | ∴ | ∴ |
| 101 | Dominican Republic | 177,969 | 1.52 | 0.00 | 0.06 |
| 102 | Kuwait | 43,519 | 1.69 | 0.00 | 0.06 |
| 103 | New Zealand | 288,963 | 1.37 | 0.00 | 0.06 |
| 104 | Indonesia | 963,315 | 1.38 | 0.00 | 0.06 |
| 105 | Saudi Arabia | 179,899 | 1.59 | 0.00 | 0.06 |
| 106 | Norway | 260,905 | 1.24 | 0.00 | 0.05 |
| 107 | Denmark | 296,035 | 1.21 | 0.00 | 0.05 |
| 108 | Guatemala | 273,157 | 1.70 | 0.00 | 0.05 |
| 109 | Singapore | 91,076 | 1.50 | 0.00 | 0.05 |
| 110 | Australia | 765,649 | 1.50 | 0.00 | 0.04 |
| 111 | Israel | 390,197 | 1.60 | 0.00 | 0.04 |
| 112 | India | 1,869,101 | 1.59 | 0.00 | 0.04 |
| 113 | Philippines | 741,827 | 1.65 | 0.00 | 0.04 |

between anxiety and depression. For example, countries such as American Samoa and Thailand are found at the upper end of the scale for both components of mental health, while countries like India or Indonesia are at the lower end. Third, as in the case for the continents, we observe relatively low values for the levels of mental health (mean values in the second column of the tables). The mean values of the mental health levels do not seem to be directly related to the variances.⁸ Therefore, among countries with high variance are countries with low mean scores (e.g., Benin or Thailand), and vice versa (e.g.,

⁸This is also reflected by a correlation coefficient between the mean and the variance of around 0.47 for anxiety, and around 0.22 for depression.

Bangladesh or Iraq).⁹

Table 2: Depression over countries

| | Country | <i>n</i> | Mean | Variance | IQR |
|-----|--------------------|-----------|-------------|-----------------|------------|
| 1 | American Samoa | 5,268 | 2.28 | 0.07 | 0.33 |
| 2 | Thailand | 817,505 | 1.81 | 0.04 | 0.30 |
| 3 | Uzbekistan | 52,329 | 1.90 | 0.02 | 0.28 |
| 4 | Kyrgyzstan | 34,593 | 2.00 | 0.03 | 0.25 |
| 5 | France | 1,114,967 | 1.86 | 0.02 | 0.24 |
| 6 | Benin | 10,346 | 1.72 | 0.02 | 0.22 |
| 7 | Belgium | 191,985 | 1.95 | 0.01 | 0.22 |
| 8 | United Kingdom | 576,240 | 1.87 | 0.01 | 0.22 |
| 9 | Tanzania | 24,096 | 1.83 | 0.02 | 0.22 |
| 10 | Ireland | 122,792 | 1.72 | 0.01 | 0.22 |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| 96 | Brazil | 5,455,904 | 1.88 | 0.00 | 0.06 |
| 97 | New Zealand | 288,963 | 1.48 | 0.00 | 0.06 |
| 98 | El Salvador | 247,023 | 1.83 | 0.00 | 0.06 |
| 99 | Libya | 115,508 | 1.92 | 0.00 | 0.06 |
| 100 | Honduras | 166,138 | 1.80 | 0.00 | 0.06 |
| 101 | Venezuela | 350,581 | 1.70 | 0.00 | 0.06 |
| 102 | Philippines | 741,827 | 1.88 | 0.00 | 0.06 |
| 103 | Iraq | 285,034 | 2.19 | 0.00 | 0.06 |
| 104 | Japan | 3,587,117 | 1.56 | 0.00 | 0.06 |
| 105 | Colombia | 926,601 | 1.74 | 0.00 | 0.05 |
| 106 | Bangladesh | 253,765 | 2.17 | 0.00 | 0.05 |
| 107 | Mexico | 3,828,110 | 1.78 | 0.00 | 0.05 |
| 108 | Costa Rica | 278,932 | 1.78 | 0.00 | 0.05 |
| 109 | Bolivia | 323,404 | 2.00 | 0.00 | 0.04 |
| 110 | Guatemala | 273,157 | 1.80 | 0.00 | 0.04 |
| 111 | Dominican Republic | 177,969 | 1.67 | 0.00 | 0.04 |
| 112 | Indonesia | 963,315 | 1.56 | 0.00 | 0.04 |
| 113 | India | 1,869,101 | 1.72 | 0.00 | 0.03 |

By and large, our country-specific results seem to confirm our previous evidence that we

⁹Qualitatively, our results do not change when focusing on relative frequencies (prevalences) rather than the mean levels of anxiety and depression.

found for the continents. On the one hand, feelings on mental health do not seem to have changed significantly during the pandemic, and on the other hand, there is some variation across countries, indicating a different degree of being affected by the pandemic.

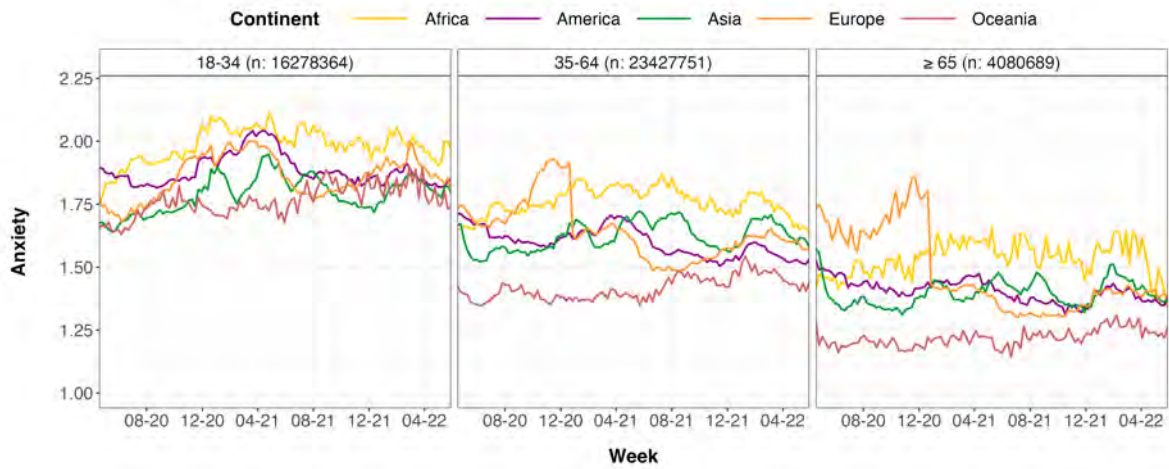
4.3 Age

To conduct a more comprehensive analysis of the impact of the COVID-19 pandemic on mental health, we take a closer look on how anxiety and depression has changed within different age cohorts. Figure 15 illustrates the corresponding results. Panel (a) of the figure relates to the trajectory of anxiety levels within distinct age groups, as outlined in Chapter 3. Notably, younger individuals consistently exhibit higher anxiety levels compared to their older counterparts. It is noteworthy that, during the initial stages of the pandemic up to December 2021, older individuals in Europe experienced the highest anxiety rates, mirroring the persistent anxiety levels observed among young Europeans throughout the pandemic. This phenomenon may be attributed to the heightened susceptibility of older individuals to infection, a risk which has been mitigated to a significant extent with the widespread availability of vaccines. Generally, it appears that people older than 64 years tend to report slightly lower anxiety levels compared to the working population aged between 35 to 64.

Panel (b) of Figure 15 illustrates the temporal evolution of depression rates across distinct age cohorts. Again, it is evident that Africa consistently records the highest levels of depression, while Asia and Oceania consistently exhibit the lowest depression rates across all age groups. Notably, a consistent pattern emerges, with younger individuals across all continents reporting higher levels of depression in comparison to their older counterparts. Conversely, those aged 64 and above consistently report the lowest levels of depression. In the initial year of the pandemic, 2020, there was a notable spike in depression levels, particularly among older individuals in Europe, potentially attributable to heightened concerns regarding infection risks. However, as the year 2021 commenced and perhaps as COVID-19 vaccines became available, there was a marked and abrupt decline in depression levels.

In summary, the trajectories of anxiety and depression exhibit a considerable degree of similarity. There are no discernible trends indicating substantial changes in mental health across various age groups. Generally, younger individuals tend to experience higher levels of both anxiety and depression than their older counterparts. Notably, during the initial phases of the pandemic, older individuals in Europe, in particular, reported heightened feelings of depression and anxiety.

(a) Anxiety ($n = 43,786,804$)



(b) Depression ($n = 43,894,177$)

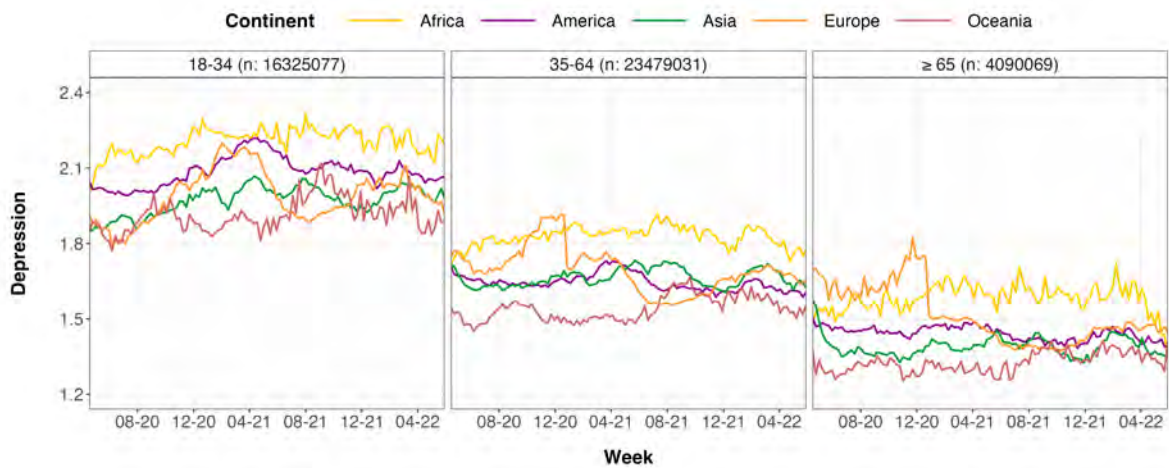


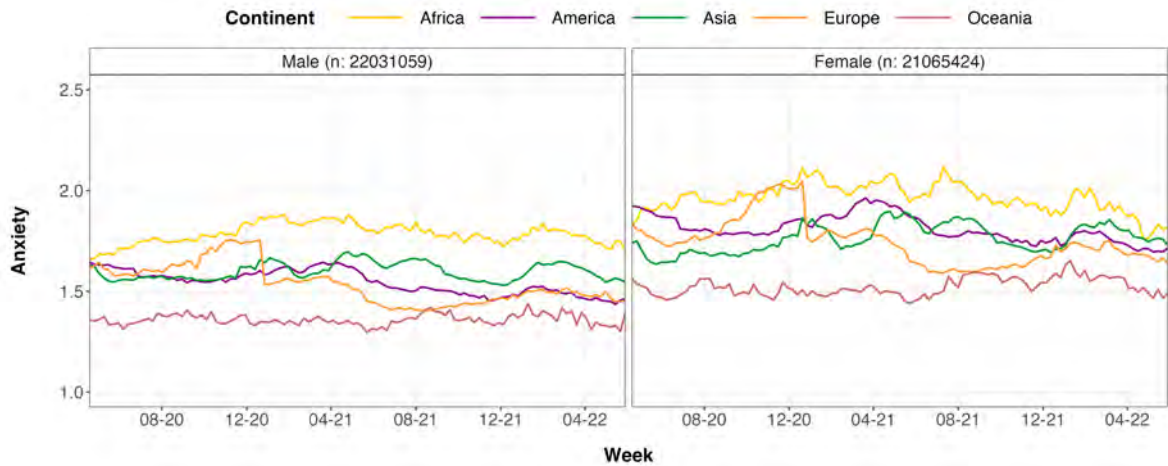
Figure 15: Mental health by age cohorts

4.4 Gender

This section focuses on the trajectories mental health within distinct gender groups, i.e., males and females. Figure 16 reports the corresponding results for anxiety (panel (a)) and depression (panel (b)). Notably, the data reveals that females consistently report higher levels of both depression and anxiety when compared to males. Interestingly, the gender gap in anxiety and depression levels is most pronounced in Europe. Once again, Africa registers the highest rates, while Oceania consistently records the lowest rates across both genders. An examination of the trends suggests some modest fluctuations in depression

and anxiety levels over time among females, while the rates for males appear relatively stable. By and large, Figures 15 and 16 indicate that the decline observed for Europe is mainly driven by females in the age groups above 64 years.

