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THE PREVALENCE OF DEPRESSION AND ANXIETY AMONG MEDICAL FIELD AND NON-MEDICAL FIELD STUDENTS IN LATVIA AND FINLAND

DIPLOMA THESIS

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ABSTRACT

Background: The COVID-19 pandemic has serious physical and psychological consequences. Among the general population, university students appear to be susceptible to mental health issues.

Aim: The aim of this study is to evaluate the prevalence of depression and anxiety of medical field and non-medical field students in both Latvia and Finland in the wake of the COVID-19 pandemic and to compare those countries.

Methods: This cross-sectional study collected survey-based data as well as anxiety (Generalized Anxiety Disorder scale-7 or GAD-7 and depression (Patient Health Questionnaire-9 or PHQ-9) screening questionnaires. The survey was conducted from January 29, 2021 to February 28, 2021.

Results: A total of 681 students completed the survey. From 681 students, 42.7% reported a moderate-to-severe level of depression and 65.3% reported mild-to-severe level of anxiety. Medical field students had higher percentages of moderate to severe anxiety compared with non-medical field students - moderate anxiety 21.7 % vs 15.1 % and severe 14.5 % vs 9.8%, however depression was not significant between the groups. Higher levels of depression and anxiety were reported in Latvia compared with Finland: moderate-to-severe level of depression 47.1% and 32.5%, respectively; the moderate-to-severe anxiety symptoms were also higher in Latvia, 37% and 21.5%. Statistically significant ($p<0.05$) findings associated with higher levels of depression and anxiety were: female gender, younger age, studying in Latvia and having a history of mental disorder and a physical illness. Working in healthcare services was associated with lower levels of depression and anxiety.

Conclusion: Medical students in comparison to non-medical field students presented with higher levels of moderate to severe anxiety, while there were no significant differences in depression levels. The prevalence of depression and anxiety was higher in students studying in Latvia compared with Finland. Additionally, we found that female gender, younger age and having a history of mental disorder and a physical illness were associated with a higher level of depression and anxiety. Surprisingly, students working in healthcare services reported lower levels of depression and anxiety.

KOPSAVILKUMS

Ievads: COVID-19 pandēmijai ir nopietnas fiziskas un psiholoģiskas sekas. Vispārējās populācijas vidū arī universitātes studenti, šķiet, ir pakļauti garīgās veselības jautājumu ietekmei.

Mērķis: Šī pētījuma mērķis ir novērtēt depresijas un trauksmes izplatību medicīnas un nemedicīnas studentu vidū Latvijā un Somijā COVID-19 pandēmijas laikā, un salīdzināt šīs valstis.

Metodoloģija: šajā šķērsgriezuma pētījuma tika apkopoti uz aptauju balstītie dati, kā arī trauksmes (Generalized Anxiety Disorder scale-7 jeb GAD-7) un depresijas (The Patient Health Questionnaire-9 jeb PHQ-9) skrīninga anketu dati. Aptauja tika veikta no 2021. gada 29. janvāra līdz 2021. gada 28. februārim.

Rezultāts: aptauju aizpildīja 681 students.. No 681 studenta 42,7% ziņoja par mērenu līdz smagu depresijas līmeni un 65,3% par vieglu līdz smagu trauksmi. Medicīnas jomas studentiem bija lielāka vidēji smagas vai smagas trauksmes procentuālā izplatība, salīdzinājumā ar nemedicīnas jomas studentiem - vidēji smagas 21.7 % vs 15.1 % un smagas 14.5 % vs 9.8% , tomēr depresijas izplatības atšķirība starp grupām nebija statistiski nozīmīga. Latvijā tika ziņots par augstāku depresijas un trauksmes līmeni, salīdzinot ar Somiju - vidēji smagu līdz smagu depresiju attiecīgi 47,1% un 32,5%. Arī vidēji smagas līdz smagas trauksmes simptomu izplatība Latvijā bija lielāka - 37% un 21,5%. Statistiski nozīmīgi ($p < 0,05$) atradnes, kas saistītas ar augstāku depresijas un trauksmes līmeni, bija šādi: sieviešu dzimums, jaunāks vecums, studijas Latvijā, ka arī psihiski traucējumi un fiziskās slimības anamnēzē. Darbs veselības aprūpes dienestos bija saistīts ar zemāku depresijas un trauksmes līmeni.

Secinājums: medicīnas studentiem, salīdzinot ar nemedicīnisko jomu studentiem, bija augstāks vidēji smagas vai smagas trauksmes līmenis, savukārt depresijas līmenī nebija būtisku atšķirību. Depresijas un trauksmes izplatība bija augstāka studentiem, kuri studē Latvijā, salīdzinot ar Somiju. Turklāt mēs noskaidrojām, ka sieviešu dzimums, jaunāks vecums un psihiski traucējumi anamnēzē un fiziskas slimības bija saistītas ar augstāku depresijas un trauksmes līmeni. Pārsteidzoši, ka studenti, kas strādā veselības aprūpes dienestos, ziņoja par zemāku depresijas un trauksmes līmeni.

ABBREVIATIONS

DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th Edition
GAD-7	The General Anxiety Disorder-7
ICD-10	International Classification of Diseases, 10th revision
MDD	Major depressive disorder
PHQ-9	Patient Health Questionnaire-9
SARS	Severe acute respiratory syndrome
WHO	World Health Organization

1 INTRODUCTION

The novel coronavirus 2019 (COVID-19) has spread exponentially since its discovery in December 2019, triggering a worldwide pandemic. It faces physical and psychological threats and pressures due to its rapid transmission and new variants. Furthermore, strict steps taken by governments to regulate its spread, such as social distancing, quarantines, and lockdowns, have had economic and educational implications.

Previous research on former epidemics and pandemics has found a rise in mental health disorders in the general public and subgroups such as healthcare staff, including elevated levels of anxiety, depression, and posttraumatic stress disorder. (Preti et al., 2020) However, to the best of our understanding, the impact of pandemics on students had not been thoroughly researched prior to the COVID-19 pandemic.

The global effect of the COVID-19 pandemic on health care staff and students was recently assessed, and it was found to be associated with a high risk of depression and anxiety. Well before the pandemic began, research revealed a high prevalence of depression and anxiety among medical students, with overall psychological distress levels consistently higher than in the general population. (Dyrbye et al., 2006)

To the best of our knowledge, no previous studies assessing the prevalence of depression and anxiety among university students in Latvia have been published. Meanwhile, the Finnish Student Health Survey, which has been conducted every four years since 2000, examines psychological distress and potential changes among 19–34-year-old Finnish undergraduate university students. (Oksanen et al., 2017) There has been no prior research into the precise impact of the COVID-19 pandemic on the mental health of university students in Latvia and Finland.

In this study, we describe the prevalence of depression and anxiety for university students comparing the prevalence between medical field and non-medical field students. In addition, we compared the prevalence of depression and anxiety in Latvia and Finland, which was another aim of ours. Using a self-administered online survey, we determined depression and anxiety levels with well-established clinical tools and also evaluated what factors were associated with increased depression and anxiety scores.

Our hypothesis is that depression and anxiety among medical field students is higher compared with non-medical field students. Research has shown that medical students generally have higher levels of depression and anxiety. In addition to this, the increased demand in healthcare

workers and medical students working frontline are all contributing factors to the basis of our hypothesis. Our second hypothesis is that students in Latvia report higher levels of depression and anxiety compared with their Finnish peers.

2 LITERATURE REVIEW

2.1 COVID-19 Pandemic

In December 2019, a new form of the Human Coronaviruses (HcoVs) emerged in Wuhan, China. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), simply known as COVID-19 was declared a pandemic on the 11th of March 2020 by the World Health Organization (WHO). (*WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*) Since its detection and as of February 28th 2021 there have been more than 113 million confirmed cases globally with almost 2,5 million deaths. (*WHO Coronavirus Disease (COVID-19) Dashboard*) Finland with a population of 5,5 million, had 56,407 confirmed cases and 742 deaths and Latvia with a population of 1,9 million had 84,983 cases and 1,601 deaths as of 28th of February 2021.

Case fatality ratio (CFR), is the ratio between the number of confirmed deaths from the disease and the number of confirmed cases, it estimates the proportion of deaths among identified confirmed cases. The CFR of COVID-19 is not constant, as it reflects the severity of the disease in a particular context, at a particular time, and in a particular population. The CFR on the 28th of February 2021 in Finland was 1.3 % and in Latvia 1.9%, while worldwide CFR is 2.2 %. (*Mortality Risk of COVID-19*) To understand the true severity of COVID-19, infection fatality ratio (IFR) is used, which estimates the proportion of deaths among all infected individuals. The true level of transmission and therefore determining the number of all infected individuals is frequently underestimated due to the nature of the disease; can be asymptomatic, present with only mild symptoms, and therefore does not warrant testing. (*Estimating mortality from COVID-19*)

Shortly after the WHO declaration of the pandemic, Finland and Latvia, among many other countries, declared a national state of emergency over coronavirus. Finland's state of emergency took effect on the 18th of March 2020. Similarly, in Latvia the emergency state was declared on the 13th of March 2020.

2.2 Definition of depression

The most common psychiatric disorder seen in the general population and met by primary care physicians is depression. (Kessler et al., 2011; Roca et al., 2009) It can refer to a brief period of depressive symptoms, which is regarded as a normal reaction to various life events involving loss or disappointment. that is considered a natural reaction to a variety of life events involving failure or disappointment. Meanwhile, depressive mood, as opposed to depression, is a chronic feeling that, when combined with other symptoms, can lead to a depressive disorder. (E. et al., 2014)

Depressive syndromes are defined in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5). (American Psychiatric Association, 2013) According to the DSM-V diagnostic classification, " the diagnosis of a major depressive episode (MDE) requires the presence of five or more of the following symptoms during the same 2-week period: depressed mood; loss of interest 22 or pleasure; significant weight loss or weight gain; insomnia or hypersomnia; psychomotor agitation or retardation; fatigue or loss of energy; feelings of worthlessness or excessive or inappropriate guilt; diminished ability to think or concentrate or recurrent thoughts of death or suicide ". However either depressed mood or loss of interest or pleasure, have to be present.

In order to lean toward a major depressive episode " a symptom must either be newly present or must have clearly worsened compared with the person's pre-episode status. The symptoms must persist for most of the day, nearly every day, for at least 2 consecutive weeks. The episode must be accompanied by clinically significant distress or impairment in social, occupational, or other important areas of functioning ". In some individuals with milder episodes, functioning may appear to be normal but requires markedly increased effort. (American Psychiatric Association, 2013)

Exclusion of mixed episodes with manic features is needed to determine a diagnosis of major depressive episode. The signs must cause "clinically significant distress or impairment in social, occupational, or other essential areas of functioning" and must not be the result of drug abuse or a general medical disorder. (American Psychiatric Association, 2013; Association, 2013)

In Latvia and Finland, the International Classification of Diseases, 10th revision (ICD-10), is used for diagnosing mental disorders in clinical work. (World Health Organization, 1993) In the ICD-10 diagnostic classification, the main types of depression are divided into depressive episodes (F32), where the depressive episode is the first the patient has experienced, and recurrent depressive disorder (F33), where the patient has had depression at least once before and long-term maintenance treatment needs to be considered. The 10 core symptoms of depression according to

ICD-10 criteria include depressed mood, loss of interest and enjoyment, fatigue, reduced self-esteem and self-confidence, unreasonable self-criticism or unwarranted ideas of guilt, recurrent thoughts concerning death or suicide or suicidal behavior, lack of initiative, feelings of indecision or inability to concentrate, psychomotor slowness or agitation, sleep disorder and change in appetite and weight. A diagnosis of depression (F32–F33) calls for the simultaneous presence of four of the aforementioned symptoms for at least two weeks; furthermore, at least two of the three first-mentioned symptoms must be present. Depression usually lasts several months, taking into account residual symptoms. The severity of depression according to ICD-10 is assessed by the number of symptoms; mild 4 to 5 symptoms, moderate 6 to 7 symptoms and severe 8 to 10 symptoms.

2.3 Definition of anxiety

Anxiety is described by the American Psychiatric Association as a feeling of restlessness or tension caused by the anticipation of a potential threat in the absence of actual danger, while fear is the emotional reaction to a real threat, followed by autonomic arousal required for fight or flight. When other symptoms, such as avoidance, coexist with chronic, excessive, and crippling fear or anxiety, an anxiety disorder may be present. (American Psychiatric Association, 2013)

According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), "anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioral disturbances. These disorders include separation anxiety disorder, selective mutism, specific phobia, social anxiety disorder (social phobia), panic disorder, agoraphobia, generalized anxiety disorder, substance/medication-induced anxiety disorder, and anxiety disorder due to another medical condition".

Excessive anxiety and worry that is difficult for the person to handle, occurring more days than not for at least 6 months, and involving multiple events or activities, are symptoms of generalized anxiety disorder (GAD). The anxiety and worry are associated with ≥ 3 of the following six symptoms and the symptoms have to cause clinically significant distress or impairment in daily functioning: restlessness or feeling keyed up or on edge, being easily fatigued, difficulty concentrating or mind going blank, irritability, muscle tension and sleep disturbance. At least one of the previous six symptoms must have been present for more days than not in the previous six months. The diagnostic criteria also call for the exclusion of symptoms caused by the immediate

physiological effects of a drug or a general medical condition. (American Psychiatric Association, 2013)

The diagnostic criteria for generalized anxiety disorder (F41.1) in the ICD-10 specify 22 symptoms divided into autonomic arousal symptoms, chest and abdominal symptoms, brain and mind symptoms, general symptoms, tension symptoms, and other non-specific symptoms. To develop a diagnosis of GAD, a symptom in the category of autonomic arousal symptoms, as well as three additional symptoms, must be present. In contrast, the DSM-5 requires three out of six symptoms, five of which are also on the ICD-10 symptom list. In comparison to the DSM-5, the ICD-10 diagnostic criteria do not require symptoms to cause significant disability in everyday life. (World Health Organization, 1993)

2.4 Psychological impact of epidemic and pandemic outbreaks

The psychological impact of epidemic and pandemic outbreaks has been studied before. Beginning with the first novel infectious disease to occur in the twenty-first century, the 2002 SARS outbreak, which was caused by SARS-CoV-1, a coronavirus strain closely linked to the pathogen responsible for the COVID-19 pandemic. Other outbreaks of novel infectious diseases, such as the Middle East respiratory syndrome (MERS) and the 2009-2010 A/H1N1 influenza pandemic, have had psychological consequences, both short and long term, in addition to the physical outcomes. (Preti et al., 2020)

During non-pandemic periods, studies have shown that healthcare workers are a high-risk population for experiencing serious effects from mental health problems and are at a greater risk of suicide. (Dutheil et al., 2019) Preti et al reviewed 44 empirical studies on the impact of epidemic and pandemic outbreaks on healthcare workers in terms of psychological distress and mental health. (Preti et al., 2020) The studies which were included referred to the SARS outbreak, MERS-CoV outbreak, COVID-19 outbreak, A/H1N1 influenza outbreak, the Ebola virus outbreak, and the A/H7N9 influenza outbreak.

Depressive symptoms during the acute phase of the pandemic ranged between 27.5 – 50.7%, with higher rates during the COVID-19 pandemic. When the 2002 SARS outbreak was compared to the current COVID-19 pandemic, the incidence of depressive symptoms was 50% and 27.6 percent, respectively. (S et al., 2020)

Anxiety levels among healthcare workers were also high; at the height of the COVID-19 pandemic, 45 percent reported extreme anxiety symptoms. At a 1-month follow-up, studies

performed after the SARS outbreak revealed a substantial decline in both depressive and anxiety symptoms. (Su et al., 2007)

A systematic study and meta-analysis examined mental health conditions in the general population, healthcare personnel, and compared gender disparities in the incidence of health problems during the COVID-19 pandemic. (Cénat et al., 2021) Cénat et al. discovered no difference in the prevalence of depression between the general population and healthcare staff. There was no difference in prevalence between found males and females. However, as compared to the findings of the most recent WHO report on common mental health conditions, the prevalence of depression during COVID-19 is higher in healthcare workers than in the general population; 15.97 % vs 4.4 %, respectively. (Cénat et al., 2021) Similarly, there were no variations in anxiety incidence between the general population, healthcare staff, or males and females. When compared to the most recent WHO survey on common mental health conditions, the incidence of anxiety was four times higher (15.15 % vs. 3.6 %). (Cénat et al., 2021)

Another systematic analysis found that the COVID-19 pandemic is associated with extremely high levels of psychological distress. (Xiong et al., 2020) During the COVID-19 pandemic, relatively high rates of anxiety (6.33 % – 50.9 %), depression (14.6 % – 48.3 %), post-traumatic stress disorder (7 % – 53.8 %), psychological distress (34.43 % – 38 %), and stress (8.1 % – 81.9 %) were recorded in the general population in various countries including China, Denmark, and the United States. Female gender, younger age group (40 years), and student status were reported as risk factors for developing more depressive symptoms during the COVID-19 pandemic. Similarly, the same risk factors were linked to increased anxiety symptoms. (Xiong et al., 2020)

2.5 The psychological impact of COVID-19 on students

The mental health consequences of past pandemics, as well as the latest COVID-19 pandemic, have been extensively studied in the general population and particular subgroups such as healthcare professionals. However, prior to the COVID-19 pandemic, the effect of pandemics on students had not been thoroughly studied.

Long before the pandemic began, research revealed a high prevalence of depression and anxiety among medical students. By the later years of training, average psychological distress levels were consistently higher than in the general population and age-matched peers. (Dyrbye et al., 2006) A recent US research used the GAD-7 and PHQ-9 questionnaires to measure depression

and anxiety in medical students from 40 medical schools. Almost one-third met the criteria for anxiety and 25% for depression, with females scoring higher on average. As compared to previous research on medical student, the findings for anxiety and depression are 61 % and 70 % higher during the Covid-19 period. (Halperin et al., 2021) Similarly, a study in China found that 35.5 % of medical students were in a state of depression and 22.1 % in a state of anxiety using the GAD-7 and PHQ-9 questionnaires. (Liu et al., 2020) Dentistry students in Brazil were evaluated for signs of depression and anxiety, and the findings revealed a high incidence of depression and anxiety symptoms, at 49.6 % and 38.9 %, respectively. There was a strong relationship between gender and anxiety symptoms, with 55.2 % of women and 30.8 % of men displaying symptoms of anxiety. (Medeiros et al., 2020) In Japan 15.9 % of medical students had a PHQ-9 score ≥10, indicating a possible depressive disorder while 7.2 % had GAD-7 scores of ≥10. (Nishimura et al., 2021) In the United States, a study using the Depression, Anxiety, and Stress Scale (DASS-21) discovered that approximately 25 % of nursing students had mild to very high levels of negative emotional states. (Rosenthal et al., 2021)

A study of nearly 70 000 university students in France examined the rates of suicidal thoughts, severe distress, stress, anxiety, and depression, as well as the factors associated with mental health disorders. The 20-item State-Trait Anxiety Inventory, State subscale, was used to measure anxiety (STAI Y-2). The Beck Depression Inventory (13 items) was used to measure depression (BDI-13). The prevalence of suicidal thoughts, severe distress, high level of perceived stress, severe depression, and high level of anxiety were 11.4%, 22.4%, 24.7%, 16.1%, and 27.5%, respectively, with 42.8% reporting at least 1 outcome, among whom 12.4% reported seeing a health professional. (Wathelet et al., 2020) Meanwhile, using the PHQ-9 and GAD-7 questionnaires, college students at Texas A&M University reported that 48.14 % had moderate-to-severe depression and 38.48 % had moderate-to-severe anxiety. (Wang et al., 2020) A large-scale and nationwide survey of college students in China, which included nearly 750 000 students, discovered that approximately 45 % of the participants had mental health issues. Probability of acute stress, depressive, and anxiety symptoms was 34.9 %, 21.1 %, and 11.0 %, respectively. (Ma et al., 2020)

2.6 Factors affecting the mental health

The psychological effects of pandemics affect individuals differently, but some groups may be more vulnerable than others, especially groups with pre-existing mental health and medical conditions.