(a) Anxiety ($n = 43,096,483$)



(b) Depression ($n = 43,194,702$)

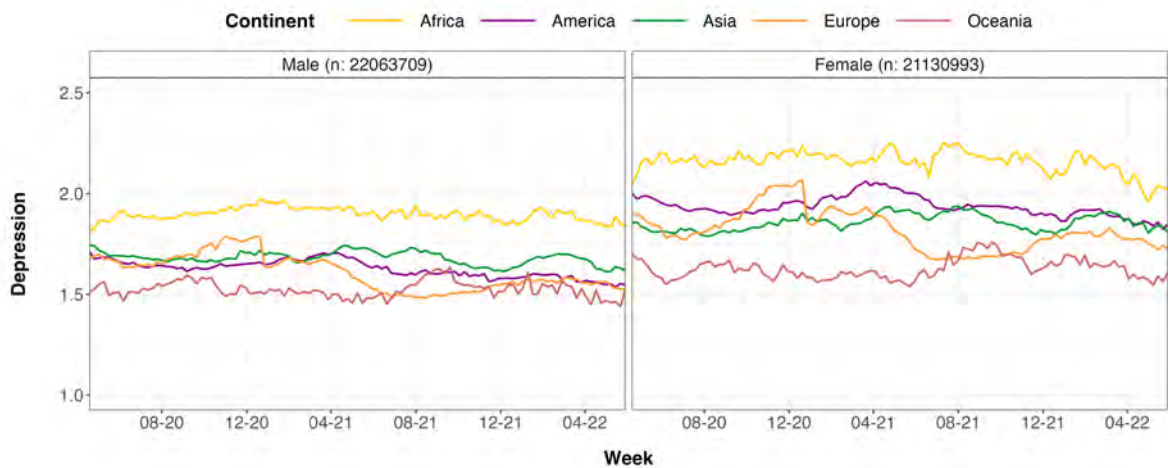


Figure 16: Mental health by gender

4.5 Discussion

The empirical findings presented in this chapter suggest that, with a few exceptions, mental health, as assessed through measurements of anxiety and depression, exhibits relatively stable patterns throughout the course of the pandemic. Additionally, we have

identified systematic variations based on geographical regions, nations, age groups, and gender. When contrasting these outcomes with those reported by Castaldelli-Maia et al. (2021), it is important to underscore that the observational window for our study is significantly longer, spanning from April 2020 to June 2022, whereas their study encompassed the period from January to May 2020. Their research indicates that Asia had the lowest prevalence of individuals experiencing depression (17.6%), followed by Europe at 26%, and the highest rates were observed in other regions of the world (39%). This aligns with our findings, as we observed the lowest rates in Oceania (approximately 7%), Asia (8%), and Europe, while America, and particularly Africa, reported higher rates, with 13%. Generally, we observed a markedly lower prevalence of mental illness than Castaldelli-Maia et al. (2021).

Castaldelli-Maia et al. (2021) identified a 15% increase in anxiety and depression during the beginning of the pandemic in Europe. Our analysis similarly revealed a substantial surge in anxiety at the outset of the pandemic in Europe, which subsequently stabilized to levels comparable to the initial phase. In contrast, Castaldelli-Maia et al. (2021) reported a 15% increase in anxiety and depression in Asia, a trend that we did not observe in our analysis, where anxiety rates remained relatively stable throughout the entire study period. One reason might be the data for China are not available in CTIS but are included in the study of Castaldelli-Maia et al. (2021). Their findings also indicated a nearly 15% increase in countries outside of Asia and Europe, a trend which we did not detect in our dataset.

To summarize, our results exhibit some similarities with those reported by Castaldelli-Maia et al. (2021) when considering the time frame from March to May. From this, we firstly may conclude that using the CTIS data delivers reliable results with regard the effects of the COVID-19 pandemic on mental health. Second, our findings indicate lower increases in both anxiety and depression prevalence compared to Castaldelli-Maia et al. (2021). Extending the time frame beyond May 2020, it seems that these changes tend to disappear (perhaps with the exception of Europe). This, in turn, suggests that serious effects of COVID-19 on mental health, if any, only occurred in the first phase of the pandemic.

5 Conclusion

The COVID-19 pandemic that swept across the globe in early 2020, enforced governments around the world to enact stringent measures such as contact restrictions and lockdowns, which in turn disrupted the daily lives of citizens on an unprecedented scale. The dramatic change in peoples' daily routines and social interactions inevitably had the potential to impact individuals' mental well-being.

This thesis investigates whether and to what extent feelings about mental health has changed over the course of the COVID-19 pandemic. For this purpose, we used a large dataset encompassing over 67 million observations across 237 countries between April 2020 and June 2022. We scrutinized the interplay between an individual's age, gender, and their psychological states as measured by anxiety and depression.

Our findings reveal several key insights. First, anxiety and depression levels have, on the whole, exhibited remarkable stability over the pandemic's course. Nevertheless, regional disparities have emerged, most notably exemplified by Europe's initial surge in mental health problems during the pandemic's onset. The African continent reports the highest prevalence of both anxiety and depression, in stark contrast to the consistently lower rates observed in Oceania. By and large, we observe similar patterns for countries. Second, our analysis underscores that younger cohorts generally experience higher levels of anxiety and depression compared to their older counterparts. An interesting finding is that older people in Europe suffered from significant anxiety and depression at the beginning of the pandemic, in contrast to Oceania, where older people had significantly fewer mental health problems. Finally, our analysis unveils a gender disparity, with females consistently reporting higher levels of both anxiety and depression, while male rates remain relatively stable throughout the observational period. Remarkably, the gender gap in mental health is highest in Europe.

It is imperative to acknowledge certain limitations of the study. First, the absence of several countries, such as the United States and China, within our dataset demands for a cautious interpretation of our findings. Second, our extensive time frame, while valuable, does not give us a definite understanding of long-term effects of the pandemic on mental health. Furthermore, the absence of pre-pandemic baseline data and the exclusive reliance on active Facebook users for participation necessitate caution in generalizing our results to regions where Facebook is inaccessible or less commonly used, such as among older individuals. Moreover, it should be kept in mind that mental health in the CTIS is only captured by two questions which does not deliver a full picture on this psychological disorder. In a broader context, using survey data may induce biased results due to misperceptions in self-reported mental illness. Therefore, it would be interesting to compare

our findings with the ones from clinical studies. Finally, it should be emphasized that our analysis is a purely descriptive exercise that does not allow for any causal interpretation about the impact of the pandemic on mental health. Extending our study in this direction provides an interesting avenue for future research.

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Software and Code Availability

Code and figures are provided in electronic form on GitHub:

<https://gitfront.io/r/user-6728044/DTwICVQ99NNo/Bachelorthesis/>

Acknowledgments

I am grateful to my supervisor, Dr. Anna-Carolina Haensch, for her support and encouragement in working out this thesis. She gave me all the freedom I needed, provided me with tips and advice, and was always available at any time.

Appendix

A Codebook

Table A.1: List of covariates

| Variable | Abbrev. | Description |
|------------|-----------------------|--|
| age | age (E4) | Age of a person Categorical, 1: 18-24, 2: 25-34, 3: 35-43, 4: 45-54, 5: 55-64, 6: >65 |
| | age_grouped | Categorical, 1: 18-34, 2: 35-64, 3: >65 |
| anxiety | anxiety (D2) | Feeling of being anxious Categorical, 1: All the time, 2: Most of the time, 3: Some of the time, 4: A little of the time, 5: None of the time |
| | anxious_grouped | Categorical, 1: Most of the time, 2: Some of the time, 3: None of the time |
| | anxious_flip | Categorical, 1: None of the time, 2: A little of the time, 3: Some of the time, 4: Most of the time, 5: All the time |
| | anxious_group_flip | Categorical, 1: None of the time, 2: Some of the time, 3: All the time |
| continent | continent | Continent assignment Categorical, Africa, America, Asia, Europe, Oceania (based on UN-Geoscheme) |
| country | country (country_agg) | Country someone lives in |
| depression | depression (D1) | Feeling of being depressed Categorical, 1: All the time, 2: Most of the time, 3: Some of the time, 4: A little of the time, 5: None of the time |
| | depressed_grouped | Categorical, 1: Most of the time, 2: Some of the time, 3: None of the time |
| | depression_flip | Categorical, 1: None of the time, 2: A little of the time, 3: Some of the time, 4: Most of the time, 5: All the time |
| | depression_group_flip | Categorical, 1: None of the time, 2: Some of the time, 3: All the time |
| gender | gender (E3) | Gender of a person Categorical, 1 = Male, 2 = Female, 3 = Other |
| | gender_grouped | Dummy, 1: Male, 2: Female |