Having a history of psychiatric disorder is correlated with psychological distress after trauma, which can be worsened by a lack of access to mental health care and resources during COVID-19 quarantine, as these individuals may be more vulnerable to depression and loneliness. (Jeong et al., 2016; Kessler et al., 2018) Serious/severe mental illness (SMI) is characterized as a mental, behavioral, or emotional condition that causes significant functional disability in one or more major life activities. Females had a higher prevalence of SMI, and young adults aged 18-25 years had the highest prevalence of SMI (8.6%) compared to adults aged 26-49 years (6.8%) and aged 50 and older (2.9%). (*Mental Illness*, 2021) Individuals with self-reported affective disorders (i.e., bipolar disorder or major depressive disorder) have higher levels of depression, anxiety, and stress than individuals without an affective disorder, and individuals with SMI have higher levels of depression, anxiety, and stress than psychiatrically healthy controls. (Pinkham et al., 2020) During the pandemic, 37.5 % of patients with eating disorders reported worsening symptoms, and 56.2 % reported additional anxiety symptoms, according to one study, while 20.9 % of patients with pre-existing psychological disorders reported worsening symptoms, according to another. As a result, a current or previous medical history of mental disorders was linked to an increased risk of depression and/or anxiety. (Vindegaard & Benros, 2020)

Prior to the COVID-19 pandemic, the general population's incidence of depression was predicted to be 4–5%, with higher percentages seen in individuals with health-related and psychosocial risk factors. The prevalence of depression in individuals with chronic conditions such as chronic obstructive pulmonary disease (COPD) is 27%, type 2 diabetes is 18% to 20%, myocardial infarction 20%, and cancer 13% to 17%. A research conducted in the United Kingdom used the PHQ-9 to assess the severity of depressive symptoms among high-risk individuals during the COVID-19 pandemic, and preexisting physical health problems were significantly associated with extreme depressive symptoms. (Iob et al., 2020)

The relationship between chronic conditions and depression or anxiety may be viewed as either separate or interconnected (with either one causing the other). Most patients feel depression or anxiety as a result of being diagnosed with a chronic disease; however, fewer studies have shown that depression or anxiety causes chronic diseases; and finally, there is no association between chronic illnesses and depression or anxiety. (DeJean et al., 2013)

During disease outbreaks, women show higher levels of depression and anxiety than men, and the female gender is considered a major risk factor for anxiety and depressive symptoms. Depression and anxiety symptoms in pregnancy usually affect between 10% and 25% of pregnant women. Elevated depressive and anxiety symptoms are linked to an increased risk of preterm birth, postpartum depression, and behavioral issues in children. A Canadian study discovered elevated depression and anxiety symptoms as compared to similar pre-pandemic pregnancy cohorts, with 37% reporting clinically relevant depression symptoms and 57% reporting clinically relevant anxiety symptoms. (Lebel et al., 2020)

2.7 Latvia and Finland; depression and anxiety

Separate studies on the prevalence of depression and anxiety have been conducted in Latvia and Finland. To the best of our knowledge, no research has compared the two countries, and no studies on depression and anxiety among students in Latvia have previously been published in English.

Depression is largely underdiagnosed and undertreated in Latvia, especially in primary care. The 12-month prevalence of depression in the Latvian general population has been estimated at 7.9 %, but figures from the National Health Service indicate that general practitioners (GPs) saw only 3514 unique patients with a diagnosis of mood disorders in 2014. The prevalence of major depression in primary care was found to be comparable to other European countries, but it is substantially underdiagnosed. (Rancans, Vrublevska, et al., 2020) A study was conducted in 24 primary care settings across Latvia as part of the National Research Program BIOMEDICINE 2014-2017. The current prevalence of any mental illness was 37.2 %, with females having higher prevalence. The most common diagnostic groups were mood disorders (18.4 %), suicidality (18.6 %), and anxiety disorders (15.8 %), with comorbidity rates between psychiatric disorders ranging from 2.9 to 53.3 %. (Rancans, Renemane, et al., 2020) The Mini International Neuropsychiatric Interview was used to assess depression.

The BIOMEDICINE National Research Program also included a validation analysis of the PHQ-9 and PHQ-2 in Latvian and Russian languages using the Mini International Neuropsychiatric Interview (MINI) as the reference standard in a representative primary care group. The study concluded that the PHQ-9 and PHQ-2 Latvian and Russian versions have moderate psychometric properties for screening for major depression in general practice, with a suggested cut-off score of 8 or greater for the PHQ-9 and 2 or greater for the PHQ-2. (Rancans et al., 2018)

Since 2000, the national Finnish Student Health Survey has investigated psychological distress and potential changes among Finnish undergraduate university students aged 19 to 34. Between 2000 and 2012, the overall psychological distress measured by the 12-item General Health Questionnaire (GHQ-12) increased from 22% to 28%, whereas the frequently experienced psychological symptoms also increased (depressiveness from 13 % to 15 % , anxiety from 8 % to 13 % , concentration problems from 12 % to 18 % , and psychological tension from 13 % to 18 % with a highest prevalence observed in 2008). The prevalence of several psychological symptoms at the same time has also increased. Females and older students were more likely to experience psychological distress. (Oksanen et al., 2017)

The majority of Finnish COVID-19 patients have been treated at the Hospital District of Helsinki and Uusimaa (HUS) Helsinki University Hospital in southern Finland. The findings of the psychological symptoms of doctors and nurses employed during the COVID-19 pandemic are shared in a report that shares the first baseline results of an ongoing prospective HUS staff well-being cohort study. The following scales were used: the Mental Health Index (MHI-5), the Insomnia Severity Index (ISI), the Patient Health Questionnaire-2 (PHQ-2), the Primary Care Post-Traumatic Stress Disorder Scale (PC-PTSD-5), and the Overall Anxiety and Impairment Scale (OASIS). These scales evaluate psychological distress, insomnia, depressive symptoms, traumatic events (with questions focusing on work-related experiences with COVID-19 patients), trauma-related psychological symptoms, and anxiety. 43.4 % of staff directly engaged in patient care reported potentially stressful COVID-19 pandemic-related incidents (PTEs), compared to 21.8 % of others. Despite the fact that more than half of the staff were asymptomatic, a subset of respondents reported PTEs as well as concurrent depression, insomnia, and anxiety symptoms. (Haravuori et al., 2020) Another Finnish research measuring the GAD-7 of hospital employees at two separate hospitals discovered that 55% of Finnish hospital workers have normal anxiety levels, 30% have mild anxiety levels, and 10% have moderate levels. According to the results, 5% of Finnish hospital staff experienced extreme anxiety during the COVID-19 pandemic, with females experiencing more anxiety than males. (Mattila et al., 2021)

3 MATERIALS AND METHODS

3.1 Aims of the Study

The primary study aim was to assess the levels of depression and anxiety during the COVID-19 pandemic, among undergraduate medical versus non-medical field students, both in Latvia and Finland. Our secondary aim was to compare the prevalence of depression and anxiety between Latvia and Finland.

3.2 Study Design

A cross-sectional design was used to investigate the COVID-19 pandemic's psychological impact. The data was collected through a tailed online questionnaire on Google Forms, between January 29th 2021, and February 28th 2021.

The depression of the students was evaluated using the nine-item Patient Health Questionnaire-9 (PHQ-9), which has been shown to be sensitive and specific enough to screen adolescents with potential depression (sensitivity 88 percent; specificity 85 percent). (Levis et al., 2019) Moreover, the PHQ-9 is the most frequently used survey intended for screening depression in primary care and is a 9-item depression component from the full PHQ. The answers were scored as follows: 0 points for not at all, 1 point for several days, 2 points for more than half of the days, and 3 points for nearly every day. The PHQ-9 is scored 0 to 27, with scores ≥ 10 indicating a possible depressive disorder. The PHQ-9 total score (range 0-27) is interpreted as follows: 0-4 for no or minimal depression, 5-9 for mild depression, 10-14 for moderate depression, 15-19 for moderately severe depression, and 20-27 for severe depression. It also includes a question to assess whether depressive symptoms are impairing function, a key criterion to establish a DSM-based diagnosis.

The General Anxiety Disorder-7 (GAD-7) scale contains seven highly relevant questions selected from 13 items (nine questions from the Diagnostic and Statistical Manual of Mental Disorder, 4th Edition, and four questions from the Anxiety Symptom Scale). It has been found to have acceptable reliability and criterion validity. (Löwe et al., 2008; Spitzer et al., 2006) The GAD-7 had acceptable properties for identifying GAD at cutoff scores 7-10. (Plummer et al., 2016) The answers were scored as follows: 0 points for not at all, 1 point for several days, 2 points for more than half of the days, and 3 points for nearly every day. The score was scaled from 0-21 (0-4:

without anxiety symptoms, 5-9: with mild anxiety symptoms, 10-14: with moderate anxiety symptoms, and 15-21: with severe anxiety symptoms).

GAD-7 and PHQ-9 scores ≥ 10 indicate only a possibility of GAD and MDD, respectively. Clinically, these scores would necessitate further assessment by a healthcare professional.

3.3 Questionnaire

A questionnaire (Appendix) consisting of 16 groups of close-ended questions was used in this study. The questions were divided into 1) gender, 2) age, 3) current country of study, 4) study field, 5) living situation, 6) COVID-19 infection, 7) working during the pandemic, 8) vaccination, 9) mental health disease diagnosis, 10) concurrent physical illness, 11) pregnancy, 12) Patient Health Questionnaire-9 (PHQ-9) and 13) Generalized Anxiety Disorder-7 (GAD-7) questionnaire.

The survey was available in three different languages: English, Finnish and Latvian. The Finnish versions of the PHQ-9 and GAD-7 were directly available on the Finnish Current Care Guidelines' website. (*Ahdistuneisuushäiriöt*, 2019) The Latvian PHQ-9 and GAD-7 were available on the website of Doctus Journal for doctors and pharmacists. (Logins R. et al., Februāris 2017) A study validating the Latvian version of PHQ-9 in a primary care sample in Latvia found that a cutoff score of 10 produced psychometric properties comparable to the findings of systematic reviews and meta-analyses of the PHQ-9 (sensitivity 86.49%, specificity 89.36%). (Rancans et al., 2018; Vrublevska et al., 2018)

For our study, medical field students were defined as those who study; medicine, dentistry, nursing, and pharmacy. Non-medical students corresponded to other studies.