B Figures

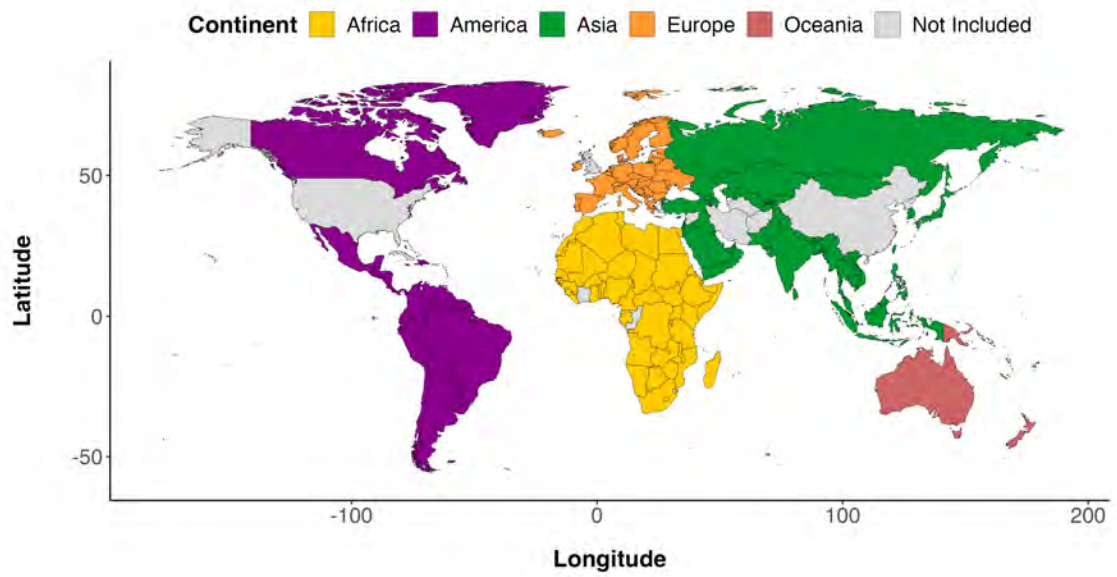


Figure B.1: UN-Geoscheme

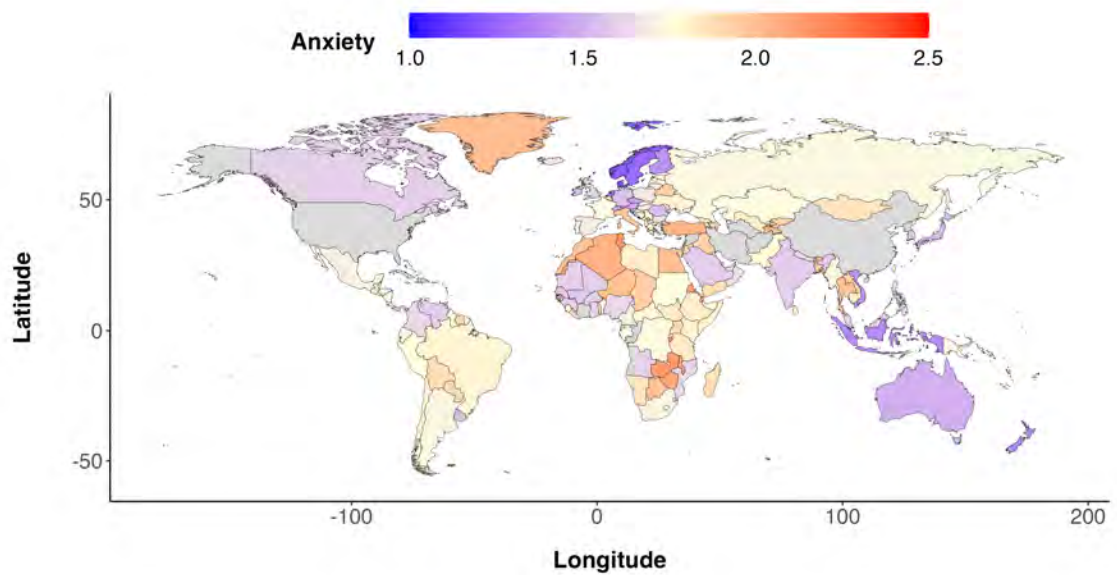


Figure B.2: Geographical distribution of anxiety ($n = 46,461,625$)

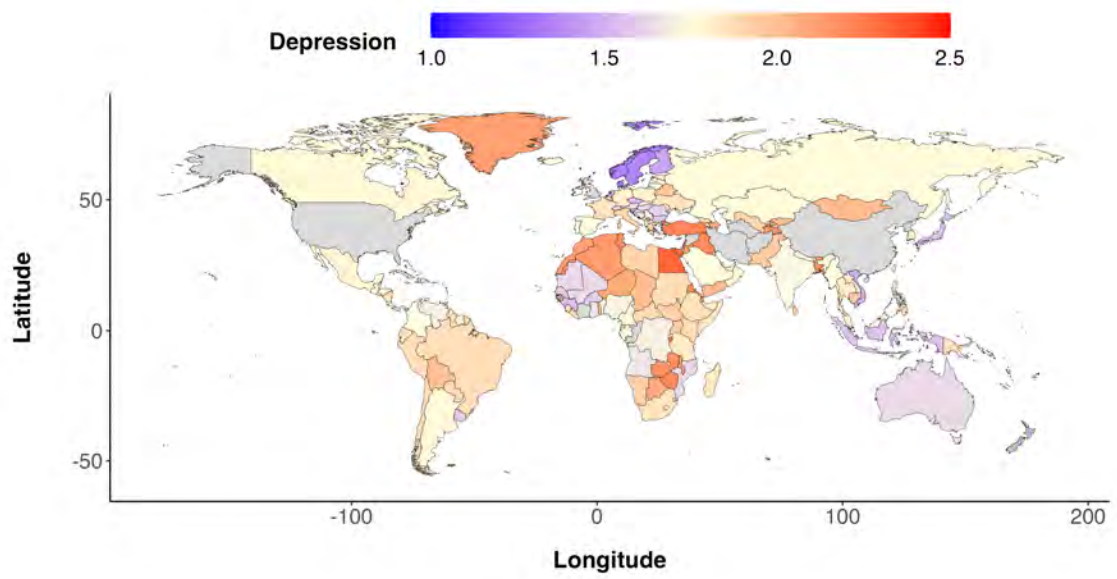


Figure B.3: Geographical distribution of depression ($n = 46, 573, 464$)

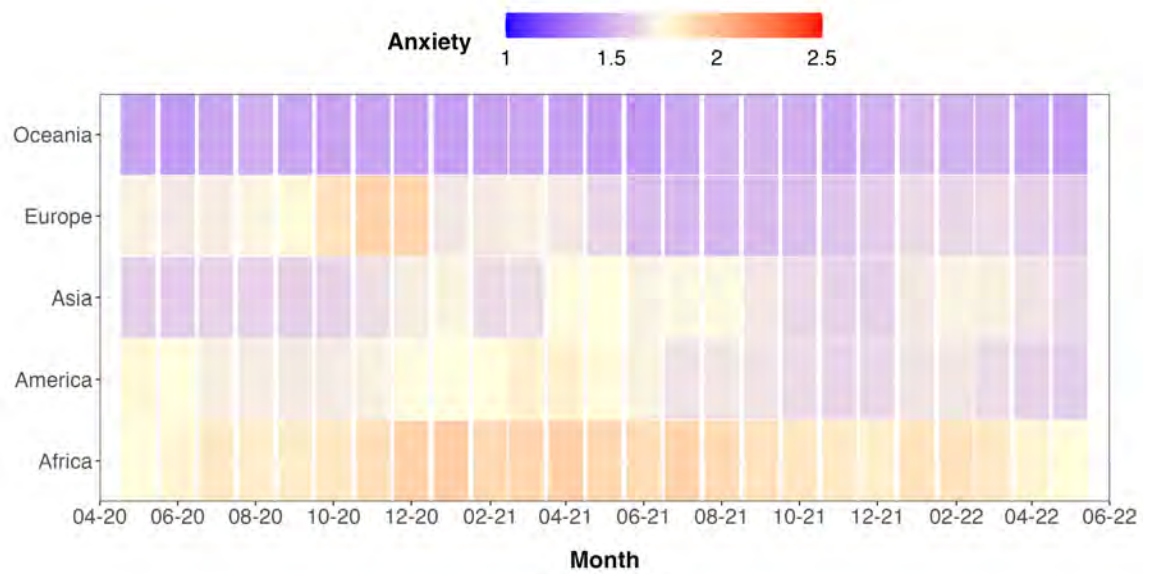


Figure B.4: Monthly aggregated anxiety level across continents ($n = 46, 461, 625$)

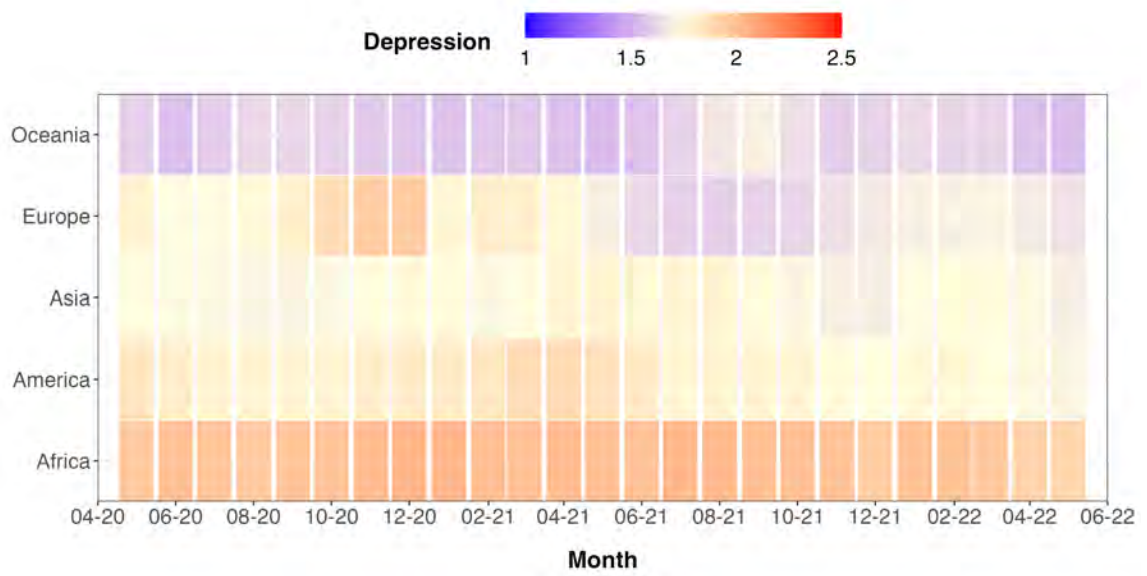


Figure B.5: Monthly aggregated depression level across continents ($n = 46,573,464$)

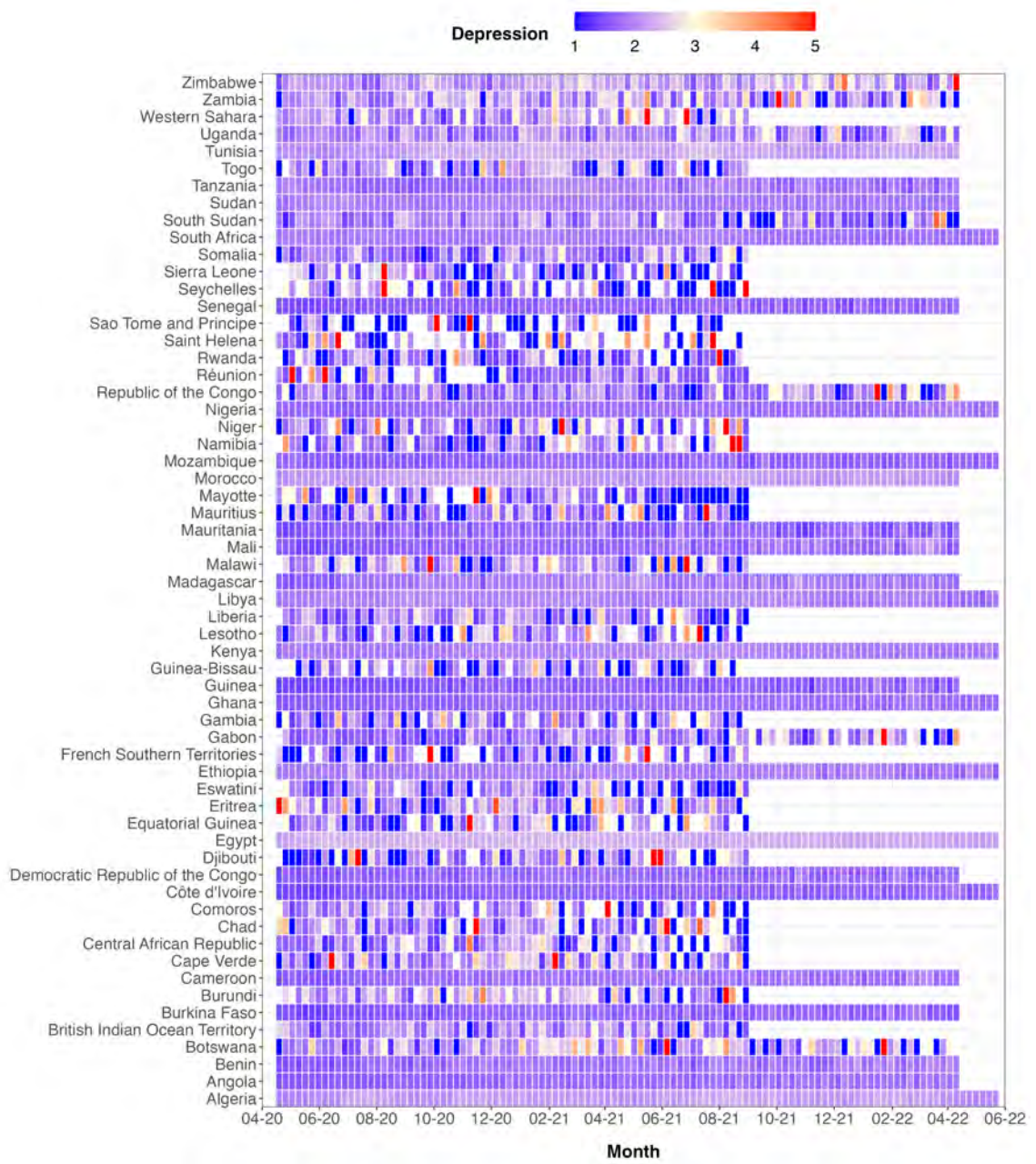


Figure B.6: Weekly aggregated depression levels across African countries ($n = 2, 576, 735$)

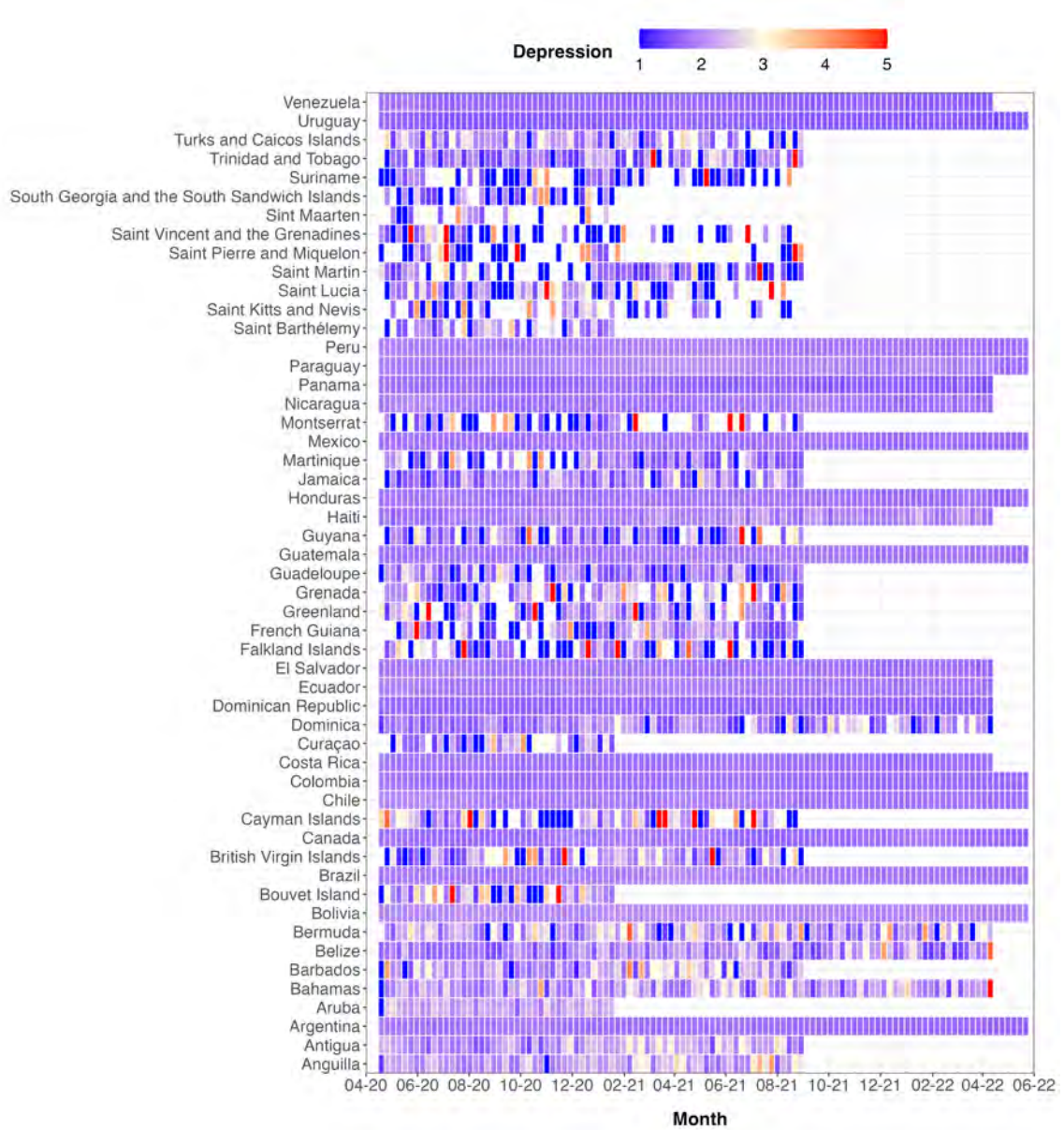


Figure B.7: Weekly aggregated depression levels across American countries
($n = 17,145,966$)

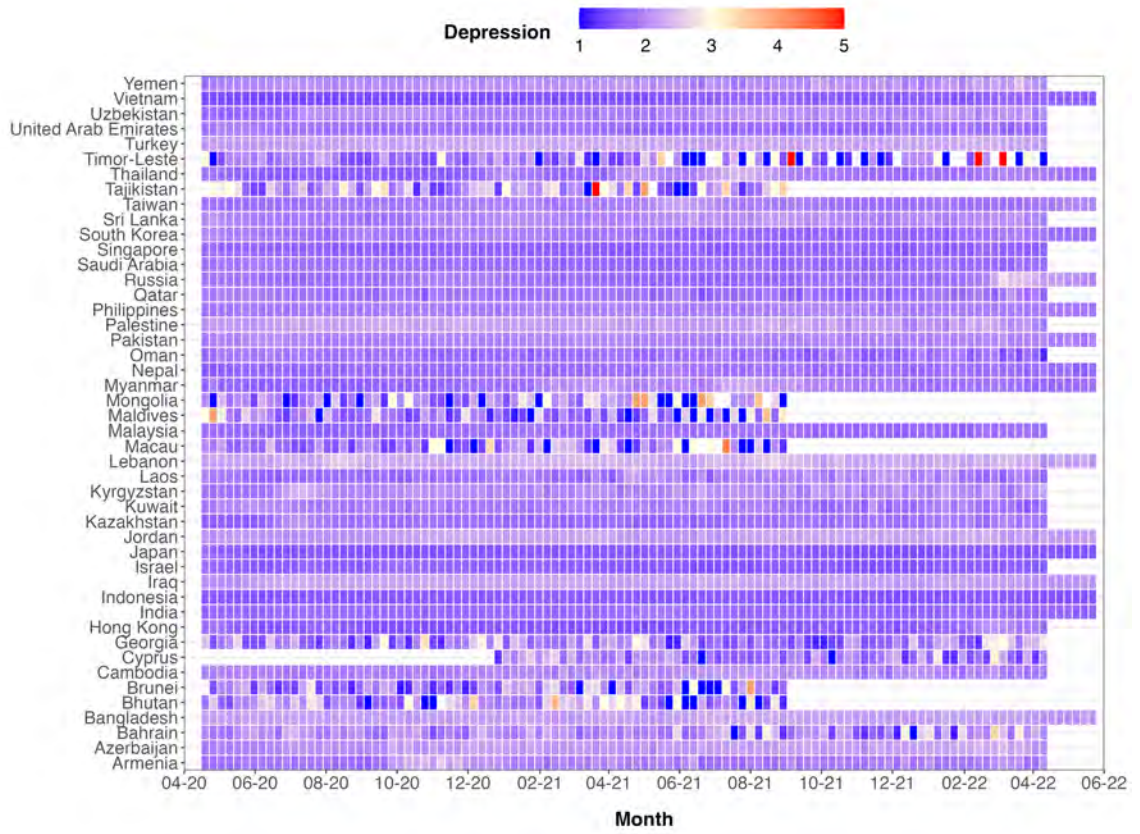


Figure B.8: Weekly aggregated depression levels across Asian countries ($n = 14,971,572$)

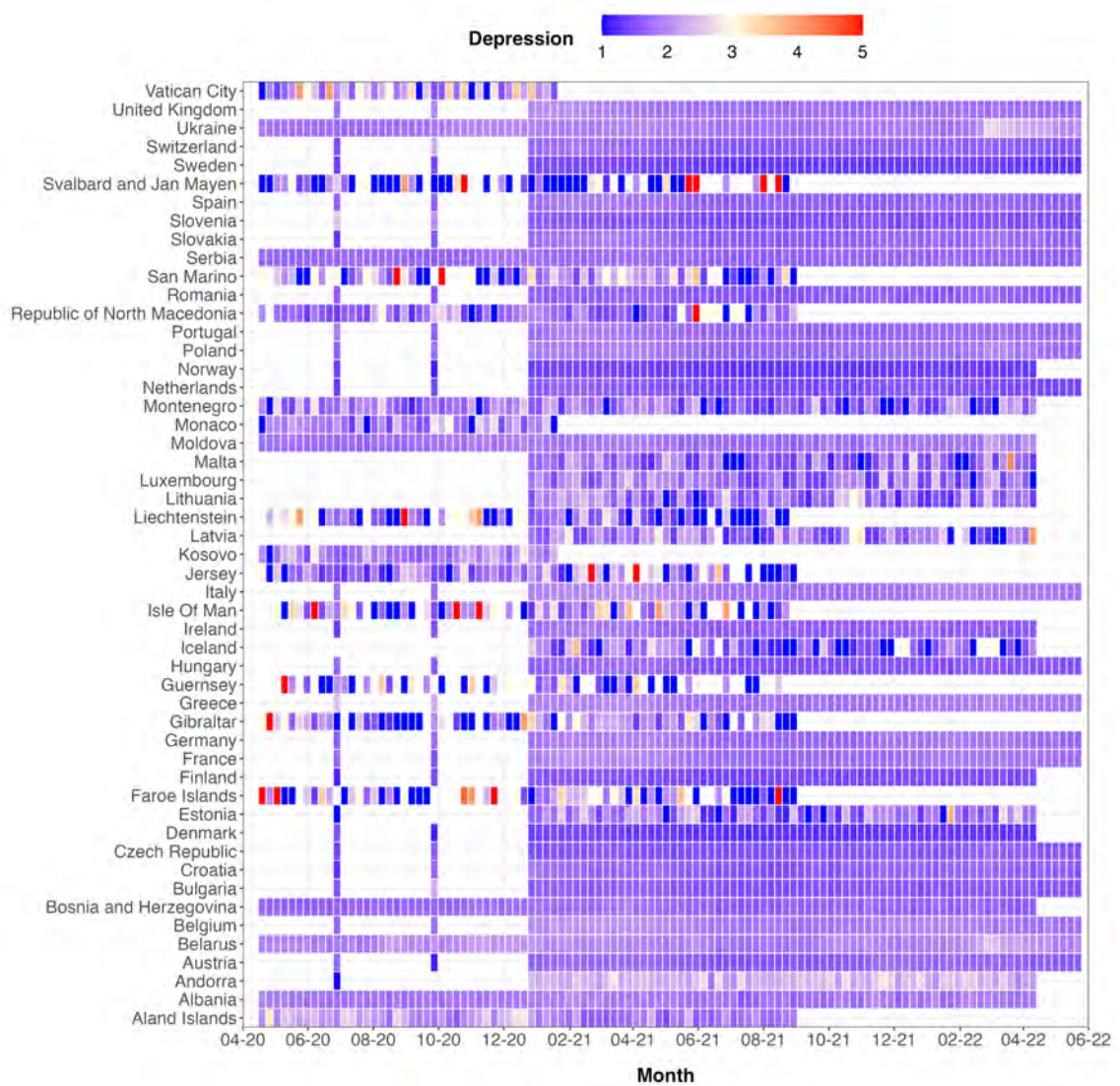


Figure B.9: Weekly aggregated depression levels across European countries ($n = 10,811,270$)