3.4 Statistical analysis

All statistical analyses were performed using the IBM SPSS Statistical Software (version 20.0.0.). The chi-square test was used to determine whether there were significant differences between the PHQ-9 and GAD-7 against different groups. Non-parametric Mann-Whitney U and Kruskal-Wallis tests were conducted to compare GAD-7 and PHQ-9 scores between characteristic groups. A p-value of <0.05 was considered statistically significant.

4 RESULTS

4.1 Characteristics of the samples

A total of 681 students have completed the questionnaire: 78.1 % were females and 21.9% males; 29.4% were studying in Finland and 70.6% in Latvia; 67% were medical field students and 33% non-medical field students. 64.3% of the participants were in the 20 – 25 age group. Almost half of the participants (48.2%) were living with their partner or family; 28.3% were living alone and 23.5% with flatmate(s). At the time of the study, 9.8% of the participants have had COVID-19 and 79.1% were planning on taking the vaccination. 27% were working in healthcare services and 24.4% as a non-medical essential worker. Also, 19.8% were diagnosed with a mental health disorders and 17% had a concurrent physical illness. The vast majority (99.7%) were not pregnant during the pandemic. (Table 4.1)

		Count	Column N %
Do you identify as	Female	532	78.1%
	Male	149	21.9%
Your age	18 – 20	102	15.0%
	20 – 25	438	64.3%
	25 – 30	97	14.2%
	30 – 35	23	3.4%
	35 +	21	3.1%
Your current country of studying	Finland	200	29.4%
	Latvia	481	70.6%
Are you currently	Medical field student	456	67.0%
	Non-medical field student	225	33.0%
Are you living	Alone	193	28.3%
	With flatmates	160	23.5%
	With partner/family members	328	48.2%
Have you had/do you currently have COVID-19?	No	614	90.2%
	Yes	67	9.8%
Are/Were you working during the pandemic in health care services?	No	497	73.0%
	Yes	184	27.0%
Are/Were you working during the pandemic as a non-medical essential worker?	No	515	75.6%
	Yes	166	24.4%
Are you planning on taking the vaccination if given the opportunity?	No	142	20.9%
	Yes	539	79.1%
	No	546	80.2%

Have you ever been diagnosed with one or more of the following?	Yes	135	19.8%
Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	No	565	83.0%
	Yes	116	17.0%
Are/were you pregnant during the pandemic?	No	679	99.7%
	Yes	2	0.3%

Table 4.1 Characteristic of the samples

4.2 The self-reported rates of depression and anxiety symptoms

Of the participants 23.9 % did not present with depressive symptoms, 33.3% had mild, 21.1% moderate, 15.3% moderately severe, and 6.3% severe depression (Table 4). Regarding anxiety 34.7% were without symptoms, 32.9% had mild. 19.5% moderate and 12.9% severe anxiety symptoms. The PHQ-9 total points mean was 9 (SD=6) and GAD-7 mean was 7 (SD=5) (Table 4.2.2).

	Minimum	Percentile 25	Median	Percentile 75	Maximum
PHQ-9 total points	0	5	8	14	27
GAD-7 total points	0	3	6	11	21

Table 4.2.1 PHQ-9 and GAD-7 score distribution

	Mean	Standard Deviation
PHQ-9 total points	9	6
GAD-7 total points	7	5

Table 4.2.2 Mean and SD in PHQ-9 and GAD-7 scores

		Count	Column N %
PHQ9_cat	No depression	163	23.9%
	Mild depression	227	33.3%
	Moderate depression	144	21.1%
	Moderately severe depression	104	15.3%
	Severe depression	43	6.3%

GAD7_cat	Without anxiety symptoms	236	34.7%
	Mild anxiety symptoms	224	32.9%
	Moderate anxiety symptoms	133	19.5%
	Severe anxiety symptoms	88	12.9%

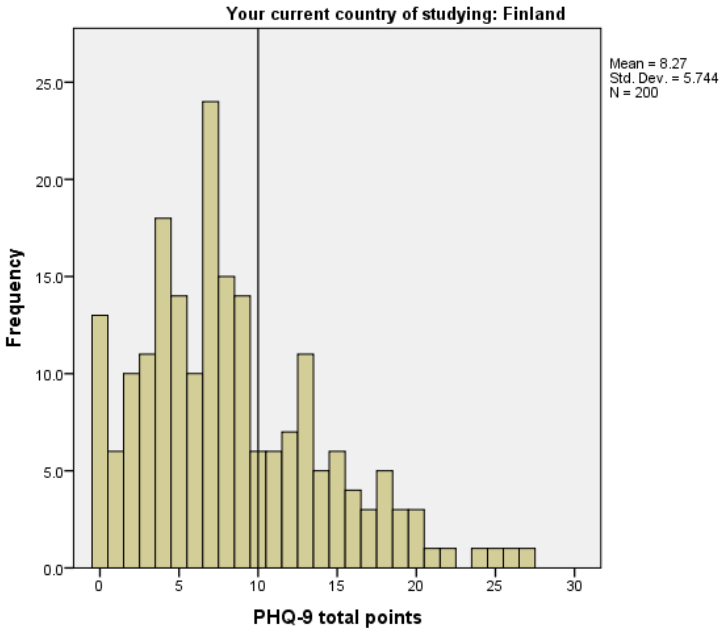
Table 4.2.3 PHQ-9 and GAD-7 categories

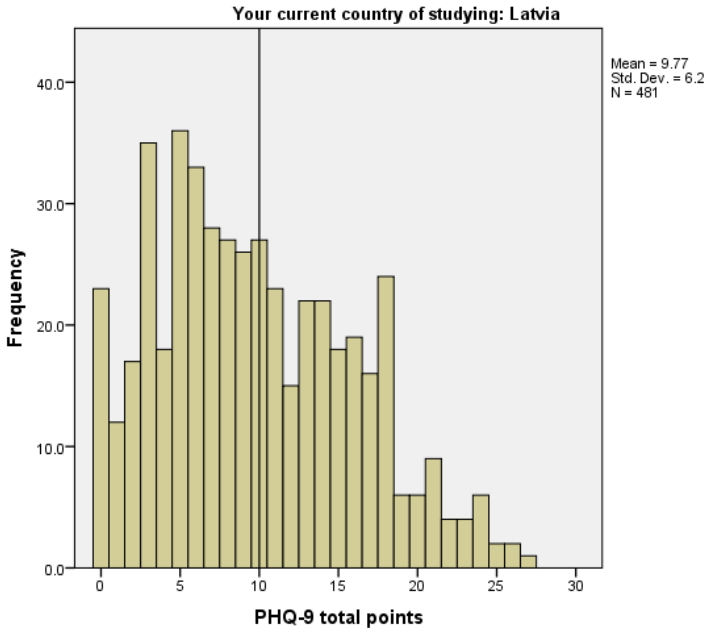
PHQ9		Count	Column N %
Finland	No depression	58	29.0%
	Mild depression	77	38.5%
	Moderate depression	35	17.5%
	Moderately severe depression	21	10.5%
	Severe depression	9	4.5%
Latvia	No depression	105	21.8%
	Mild depression	150	31.2%
	Moderate depression	109	22.7%
	Moderately severe depression	83	17.3%
	Severe depression	34	7.1%

Table 4.2.4 PHQ-9 scores in Finland and Latvia

GAD7		Count	Column N %
Finland	Without anxiety symptoms	73	36.5%
	Mild anxiety symptoms	84	42.0%
	Moderate anxiety symptoms	27	13.5%
	Severe anxiety symptoms	16	8.0%
Latvia	Without anxiety symptoms	163	33.9%
	Mild anxiety symptoms	140	29.1%
	Moderate anxiety symptoms	106	22.0%
	Severe anxiety symptoms	72	15.0%

Table 4.2.5 GAD-7 scores in Finland and Latvia





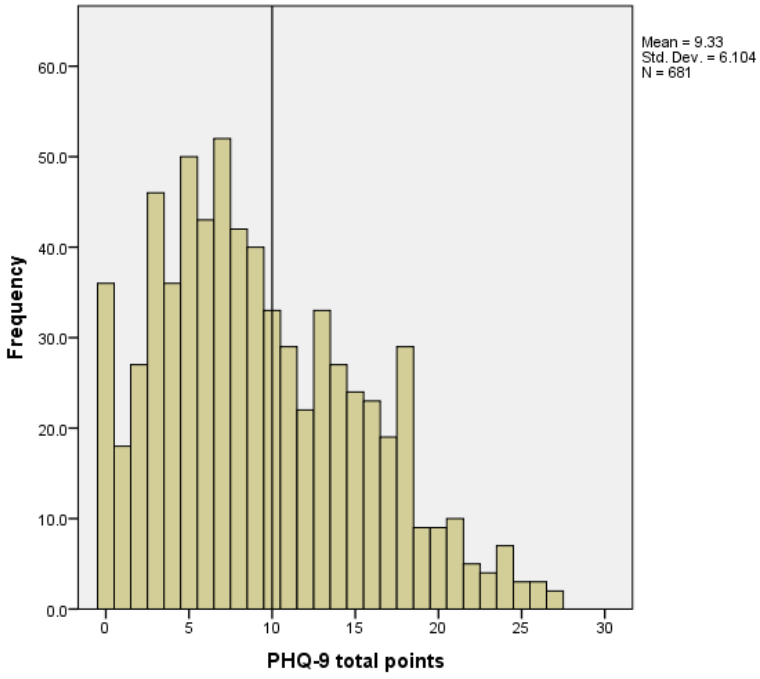


Figure 4.2.1 PHQ-9 scores in Finland, Latvia and total. Scores ≥ 10 are indicative of a positive screen for probable major depressive disorder (MDD)