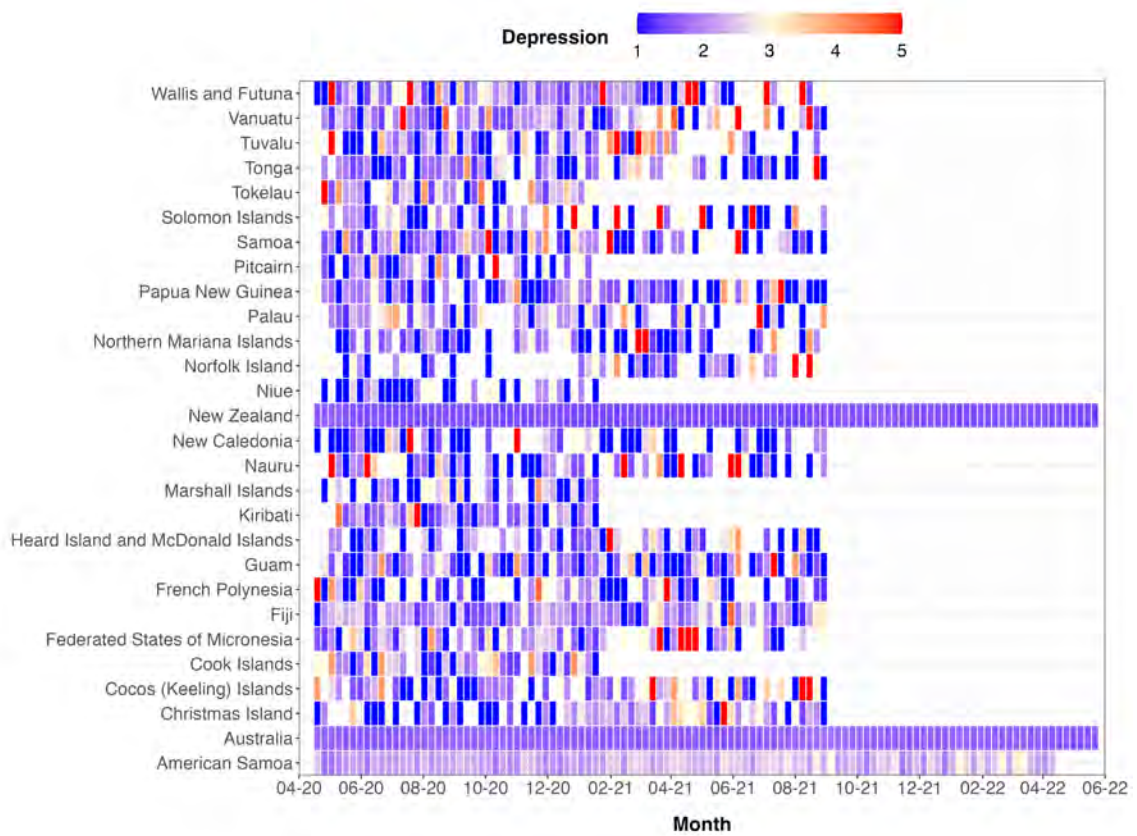


Figure B.10: Weekly aggregated depression levels across Oceanic countries
($n = 1,067,921$)



Figure B.11: Weekly aggregated anxiety levels across African countries ($n = 2,572,931$)

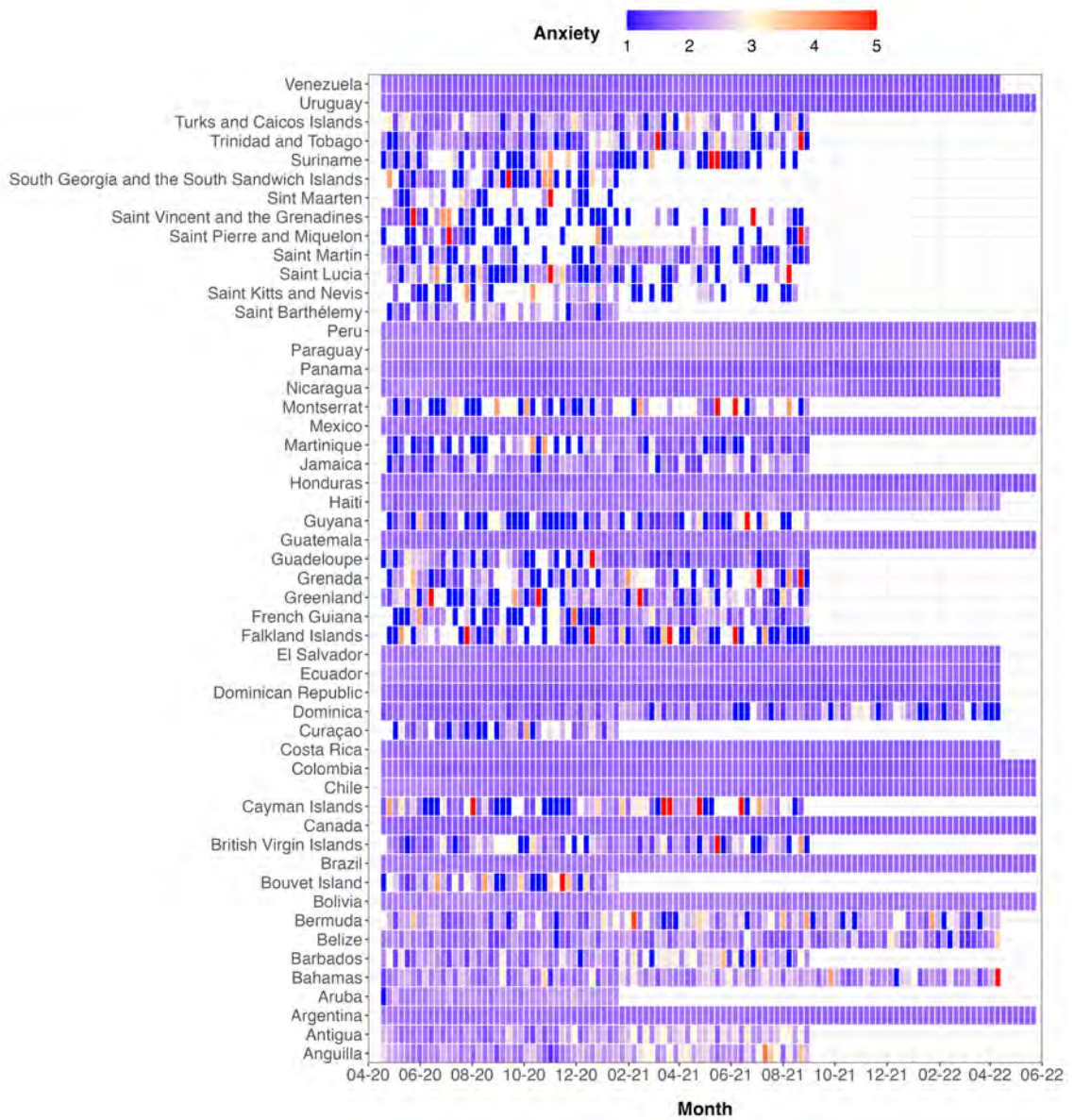


Figure B.12: Weekly aggregated anxiety levels across American countries ($n = 17,080,937$)

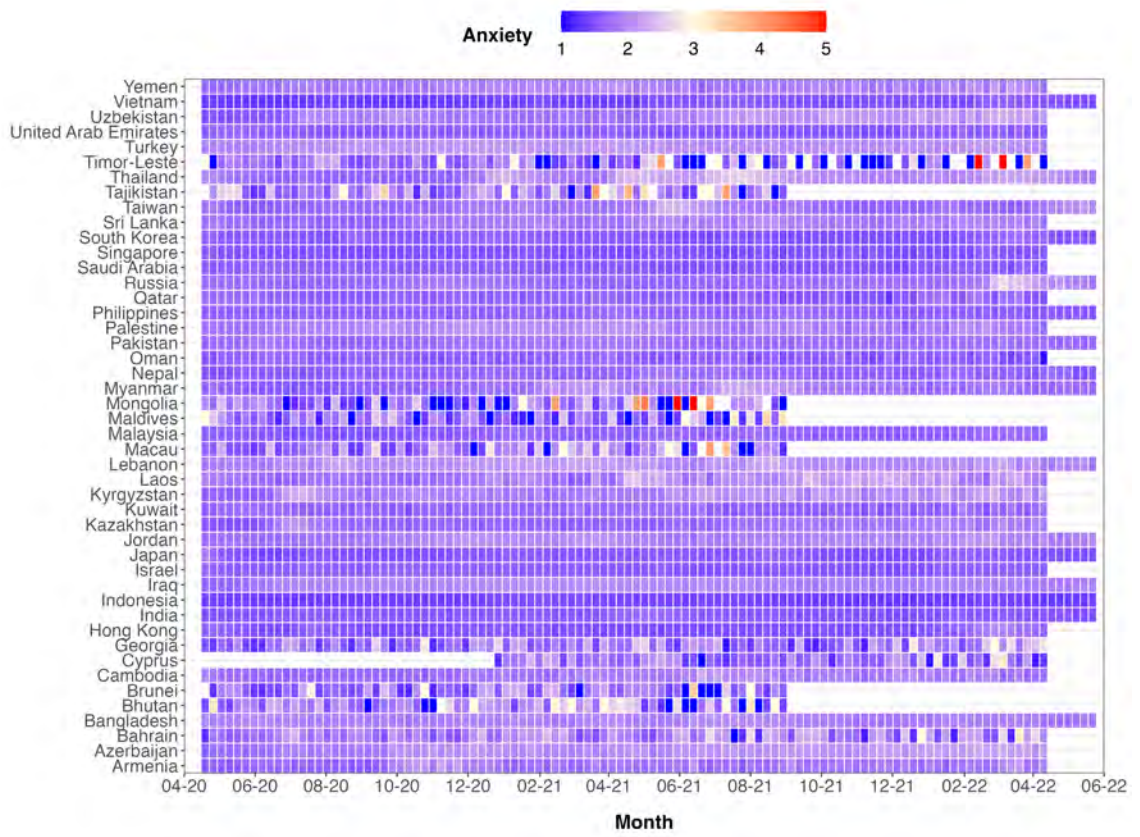


Figure B.13: Weekly aggregated anxiety levels across Asian countries ($n = 14,944,804$)

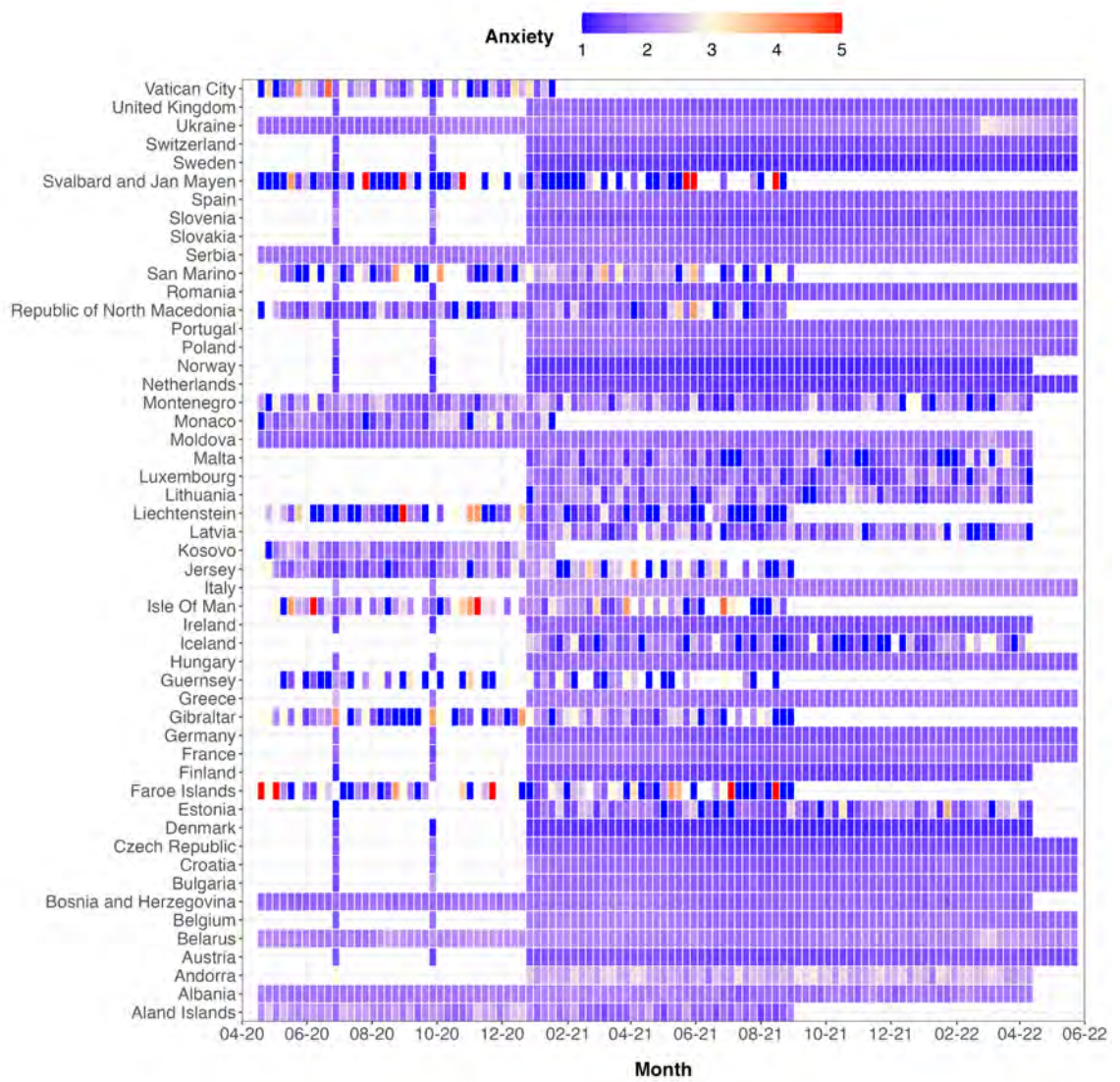


Figure B.14: Weekly aggregated anxiety levels across European countries ($n = 10,798,309$)



Figure B.15: Weekly aggregated anxiety levels across Oceanic countries ($n = 1,064,644$)

C Tables

Table C.1: Anxiety and depression over countries

| Country | <i>n</i> | Depression | | | Anxiety | | | |
|---------|----------------|------------|----------|------|---------|----------|------|------|
| | | Mean | Variance | IQR | Mean | Variance | IQR | |
| 1 | Brazil | 5,455,904 | 1.88 | 0.00 | 0.06 | 1.79 | 0.00 | 0.08 |
| 2 | Mexico | 3,828,110 | 1.78 | 0.00 | 0.05 | 1.71 | 0.00 | 0.08 |
| 3 | Japan | 3,587,117 | 1.56 | 0.00 | 0.06 | 1.53 | 0.00 | 0.08 |
| 4 | India | 1,869,101 | 1.72 | 0.00 | 0.03 | 1.59 | 0.00 | 0.04 |
| 5 | Argentina | 1,373,777 | 1.77 | 0.00 | 0.07 | 1.72 | 0.00 | 0.09 |
| 6 | Italy | 1,185,262 | 1.91 | 0.01 | 0.19 | 1.96 | 0.01 | 0.20 |
| 7 | Germany | 1,150,837 | 1.82 | 0.01 | 0.16 | 1.56 | 0.00 | 0.10 |
| 8 | Canada | 1,128,073 | 1.77 | 0.01 | 0.13 | 1.60 | 0.00 | 0.12 |
| 9 | France | 1,114,967 | 1.86 | 0.02 | 0.24 | 1.73 | 0.01 | 0.22 |
| 10 | Indonesia | 963,315 | 1.56 | 0.00 | 0.04 | 1.38 | 0.00 | 0.06 |
| 11 | Colombia | 926,601 | 1.74 | 0.00 | 0.05 | 1.63 | 0.00 | 0.08 |
| 12 | Ukraine | 923,552 | 1.86 | 0.01 | 0.16 | 1.80 | 0.02 | 0.21 |
| 13 | Vietnam | 913,816 | 1.51 | 0.01 | 0.10 | 1.41 | 0.01 | 0.16 |
| 14 | Turkey | 880,623 | 2.21 | 0.00 | 0.10 | 2.04 | 0.00 | 0.09 |
| 15 | Taiwan | 831,785 | 1.85 | 0.01 | 0.13 | 1.78 | 0.03 | 0.15 |
| 16 | Thailand | 817,505 | 1.81 | 0.04 | 0.30 | 1.99 | 0.08 | 0.48 |
| 17 | Australia | 765,649 | 1.63 | 0.00 | 0.07 | 1.50 | 0.00 | 0.04 |
| 18 | Sweden | 746,428 | 1.36 | 0.00 | 0.12 | 1.27 | 0.00 | 0.10 |
| 19 | Philippines | 741,827 | 1.88 | 0.00 | 0.06 | 1.65 | 0.00 | 0.04 |
| 20 | Chile | 666,587 | 1.88 | 0.01 | 0.14 | 1.77 | 0.01 | 0.15 |
| 21 | Peru | 636,268 | 1.87 | 0.00 | 0.07 | 1.75 | 0.01 | 0.14 |
| 22 | Russia | 627,509 | 1.76 | 0.01 | 0.10 | 1.73 | 0.01 | 0.08 |
| 23 | Egypt | 581,961 | 2.31 | 0.00 | 0.07 | 1.99 | 0.01 | 0.13 |
| 24 | United Kingdom | 576,240 | 1.87 | 0.01 | 0.22 | 1.61 | 0.01 | 0.14 |
| 25 | Spain | 573,661 | 1.74 | 0.01 | 0.20 | 1.69 | 0.01 | 0.15 |
| 26 | Ecuador | 487,404 | 1.86 | 0.00 | 0.07 | 1.74 | 0.01 | 0.12 |
| 27 | South Africa | 456,240 | 1.85 | 0.00 | 0.07 | 1.72 | 0.01 | 0.09 |
| 28 | Malaysia | 416,393 | 1.72 | 0.00 | 0.10 | 1.61 | 0.01 | 0.09 |
| 29 | Hungary | 411,857 | 1.62 | 0.01 | 0.19 | 1.67 | 0.01 | 0.10 |
| 30 | Israel | 390,197 | 1.61 | 0.00 | 0.07 | 1.60 | 0.00 | 0.04 |
| 31 | Poland | 369,177 | 1.80 | 0.01 | 0.16 | 1.67 | 0.01 | 0.19 |
| 32 | Netherlands | 364,736 | 1.53 | 0.01 | 0.17 | 1.35 | 0.00 | 0.10 |
| 33 | Venezuela | 350,581 | 1.70 | 0.00 | 0.06 | 1.60 | 0.00 | 0.09 |
| 34 | Portugal | 341,346 | 1.77 | 0.01 | 0.18 | 1.72 | 0.01 | 0.17 |
| 35 | Bolivia | 323,404 | 2.00 | 0.00 | 0.04 | 1.88 | 0.00 | 0.07 |
| 36 | South Korea | 310,634 | 1.82 | 0.01 | 0.11 | 1.58 | 0.00 | 0.09 |
| 37 | Romania | 299,167 | 1.60 | 0.00 | 0.07 | 1.54 | 0.00 | 0.07 |
| 38 | Pakistan | 297,704 | 1.95 | 0.00 | 0.07 | 1.77 | 0.00 | 0.09 |
| 39 | Denmark | 296,035 | 1.33 | 0.00 | 0.12 | 1.21 | 0.00 | 0.05 |

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Table C.1 – continued from previous page

| Country | <i>n</i> | Depression | | | Anxiety | | | |
|---------|----------------------|------------|----------|------|---------|----------|------|------|
| | | Mean | Variance | IQR | Mean | Variance | IQR | |
| 40 | New Zealand | 288,963 | 1.48 | 0.00 | 0.06 | 1.37 | 0.00 | 0.06 |
| 41 | Uruguay | 287,415 | 1.59 | 0.00 | 0.09 | 1.55 | 0.00 | 0.10 |
| 42 | Iraq | 285,034 | 2.19 | 0.00 | 0.06 | 1.92 | 0.01 | 0.08 |
| 43 | Costa Rica | 278,932 | 1.78 | 0.00 | 0.05 | 1.68 | 0.00 | 0.07 |
| 44 | Guatemala | 273,157 | 1.80 | 0.00 | 0.04 | 1.70 | 0.00 | 0.05 |
| 45 | Norway | 260,905 | 1.34 | 0.00 | 0.08 | 1.24 | 0.00 | 0.05 |
| 46 | Bangladesh | 253,765 | 2.17 | 0.00 | 0.05 | 1.92 | 0.00 | 0.08 |
| 47 | El Salvador | 247,023 | 1.83 | 0.00 | 0.06 | 1.75 | 0.00 | 0.10 |
| 48 | Czech Republic | 229,811 | 1.53 | 0.00 | 0.08 | 1.48 | 0.01 | 0.12 |
| 49 | Serbia | 226,669 | 1.70 | 0.00 | 0.07 | 1.79 | 0.00 | 0.09 |
| 50 | Greece | 225,541 | 1.88 | 0.01 | 0.15 | 1.79 | 0.01 | 0.14 |
| 51 | Nigeria | 220,980 | 1.71 | 0.00 | 0.07 | 1.62 | 0.01 | 0.11 |
| 52 | Jordan | 204,856 | 2.14 | 0.01 | 0.15 | 1.88 | 0.01 | 0.19 |
| 53 | Kenya | 202,958 | 1.90 | 0.00 | 0.10 | 1.81 | 0.01 | 0.10 |
| 54 | Algeria | 199,217 | 2.13 | 0.01 | 0.19 | 2.05 | 0.02 | 0.22 |
| 55 | Belgium | 191,985 | 1.95 | 0.01 | 0.22 | 1.82 | 0.01 | 0.17 |
| 56 | Austria | 191,060 | 1.65 | 0.01 | 0.10 | 1.48 | 0.00 | 0.10 |
| 57 | Saudi Arabia | 179,899 | 1.75 | 0.01 | 0.13 | 1.59 | 0.00 | 0.06 |
| 58 | Dominican Republic | 177,969 | 1.67 | 0.00 | 0.04 | 1.52 | 0.00 | 0.06 |
| 59 | Switzerland | 174,052 | 1.65 | 0.01 | 0.14 | 1.52 | 0.00 | 0.13 |
| 60 | Honduras | 166,138 | 1.80 | 0.00 | 0.06 | 1.68 | 0.00 | 0.08 |
| 61 | Nepal | 160,554 | 1.72 | 0.00 | 0.07 | 1.65 | 0.01 | 0.10 |
| 62 | Tunisia | 159,647 | 2.18 | 0.02 | 0.21 | 2.15 | 0.02 | 0.22 |
| 63 | Nicaragua | 152,820 | 1.86 | 0.01 | 0.17 | 1.76 | 0.02 | 0.28 |
| 64 | United Arab Emirates | 150,847 | 1.79 | 0.00 | 0.08 | 1.61 | 0.00 | 0.08 |
| 65 | Morocco | 148,174 | 2.11 | 0.00 | 0.08 | 1.99 | 0.01 | 0.16 |
| 66 | Paraguay | 146,362 | 1.90 | 0.01 | 0.13 | 1.90 | 0.01 | 0.12 |
| 67 | Hong Kong | 136,328 | 1.58 | 0.01 | 0.10 | 1.54 | 0.01 | 0.12 |
| 68 | Finland | 126,672 | 1.47 | 0.00 | 0.09 | 1.41 | 0.00 | 0.10 |
| 69 | Myanmar | 123,722 | 1.75 | 0.02 | 0.14 | 1.72 | 0.03 | 0.18 |
| 70 | Ireland | 122,792 | 1.72 | 0.01 | 0.22 | 1.55 | 0.01 | 0.15 |
| 71 | Slovakia | 120,298 | 1.72 | 0.01 | 0.18 | 1.71 | 0.01 | 0.14 |
| 72 | Bulgaria | 119,958 | 1.57 | 0.00 | 0.10 | 1.66 | 0.00 | 0.09 |
| 73 | Libya | 115,508 | 1.92 | 0.00 | 0.06 | 1.81 | 0.01 | 0.17 |
| 74 | Belarus | 111,586 | 1.97 | 0.01 | 0.14 | 1.94 | 0.01 | 0.15 |
| 75 | Panama | 108,910 | 1.69 | 0.00 | 0.09 | 1.63 | 0.01 | 0.13 |
| 76 | Kazakhstan | 102,430 | 1.77 | 0.02 | 0.17 | 1.74 | 0.03 | 0.21 |
| 77 | Singapore | 91,076 | 1.64 | 0.00 | 0.07 | 1.50 | 0.00 | 0.05 |
| 78 | Sudan | 85,610 | 1.89 | 0.01 | 0.10 | 1.75 | 0.01 | 0.13 |
| 79 | Croatia | 85,270 | 1.64 | 0.01 | 0.08 | 1.67 | 0.01 | 0.12 |
| 80 | Lebanon | 78,007 | 2.29 | 0.01 | 0.13 | 2.05 | 0.01 | 0.16 |
| 81 | Sri Lanka | 75,051 | 1.93 | 0.01 | 0.13 | 1.80 | 0.01 | 0.18 |