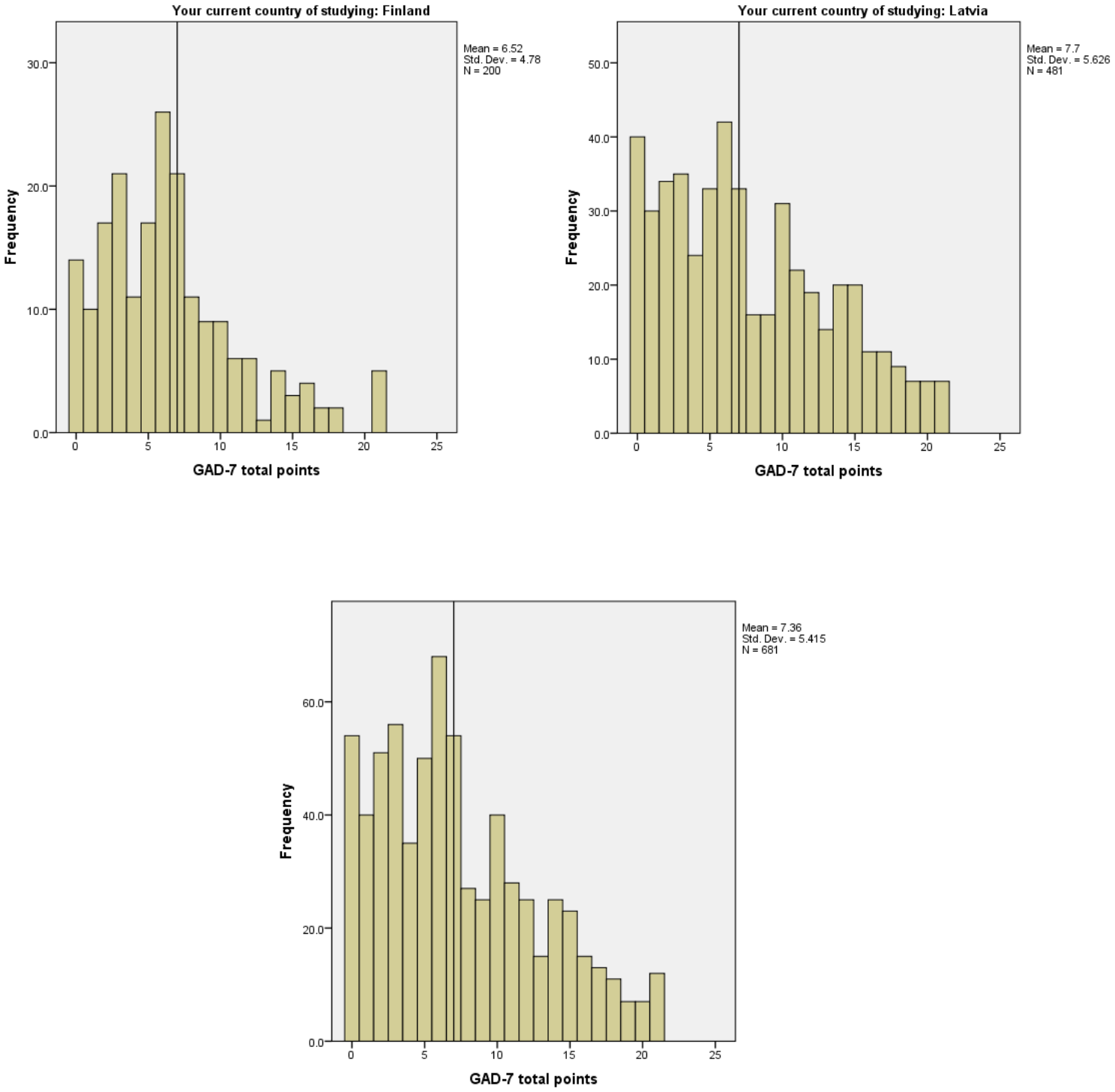


Figure 4.2.2 GAD-7 scores in Finland, Latvia and total. Scores ≥ 7 are indicative of a positive screen for probable generalized anxiety disorder

4.3 PHQ-9 scores in different groups

According to the Mann-Whitney U test, the PHQ-9 score is different among males and females (p=0.004). As shown in the table 4.3.1, female respondents have higher PHQ-9 scores.

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Do you identify as	Female	0	5	9	14	27
	Male	0	3	7	14	26

Table 4.3.1 PHQ-9 and gender

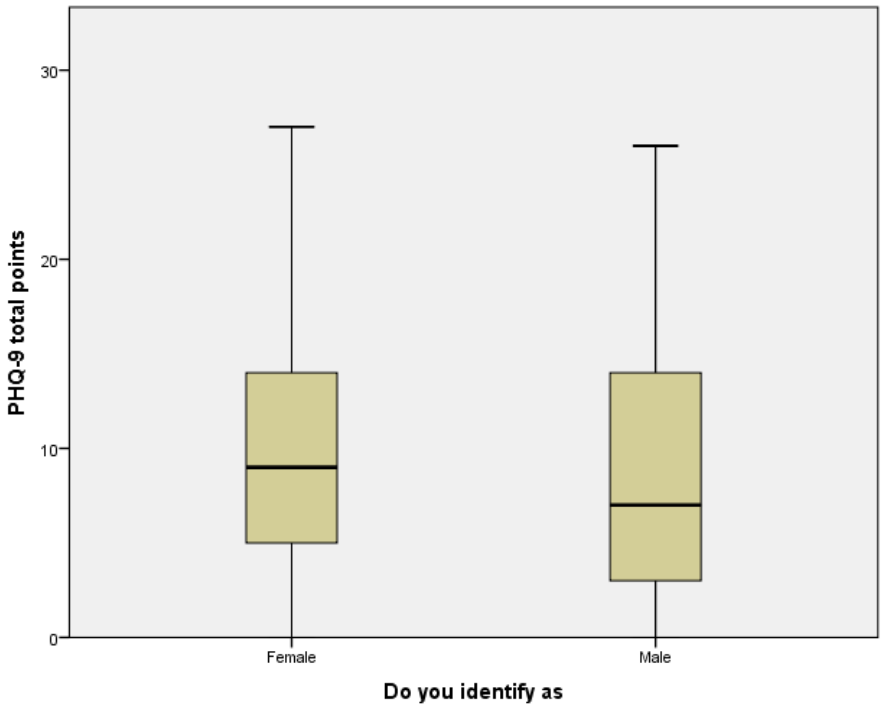


Figure 4.3.1 PHQ-9 and gender

According to the Kruskal-Wallis test, the PHQ-9 score is different in the analyzed age groups (p<0.001). Additional pairwise analysis, comparing each group to every other group showed that the pairs that have statistically significant difference are the following: 18-20 and 25-30 (higher in the first, p=0.001), 18-20 and 30-35 (higher in the first, p=0.035), 18-20 and 35+

(higher in the first, p<0.001), 20-25 and 35+ (higher in the first, p=0.007). We can also notice the trend that PHQ-9 scores are lower in the older age groups (Figure 4.3.2)

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Your age	18 – 20	0	7	11	15	26
	20 – 25	0	5	8	14	27
	25 – 30	0	4	7	12	21
	30 – 35	0	3	7	9	18
	35 +	0	2	4	8	11

Table 4.3.2 PHQ-9 and age distribution

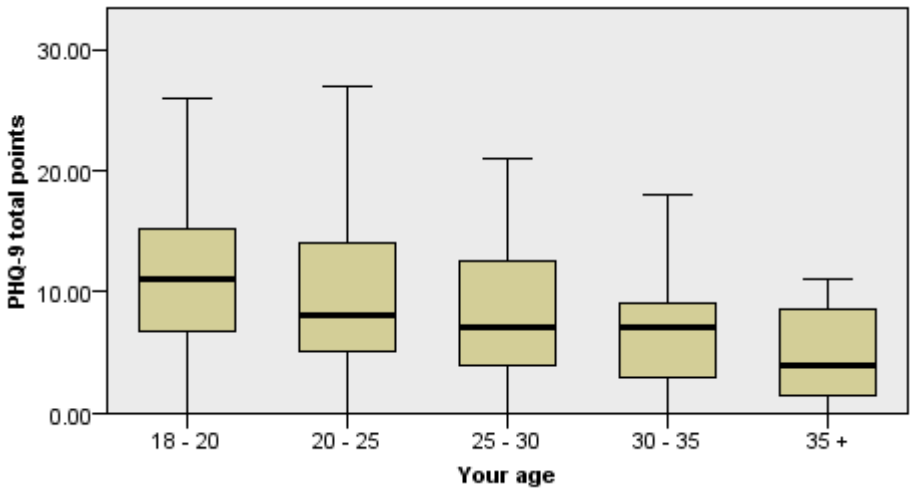


Figure 4.3.2 PHQ-9 and age distribution

According to the Mann-Whitney U test, the PHQ-9 score is different among countries (p=0.004). As shown in the table 4.3.3, respondents in Latvia have higher PHQ-9 scores.

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Your current country of studying	Finland	0	4	7	12	27
	Latvia	0	5	9	14	27

Table 4.3.3 PHQ-9 and country of studying

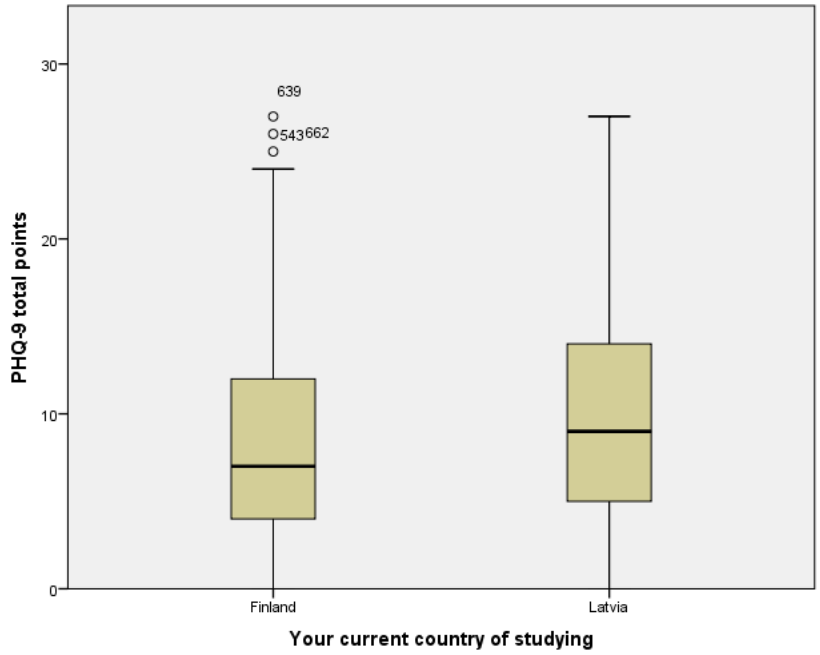


Figure 4.3.3 PHQ-9 and country of studying

According to the Mann-Whitney U test, the PHQ-9 score is not significantly different among medical and non-medical students (p=0.371) (Table 4.3.4).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are you currently	Medical field student	0	5	9	14	27
	Non-medical field student	0	5	7	13	27

Table 4.3.4 PHQ-9 and study field

According to the Kruskal-Wallis test, the PHQ-9 score is not significantly different in the groups (p=0.289).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are you living	Alone	0	5	8	15	26
	With flatmates	0	4	8	13	26
	With partner/family members	0	5	8	14	27

Table 4.3.5 PHQ-9 and living situation

According to the Mann-Whitney U test, the PHQ-9 score is not significantly different among those who had or did not have COVID-19 (p=0.113).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Have you had/do you currently have COVID-19?	No	0	5	8	13	27
	Yes	0	6	9	15	22

Table 4.3.6 PHQ-9 and COVID-19 illness

According to the Mann-Whitney U test, the PHQ-9 score is different among those who work in health care services during the pandemic and those who do not (p=0.004). Those who do, have lower scores (Figure 4.3.4).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are/Were you working during the pandemic in health care services?	No	0	5	9	14	27
	Yes	0	3	7	13	24

Table 4.3.7 PHQ-9 and working in health care services

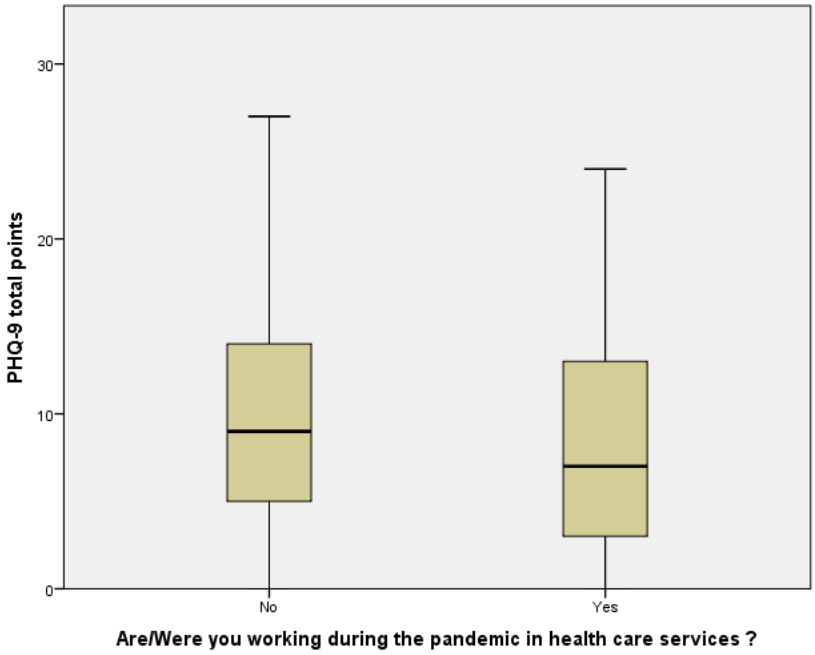


Figure 4.3.4 PHQ-9 and working in health care services

The score difference in those who are essential non-medical workers and those who are not is not statistically significant (Mann-Whitney U test p=0.710).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are/Were you working during the pandemic as a non-medical essential worker?	No	0	5	8	14	27
	Yes	0	5	9	13	27

Table 4.3.8 PHQ-9 and non-essential work

Neither among those who are planning to get vaccinated and those who are not (Mann-Whitney U test p=0.321).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are you planning on taking the vaccination if given the opportunity?	No	0	4	8	13	24
	Yes	0	5	8	14	27

Table 4.3.9 PHQ-9 and vaccination preferences

The difference among those who had been diagnosed with at least one of the following: depression, mania/bipolar disorder, psychotic disorder (including schizophrenia), PTSD, eating disorders, compulsive disorder (OCD), substance abuse or addiction disorder, attention disorder ADD or ADHD, personality disorder, autism spectrum disorder, and those who have not been diagnosed with any of those is statistically significant (Mann-Whitney U test $p<0.001$). The higher scores are in the group who have been diagnosed (Figure 4.3.5).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Have you ever been diagnosed with one or more of the following?	No	0	4	8	13	27
	Yes	0	7	13	18	27

Table 4.3.10 PHQ-9 and diagnosis of a mental illness

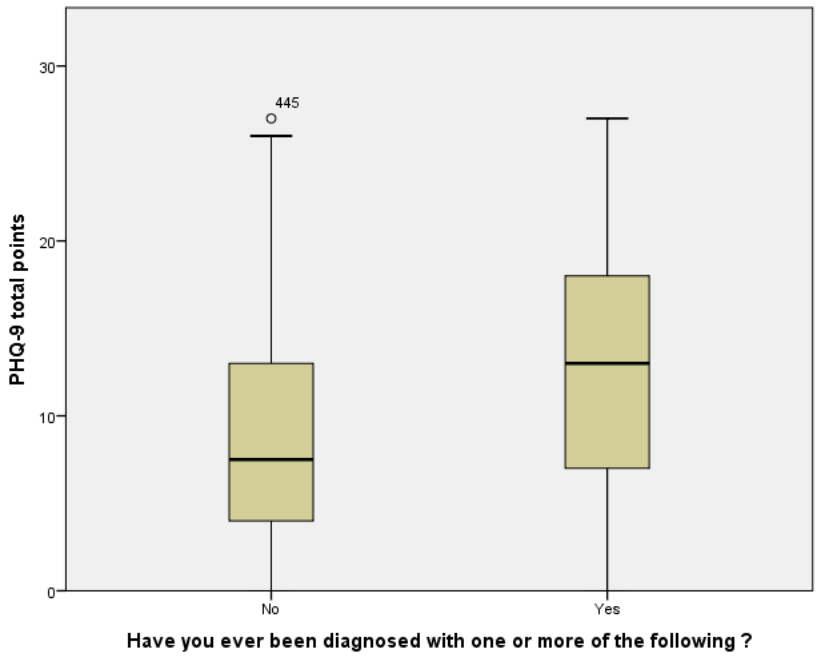


Figure 4.3.5 PHQ-9 and diagnosis of mental illness

There is also a significant difference among those who have concurrent illnesses and those who don't (Mann-Whitney U test $p<0.001$). The score is higher in those who have (Figure 4.3.6).

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	No	0	4	8	13	27
	Yes	0	7	11	17	26

Table 4.3.11 PHQ-9 and concurrent physical illness

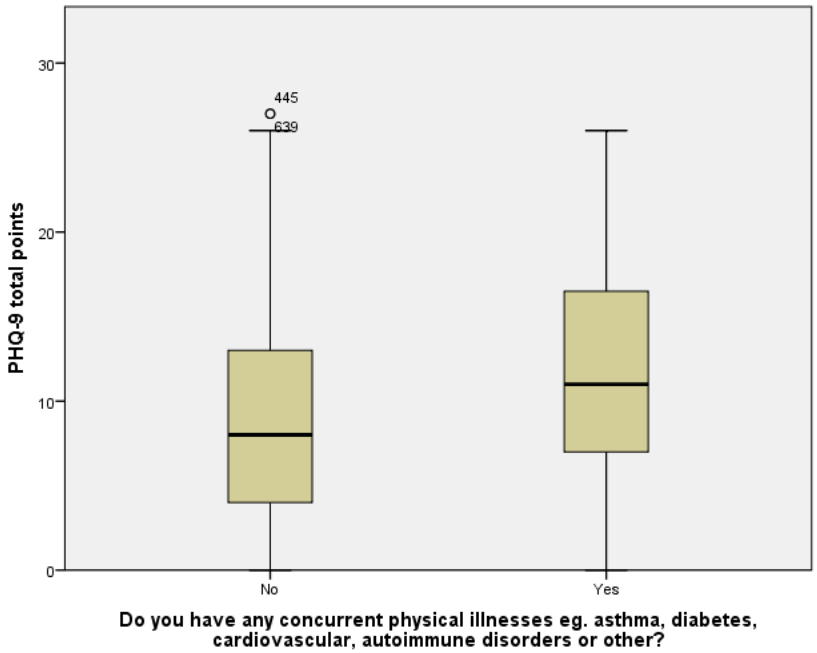


Figure 4.3.6 PHQ-9 and concurrent physical illness

There is no significant difference among those who are/were pregnant and those who are/were not (p=0.861). Although this is not representative and should not be taken into account because we only have 2 respondents who answered Yes. Therefore, there are too few cases in the Yes group.

		PHQ-9 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are/were you pregnant during the pandemic?	No	0	5	8	14	27
	Yes	0	0	9	18	18

Table 4.3.12 PHQ-9 and pregnancy

4.4 GAD-7 scores in different groups

According to the Mann-Whitney U test, the GAD-7 score is different among males and females (p=0.001). As shown in figure 4.4.1, female respondents have higher scores.