Continued on next page

Table C.1 – continued from previous page

| Country | <i>n</i> | Depression | | | Anxiety | | | |
|---------|---------------------------------|------------|----------|------|---------|----------|------|------|
| | | Mean | Variance | IQR | Mean | Variance | IQR | |
| 82 | Ghana | 73,942 | 1.66 | 0.01 | 0.13 | 1.61 | 0.01 | 0.14 |
| 83 | Bosnia and Herzegovina | 67,884 | 1.69 | 0.00 | 0.08 | 1.73 | 0.01 | 0.09 |
| 84 | Moldova | 66,000 | 1.77 | 0.01 | 0.11 | 1.70 | 0.01 | 0.13 |
| 85 | Palestine | 63,385 | 2.18 | 0.01 | 0.09 | 1.93 | 0.01 | 0.13 |
| 86 | Uzbekistan | 52,329 | 1.90 | 0.02 | 0.28 | 1.82 | 0.04 | 0.40 |
| 87 | Slovenia | 50,674 | 1.50 | 0.00 | 0.08 | 1.46 | 0.00 | 0.09 |
| 88 | Albania | 44,872 | 1.83 | 0.01 | 0.09 | 1.83 | 0.01 | 0.10 |
| 89 | Kuwait | 43,519 | 1.90 | 0.01 | 0.12 | 1.69 | 0.00 | 0.06 |
| 90 | Azerbaijan | 42,023 | 2.06 | 0.01 | 0.18 | 1.94 | 0.02 | 0.25 |
| 91 | Côte d'Ivoire | 41,727 | 1.55 | 0.01 | 0.17 | 1.53 | 0.02 | 0.25 |
| 92 | Qatar | 39,962 | 1.80 | 0.01 | 0.10 | 1.64 | 0.01 | 0.09 |
| 93 | Mozambique | 39,026 | 1.63 | 0.01 | 0.13 | 1.62 | 0.01 | 0.14 |
| 94 | Ethiopia | 39,001 | 1.86 | 0.00 | 0.09 | 1.81 | 0.00 | 0.08 |
| 95 | Yemen | 35,926 | 2.01 | 0.01 | 0.12 | 1.87 | 0.01 | 0.13 |
| 96 | Kyrgyzstan | 34,593 | 2.00 | 0.03 | 0.25 | 1.93 | 0.05 | 0.24 |
| 97 | Angola | 31,560 | 1.66 | 0.01 | 0.14 | 1.60 | 0.01 | 0.16 |
| 98 | Cambodia | 29,467 | 1.94 | 0.01 | 0.11 | 1.81 | 0.01 | 0.16 |
| 99 | Cameroon | 29,036 | 1.71 | 0.01 | 0.21 | 1.70 | 0.02 | 0.23 |
| 100 | Armenia | 24,808 | 1.89 | 0.02 | 0.12 | 1.75 | 0.02 | 0.15 |
| 101 | Tanzania | 24,096 | 1.83 | 0.02 | 0.22 | 1.83 | 0.03 | 0.27 |
| 102 | Oman | 21,552 | 1.79 | 0.01 | 0.12 | 1.64 | 0.01 | 0.10 |
| 103 | Senegal | 17,028 | 1.58 | 0.01 | 0.17 | 1.57 | 0.02 | 0.22 |
| 104 | Haiti | 16,426 | 1.86 | 0.02 | 0.13 | 1.78 | 0.01 | 0.14 |
| 105 | Laos | 15,267 | 1.83 | 0.03 | 0.20 | 1.91 | 0.05 | 0.30 |
| 106 | Mali | 13,896 | 1.62 | 0.02 | 0.18 | 1.58 | 0.02 | 0.18 |
| 107 | Burkina Faso | 13,122 | 1.58 | 0.02 | 0.19 | 1.59 | 0.02 | 0.20 |
| 108 | Democratic Rep. of the Congo | 12,615 | 1.70 | 0.01 | 0.16 | 1.73 | 0.01 | 0.14 |
| 109 | Madagascar | 11,955 | 1.83 | 0.03 | 0.20 | 1.87 | 0.03 | 0.19 |
| 110 | Benin | 10,346 | 1.72 | 0.02 | 0.22 | 1.71 | 0.02 | 0.25 |
| 111 | Guinea | 10,301 | 1.54 | 0.02 | 0.19 | 1.59 | 0.02 | 0.23 |
| 112 | Mauritania | 6,142 | 1.62 | 0.02 | 0.20 | 1.60 | 0.02 | 0.20 |
| 113 | American Samoa | 5,268 | 2.28 | 0.07 | 0.33 | 2.19 | 0.08 | 0.33 |
| 114 | Andorra | 3,827 | 2.35 | 0.04 | 0.23 | 2.31 | 0.05 | 0.38 |
| 115 | Bahrain | 3,487 | 1.92 | 0.06 | 0.14 | 1.83 | 0.06 | 0.12 |
| 116 | Bahamas | 3,084 | 1.97 | 0.10 | 0.07 | 1.92 | 0.08 | 0.01 |
| 117 | Aland Islands | 2,821 | 1.96 | 0.10 | 0.39 | 1.89 | 0.07 | 0.40 |
| 118 | Zimbabwe | 2,542 | 2.18 | 0.12 | 0.31 | 2.08 | 0.13 | 0.39 |
| 119 | Aruba | 2,127 | 2.20 | 0.04 | 0.21 | 1.98 | 0.03 | 0.20 |
| 120 | Dominica | 1,912 | 1.81 | 0.08 | 0.32 | 1.65 | 0.07 | 0.27 |
| 121 | Belize | 1,728 | 1.88 | 0.10 | 0.33 | 1.86 | 0.09 | 0.38 |
| 122 | Uganda | 1,493 | 1.94 | 0.11 | 0.34 | 1.89 | 0.11 | 0.39 |

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Table C.1 – continued from previous page

| Country | <i>n</i> | Depression | | | Anxiety | | | |
|---------|------------------------------|------------|----------|------|---------|----------|------|------|
| | | Mean | Variance | IQR | Mean | Variance | IQR | |
| 123 | Antigua | 1,329 | 2.09 | 0.14 | 0.49 | 2.03 | 0.17 | 0.49 |
| 124 | Anguilla | 1,211 | 2.24 | 0.19 | 0.54 | 2.19 | 0.22 | 0.39 |
| 125 | South Sudan | 1,182 | 1.93 | 0.15 | 0.49 | 1.83 | 0.17 | 0.46 |
| 126 | Georgia | 983 | 1.88 | 0.19 | 0.60 | 1.80 | 0.16 | 0.50 |
| 127 | Montenegro | 964 | 1.69 | 0.13 | 0.44 | 1.74 | 0.15 | 0.56 |
| 128 | Cyprus | 913 | 1.89 | 0.12 | 0.43 | 1.77 | 0.11 | 0.46 |
| 129 | Gabon | 909 | 1.78 | 0.18 | 0.41 | 1.76 | 0.19 | 0.55 |
| 130 | Botswana | 886 | 2.07 | 0.39 | 0.63 | 1.99 | 0.38 | 0.72 |
| 131 | Timor-Leste | 869 | 1.85 | 0.16 | 0.36 | 1.81 | 0.19 | 0.35 |
| 132 | Zambia | 857 | 2.16 | 0.29 | 0.64 | 2.11 | 0.27 | 0.61 |
| 133 | Luxembourg | 842 | 1.81 | 0.10 | 0.46 | 1.71 | 0.08 | 0.34 |
| 134 | Republic of the Congo | 712 | 1.85 | 0.21 | 0.58 | 1.74 | 0.19 | 0.60 |
| 135 | Kosovo | 637 | 1.97 | 0.12 | 0.45 | 1.92 | 0.09 | 0.40 |
| 136 | Estonia | 589 | 1.83 | 0.19 | 0.56 | 1.76 | 0.22 | 0.57 |
| 137 | Brit. Indian Ocean Territory | 583 | 1.95 | 0.19 | 0.54 | 1.83 | 0.16 | 0.51 |
| 138 | Bermuda | 574 | 2.23 | 0.39 | 0.70 | 2.11 | 0.39 | 0.53 |
| 139 | Maldives | 562 | 1.84 | 0.29 | 0.67 | 1.75 | 0.25 | 0.50 |
| 140 | Brunei | 555 | 1.85 | 0.22 | 0.68 | 1.79 | 0.18 | 0.50 |
| 141 | Jamaica | 548 | 1.82 | 0.21 | 0.54 | 1.80 | 0.20 | 0.50 |
| 142 | Lithuania | 539 | 1.74 | 0.16 | 0.57 | 1.69 | 0.12 | 0.33 |
| 143 | Macau | 538 | 1.86 | 0.22 | 0.57 | 1.86 | 0.21 | 0.54 |
| 144 | Somalia | 537 | 1.83 | 0.21 | 0.50 | 1.78 | 0.25 | 0.50 |
| 145 | Guadeloupe | 512 | 1.72 | 0.15 | 0.50 | 1.64 | 0.17 | 0.39 |
| 146 | Rep. of North Macedonia | 497 | 1.78 | 0.21 | 0.44 | 1.73 | 0.22 | 0.54 |
| 147 | Central African Republic | 496 | 1.90 | 0.27 | 0.65 | 1.79 | 0.21 | 0.50 |
| 148 | Barbados | 458 | 2.18 | 0.33 | 0.67 | 2.06 | 0.33 | 0.65 |
| 149 | Western Sahara | 443 | 2.16 | 0.25 | 0.46 | 2.08 | 0.29 | 0.58 |
| 150 | Bhutan | 440 | 2.09 | 0.30 | 0.70 | 2.00 | 0.25 | 0.61 |
| 151 | Malta | 433 | 1.68 | 0.19 | 0.43 | 1.64 | 0.16 | 0.56 |
| 152 | Réunion | 422 | 1.75 | 0.21 | 0.45 | 1.70 | 0.18 | 0.50 |
| 153 | Latvia | 416 | 1.82 | 0.23 | 0.70 | 1.76 | 0.19 | 0.55 |
| 154 | Liberia | 411 | 1.91 | 0.27 | 0.79 | 1.89 | 0.27 | 0.72 |
| 155 | Trinidad and Tobago | 382 | 1.87 | 0.30 | 0.80 | 1.91 | 0.35 | 0.75 |
| 156 | Fiji | 369 | 1.99 | 0.34 | 0.68 | 1.94 | 0.35 | 0.83 |
| 157 | Tajikistan | 363 | 2.15 | 0.42 | 0.90 | 2.00 | 0.35 | 0.76 |
| 158 | Malawi | 359 | 2.13 | 0.49 | 1.07 | 2.09 | 0.56 | 0.80 |
| 159 | Chad | 354 | 2.01 | 0.50 | 0.90 | 1.93 | 0.42 | 0.61 |
| 160 | Jersey | 352 | 1.83 | 0.36 | 0.70 | 1.83 | 0.29 | 0.50 |
| 161 | Iceland | 349 | 1.75 | 0.34 | 0.71 | 1.66 | 0.23 | 0.67 |
| 162 | Monaco | 349 | 1.96 | 0.14 | 0.40 | 1.83 | 0.19 | 0.46 |
| 163 | Martinique | 341 | 1.74 | 0.22 | 0.56 | 1.63 | 0.21 | 0.60 |