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Do you identify as	Female	0	3	7	11	21
	Male	0	1	6	10	21

Table 4.4.1 GAD-7 and gender

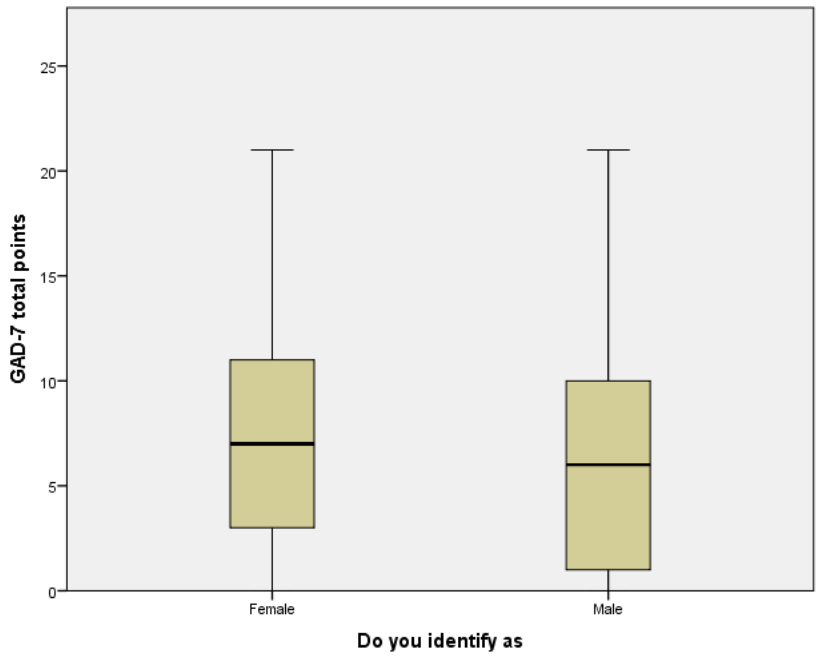


Figure 4.4.1 GAD-7 and gender

According to the Kruskal-Wallis test, the GAD-7 score is different in the analyzed age groups (p=0.002). Additional pairwise analysis, comparing each group to every other group showed that the pairs that have statistically significant differences are the following: 18-20 and 35+

(higher in the first, p=0.003), 20-25, and 35+ (higher in the first, p=0.034). We can also notice the trend that GAD-7 scores are lower in the older age groups (Figure 4.4.2)

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Your age	18 – 20	0	4	8	12	21
	20 – 25	0	3	6	11	21
	25 – 30	0	2	6	10	19
	30 – 35	0	3	4	7	20
	35 +	0	2	3	6	10

Table 4.4.2 GAD-7 and age distribution

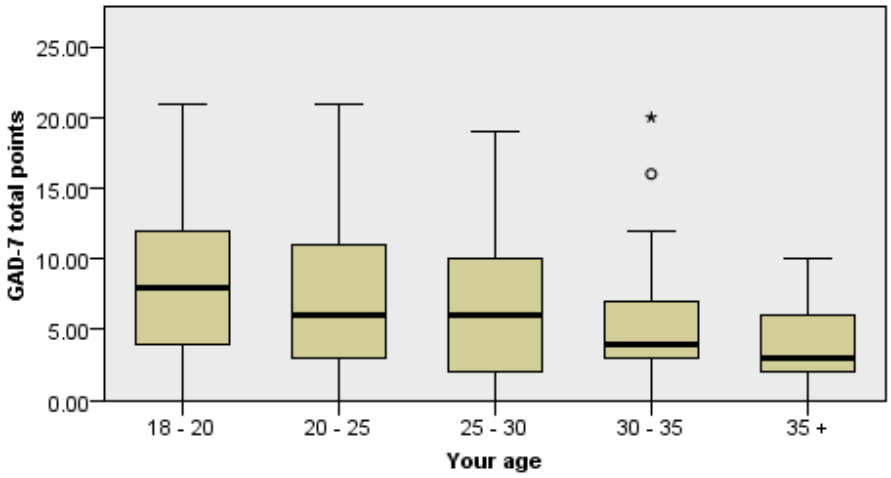


Figure 4.4.2 GAD-7 and age distribution

The score difference among respondents in Latvia and Finland is significantly different (Mann-Whitney U test p=0.028). Respondents in Latvia have a higher score (Figure 4.4.3)

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Your current country of studying	Finland	0	3	6	9	21
	Latvia	0	3	7	12	21

Table 4.4.3 GAD-7 and country of studying

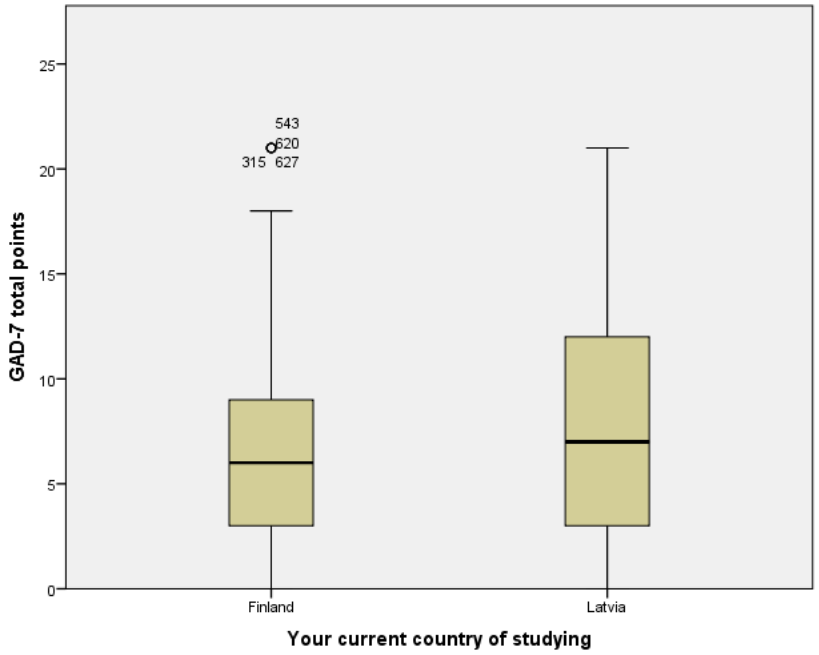


Figure 4.4.3 GAD-7 and country of studying

The score difference among medical and non-medical students is not significant (Mann-Whitney U test p=0.228).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are you currently	Medical field student	0	3	7	12	21
	Non-medical field student	0	3	6	9	21

Table 4.4.4 GAD-7 and field of study

The difference among groups is not statistically significant (Kruskal-Wallis test p=0.363).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are you living	Alone	0	3	6	11	21
	With flatmates	0	3	6	11	21
	With partner/family members	0	3	7	11	21

Table 4.4.5 GAD-7 and living situation

According to the Mann-Whitney U test, the GAD-7 score is not significantly different among those who had or did not have COVID-19 (Mann-Whitney U test p=0.733).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Have you had/do you currently have COVID-19?	No	0	3	6	11	21
	Yes	0	3	6	11	21

Table 4.4.6 GAD-7 and COVID-19 illness

The difference between groups is statistically significant (Mann-Whitney U test p=0.002). Those working in health services have lower scores (Figure 4.4.4).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are/Were you working during the pandemic in health care service?	No	0	3	7	11	21
	Yes	0	2	5	10	21

Table 4.4.7 GAD-7 and working in health care services

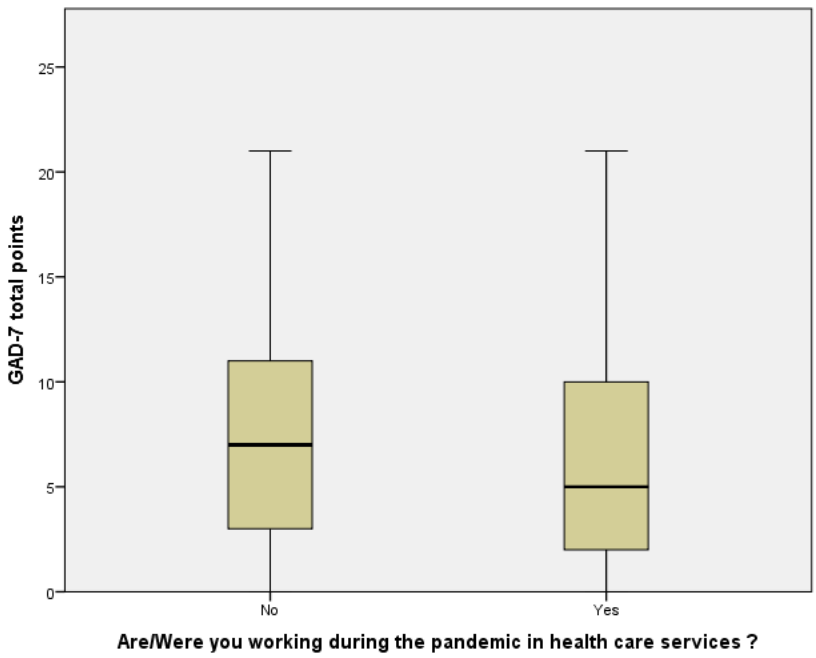


Figure 4.4.4 GAD-7 and working in health care services

The score difference in those who are essential non-medical workers and those who are not is not statistically significant (Mann-Whitney U test p=0.263).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are/Were you working during the pandemic as a non-medical essential worker?	No	0	3	6	11	21
	Yes	0	4	6	11	21

Table 4.4.8 GAD-7 and non-essential work

The difference between groups is not statistically significant (Mann-Whitney U test p=0.273).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are you planning on taking the vaccination if given the opportunity?	No	0	2	6	10	20
	Yes	0	3	6	11	21

Table 4.4.9 GAD-7 and vaccination preferences

The difference between groups is statistically significant (Mann-Whitney U test $p<0.001$). Those who have been diagnosed with mental disorders have higher scores (Figure 4.4.5).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Have you ever been diagnosed with one or more of the following?	No	0	3	6	10	21
	Yes	0	5	10	15	21

Table 4.4.10 GAD-7 and history of mental illness

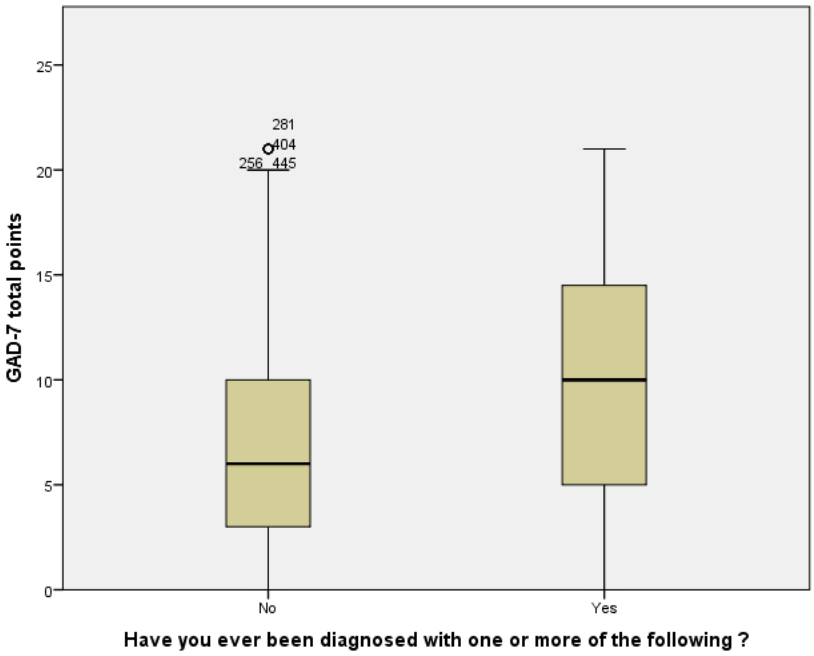


Figure 4.4.5 GAD-7 and history of mental illness

The difference between groups is statistically significant (Mann-Whitney U test p=0.007). Those who have concurrent illnesses have higher scores (Figure 4.4.6).