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Table C.1 – continued from previous page

| Country | <i>n</i> | Depression | | | Anxiety | | | |
|---------|---------------------------|------------|----------|------|---------|----------|------|------|
| | | Mean | Variance | IQR | Mean | Variance | IQR | |
| 164 | Turks and Caicos Islands | 312 | 2.13 | 0.34 | 0.88 | 2.13 | 0.35 | 0.70 |
| 165 | Burundi | 297 | 2.25 | 0.42 | 0.60 | 2.17 | 0.46 | 0.89 |
| 166 | French Guiana | 297 | 1.91 | 0.36 | 0.67 | 1.77 | 0.30 | 0.75 |
| 167 | British Virgin Islands | 296 | 2.14 | 0.46 | 0.83 | 1.98 | 0.39 | 0.83 |
| 168 | Mongolia | 278 | 2.02 | 0.40 | 0.57 | 1.85 | 0.50 | 0.68 |
| 169 | Eritrea | 277 | 2.17 | 0.61 | 0.70 | 2.10 | 0.54 | 0.73 |
| 170 | Togo | 276 | 1.99 | 0.34 | 0.69 | 1.88 | 0.29 | 0.77 |
| 171 | Cape Verde | 262 | 2.17 | 0.51 | 0.93 | 2.02 | 0.54 | 1.10 |
| 172 | Eswatini | 244 | 1.86 | 0.31 | 0.57 | 1.80 | 0.31 | 0.69 |
| 173 | Greenland | 236 | 2.12 | 0.56 | 0.83 | 2.02 | 0.55 | 0.73 |
| 174 | Niger | 236 | 2.08 | 0.69 | 0.78 | 1.99 | 0.53 | 0.83 |
| 175 | Papua New Guinea | 231 | 1.87 | 0.54 | 0.67 | 1.71 | 0.50 | 0.82 |
| 176 | Rwanda | 229 | 1.86 | 0.38 | 1.00 | 1.80 | 0.45 | 1.00 |
| 177 | Mauritius | 228 | 1.87 | 0.46 | 0.70 | 1.71 | 0.29 | 0.75 |
| 178 | Namibia | 226 | 1.92 | 0.50 | 0.75 | 1.85 | 0.45 | 0.62 |
| 179 | Comoros | 214 | 1.99 | 0.36 | 0.72 | 1.93 | 0.36 | 0.72 |
| 180 | Lesotho | 212 | 2.00 | 0.42 | 0.60 | 2.02 | 0.58 | 0.83 |
| 181 | Cayman Islands | 211 | 2.24 | 0.76 | 1.08 | 2.07 | 0.75 | 1.25 |
| 182 | Gibraltar | 210 | 1.99 | 0.47 | 0.79 | 1.96 | 0.47 | 0.97 |
| 183 | Djibouti | 208 | 2.00 | 0.76 | 1.07 | 2.01 | 0.91 | 1.54 |
| 184 | Mayotte | 208 | 1.85 | 0.55 | 1.08 | 1.80 | 0.48 | 1.00 |
| 185 | San Marino | 207 | 2.18 | 0.58 | 0.96 | 2.13 | 0.54 | 0.87 |
| 186 | Equatorial Guinea | 201 | 2.02 | 0.45 | 0.83 | 1.98 | 0.41 | 0.75 |
| 187 | Gambia | 200 | 1.92 | 0.49 | 0.75 | 1.91 | 0.37 | 0.73 |
| 188 | Guyana | 197 | 1.89 | 0.60 | 0.81 | 1.74 | 0.59 | 0.80 |
| 189 | Vanuatu | 193 | 2.11 | 0.75 | 1.10 | 2.06 | 0.69 | 1.10 |
| 190 | Guam | 191 | 1.92 | 0.75 | 1.33 | 1.84 | 0.55 | 1.25 |
| 191 | Wallis and Futuna | 186 | 2.15 | 0.89 | 1.00 | 2.07 | 1.22 | 1.30 |
| 192 | Liechtenstein | 180 | 1.83 | 0.62 | 0.60 | 1.70 | 0.62 | 0.75 |
| 193 | Saint Martin | 178 | 1.70 | 0.43 | 0.62 | 1.69 | 0.24 | 0.67 |
| 194 | Sierra Leone | 174 | 1.86 | 0.41 | 1.00 | 1.79 | 0.42 | 0.75 |
| 195 | Tonga | 174 | 1.86 | 0.58 | 0.75 | 1.78 | 0.47 | 0.71 |
| 196 | Vatican City | 170 | 2.23 | 0.46 | 0.83 | 2.08 | 0.50 | 0.90 |
| 197 | Christmas Island | 165 | 2.19 | 0.62 | 1.12 | 2.26 | 0.70 | 1.00 |
| 198 | Isle Of Man | 163 | 2.10 | 0.79 | 1.17 | 2.15 | 0.72 | 1.17 |
| 199 | Cocos (Keeling) Islands | 156 | 2.21 | 0.91 | 1.50 | 2.18 | 0.85 | 1.40 |
| 200 | Samoa | 154 | 1.97 | 0.86 | 1.18 | 1.91 | 0.69 | 1.05 |
| 201 | Fed. States of Micronesia | 153 | 2.27 | 0.75 | 1.05 | 2.14 | 0.74 | 1.33 |
| 202 | Bouvet Island | 142 | 2.39 | 0.71 | 1.17 | 2.19 | 0.75 | 1.00 |
| 203 | Falkland Islands | 142 | 2.12 | 1.11 | 1.67 | 2.08 | 1.19 | 1.50 |
| 204 | Palau | 140 | 2.26 | 0.63 | 0.85 | 2.02 | 0.81 | 1.27 |
| 205 | Guinea-Bissau | 137 | 2.09 | 0.59 | 1.00 | 2.02 | 0.72 | 1.33 |

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Table C.1 – continued from previous page

| Country | <i>n</i> | Depression | | | Anxiety | | | |
|---------|---|------------|----------|------|---------|----------|------|------|
| | | Mean | Variance | IQR | Mean | Variance | IQR | |
| 206 | Grenada | 135 | 2.21 | 0.67 | 0.83 | 2.04 | 0.73 | 1.25 |
| 207 | Cook Islands | 134 | 2.25 | 0.81 | 1.17 | 2.16 | 0.64 | 0.75 |
| 208 | Kiribati | 132 | 1.90 | 0.55 | 0.90 | 1.82 | 0.50 | 0.74 |
| 209 | French Polynesia | 131 | 2.04 | 0.93 | 1.71 | 1.95 | 0.71 | 1.25 |
| 210 | French Southern Territ. | 130 | 1.87 | 0.62 | 0.82 | 1.75 | 0.53 | 1.17 |
| 211 | Faroe Islands | 129 | 2.14 | 0.93 | 1.00 | 2.05 | 1.01 | 1.42 |
| 212 | Curaçao | 125 | 2.02 | 0.44 | 0.93 | 1.90 | 0.34 | 0.75 |
| 213 | Tuvalu | 124 | 2.14 | 0.96 | 1.42 | 2.05 | 0.76 | 0.65 |
| 214 | Saint Lucia | 115 | 2.08 | 0.76 | 1.29 | 1.92 | 0.78 | 1.50 |
| 215 | Svalbard and Jan Mayen | 110 | 1.79 | 1.11 | 1.00 | 1.67 | 1.13 | 1.00 |
| 216 | Saint Barthélemy | 109 | 1.91 | 0.34 | 0.75 | 1.86 | 0.22 | 0.47 |
| 217 | Suriname | 108 | 1.81 | 0.74 | 1.20 | 1.87 | 0.88 | 1.50 |
| 218 | Seychelles | 100 | 1.87 | 0.83 | 1.05 | 1.89 | 1.22 | 1.40 |
| 219 | Heard Island & McDon- ald Islands | 98 | 2.02 | 0.69 | 1.25 | 2.04 | 0.97 | 1.71 |
| 220 | Nauru | 98 | 2.11 | 1.33 | 2.00 | 2.20 | 1.31 | 2.00 |
| 221 | Tokelau | 98 | 2.30 | 0.77 | 0.80 | 2.14 | 0.74 | 1.10 |
| 222 | Northern Mariana Isl. | 89 | 1.81 | 0.90 | 1.00 | 1.88 | 1.11 | 1.33 |
| 223 | New Caledonia | 88 | 1.91 | 0.96 | 1.67 | 1.76 | 0.84 | 1.38 |
| 224 | Montserrat | 84 | 2.10 | 1.12 | 2.00 | 2.04 | 1.00 | 2.00 |
| 225 | Saint Helena | 83 | 2.13 | 1.01 | 1.50 | 2.06 | 1.02 | 1.67 |
| 226 | Guernsey | 82 | 1.94 | 0.83 | 1.50 | 1.78 | 0.64 | 1.14 |
| 227 | Solomon Islands | 77 | 2.18 | 1.22 | 2.00 | 1.95 | 1.13 | 1.50 |
| 228 | Sao Tome and Principe | 71 | 1.72 | 0.94 | 1.00 | 1.75 | 0.99 | 1.00 |
| 229 | Pitcairn | 70 | 1.94 | 0.74 | 1.25 | 1.93 | 0.48 | 0.75 |
| 230 | Saint Kitts and Nevis | 70 | 2.09 | 0.79 | 1.22 | 1.93 | 0.61 | 1.42 |
| 231 | St. Vincent & the Grena- dines | 63 | 1.83 | 1.16 | 1.00 | 1.78 | 0.96 | 1.00 |
| 232 | South Georgia & the South Sandwich Islands | 63 | 1.83 | 0.70 | 1.00 | 1.89 | 0.92 | 1.33 |
| 233 | Marshall Islands | 62 | 2.24 | 0.82 | 1.88 | 2.18 | 1.13 | 1.58 |
| 234 | Norfolk Island | 58 | 2.14 | 0.92 | 1.00 | 1.95 | 1.08 | 1.38 |
| 235 | Niue | 54 | 1.87 | 0.70 | 1.67 | 1.93 | 0.98 | 2.00 |
| 236 | Saint Pierre and Mique- lon | 47 | 2.23 | 1.60 | 2.00 | 2.00 | 1.25 | 2.00 |
| 237 | Sint Maarten | 35 | 2.23 | 0.86 | 1.50 | 1.94 | 0.84 | 1.25 |

Declaration of Authorship

I hereby declare that the report submitted is my own unaided work. All direct or indirect sources used are acknowledged as references. This thesis was not previously presented to another examination board and has not been published.

Munich, September 20, 2023

Name