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	No	0	3	6	10	21
	Yes	0	5	8	13	21

Table 4.4.11 GAD-7 and concurrent physical illness

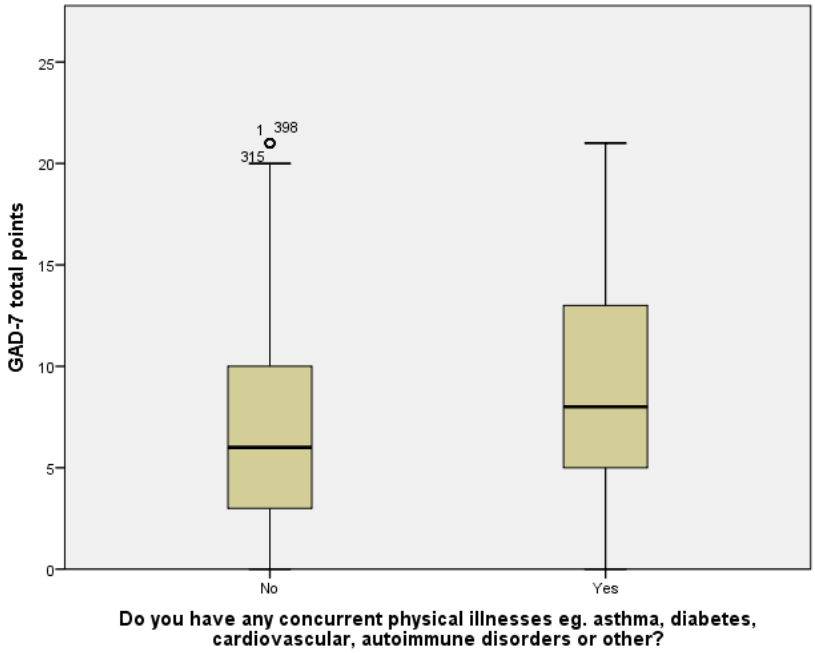


Figure 4.4.6 GAD-7 and concurrent physical illness

There is no significant difference among those who are/were pregnant and those who are/were not (p=0.952). Although this is not representative and should not be taken into account because we only have 2 respondents who answered Yes. Therefore, there are too few cases in the Yes group.

		GAD-7 total points				
		Minimum	Percentile 25	Median	Percentile 75	Maximum
Are/were you pregnant during the pandemic?	No	0	3	6	11	21
	Yes	0	0	9	17	17

Table 4.4.12 GAD-7 and pregnancy

4.5 PHQ-9 scores against groups

		PHQ9_cat										p-value Chi-square test)
		No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression		
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	
Do you identify as	Female	111	20.9%	183	34.4%	121	22.7%	79	14.8%	38	7.1%	0.003
	Male	52	34.9%	44	29.5%	23	15.4%	25	16.8%	5	3.4%	
Your age	18 – 20	16	15.7%	26	25.5%	28	27.5%	22	21.6%	10	9.8%	0.001
	20 – 25	99	22.6%	147	33.6%	91	20.8%	70	16.0%	31	7.1%	
	25 – 30	29	29.9%	37	38.1%	19	19.6%	10	10.3%	2	2.1%	
	30 – 35	7	30.4%	11	47.8%	3	13.0%	2	8.7%	0	0.0%	
	35 +	12	57.1%	6	28.6%	3	14.3%	0	0.0%	0	0.0%	
Your current country of studying	Finland	58	29.0%	77	38.5%	35	17.5%	21	10.5%	9	4.5%	0.012
	Latvia	105	21.8%	150	31.2%	109	22.7%	83	17.3%	34	7.1%	
Are you currently	Medical field student	114	25.0%	139	30.5%	99	21.7%	73	16.0%	31	6.8%	0.264
	Non-medical field student	49	21.8%	88	39.1%	45	20.0%	31	13.8%	12	5.3%	
Are you living	Alone	45	23.3%	63	32.6%	34	17.6%	34	17.6%	17	8.8%	0.176
	With flatmates	44	27.5%	51	31.9%	42	26.3%	18	11.3%	5	3.1%	
	With partner/family members	74	22.6%	113	34.5%	68	20.7%	52	15.9%	21	6.4%	
Have you had/do you currently have COVID-19?	No	150	24.4%	206	33.6%	132	21.5%	85	13.8%	41	6.7%	0.030
	Yes	13	19.4%	21	31.3%	12	17.9%	19	28.4%	2	3.0%	
Are/Were you working during the pandemic in health care services?	No	109	21.9%	164	33.0%	110	22.1%	75	15.1%	39	7.8%	0.028
	Yes	54	29.3%	63	34.2%	34	18.5%	29	15.8%	4	2.2%	
Are/Were you working during	No	126	24.5%	167	32.4%	108	21.0%	81	15.7%	33	6.4%	0.892
	Yes	37	22.3%	60	36.1%	36	21.7%	23	13.9%	10	6.0%	

the pandemic as a non-medical essential worker?												
Are you planning on taking the vaccination if given the opportunity?	No	36	25.4%	51	35.9%	29	20.4%	20	14.1%	6	4.2%	0.743
	Yes	127	23.6%	176	32.7%	115	21.3%	84	15.6%	37	6.9%	
Have you ever been diagnosed with one or more of the following?	No	148	27.1%	198	36.3%	108	19.8%	71	13.0%	21	3.8%	<0.001
	Yes	15	11.1%	29	21.5%	36	26.7%	33	24.4%	22	16.3%	
Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	No	144	25.5%	202	35.8%	109	19.3%	79	14.0%	31	5.5%	<0.001
	Yes	19	16.4%	25	21.6%	35	30.2%	25	21.6%	12	10.3%	
Are/were you pregnant during the pandemic?	No	162	23.9%	227	33.4%	144	21.2%	103	15.2%	43	6.3%	0.497
	Yes	1	50.0%	0	0.0%	0	0.0%	1	50.0%	0	0.0%	

Table 4.5.1 PHQ-9 scores against groups

There is a significant difference between genders and depression levels (Chi-square test p=0.003). Almost one-third of the male respondents (34.9%, N=52) were without anxiety symptoms, while female respondents' scores were more equally distributed with higher percentages in the groups with mild, moderate, or severe depression symptoms (Table 4.5.2).

Do you identify as	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Female	111	20.9%	183	34.4%	121	22.7%	79	14.8%	38	7.1%
Male	52	34.9%	44	29.5%	23	15.4%	25	16.8%	5	3.4%

Table 4.5.2 PHQ-9 and gender

There is a significant difference among age groups (Chi-square test p=0.001). More than half of respondents aged 35+ (57.1%, N=12) presented without depressive symptoms and 30% (N=7) of 30 – 35-year-olds didn't have depression. The level of depression decreases the older the age groups are, except in the state of mild depression; 25 – 30 (38.1%, N=37) and 30 – 35 (47.8%, N=11) (Table 4.5.3).

Your age	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
18 – 20	16	15.7%	26	25.5%	28	27.5%	22	21.6%	10	9.8%
20 – 25	99	22.6%	147	33.6%	91	20.8%	70	16.0%	31	7.1%
25 – 30	29	29.9%	37	38.1%	19	19.6%	10	10.3%	2	2.1%
30 – 35	7	30.4%	11	47.8%	3	13.0%	2	8.7%	0	0.0%
35 +	12	57.1%	6	28.6%	3	14.3%	0	0.0%	0	0.0%

Table 4.5.3 PHQ-9 and age distribution

There is a statistically significant difference in which country students are studying (Chi-square test p=0.012). Students studying in Finland report lower levels of moderate, moderately severe, and severe depression compared with their peers studying in Latvia (Table 4.5.4).

Your current country of studying	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Finland	58	29.0%	77	38.5%	35	17.5%	21	10.5%	9	4.5%
Latvia	105	21.8%	150	31.2%	109	22.7%	83	17.3%	34	7.1%

Table 4.5.4 PHQ-9 and country of studying

There is a statistically significant difference between students who have had COVID-19 and those who haven't (Chi-square test p=0.030). From 681 respondents 9.8% have had COVID-19 at the time of the study. No, mild and moderate depression was observed in 79.5% (N=488) of students who haven't had COVID-19. Meanwhile, 28.4% (N=19) of those with a diagnosed COVID-19 had moderately severe depression, while the percentage is 13.8%(N=85) in those with a negative diagnosis. Since only 9.8% have

had COVID-19, bigger sample size is needed to evaluate the correlation between COVID-19 and depression and anxiety (Table 4.5.5).

Have you had/do you currently have COVID-19?	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	150	24.4%	206	33.6%	132	21.5%	85	13.8%	41	6.7%
Yes	13	19.4%	21	31.3%	12	17.9%	19	28.4%	2	3.0%

Table 4.5.5 PHQ-9 and COVID-19 illness

There is a statistically significant difference whether the students were working in the healthcare services or not (Chi-square test p=0.028). Students who were working in the healthcare services show a decreased level of moderate and severe depression with almost equal levels of moderately severe depression. Severe depression is almost four times lower in students working compared with those who weren't (7.8% vs 2.2%). Furthermore, almost 30 % of working students in healthcare services don't have depression, while it´s 21.9% in students who weren't working (Table 4.5.6).

Are/Were you working during the pandemic in health care services?	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	109	21.9%	164	33.0%	110	22.1%	75	15.1%	39	7.8%
Yes	54	29.3%	63	34.2%	34	18.5%	29	15.8%	4	2.2%

Table 4.5.6 PHQ-9 and working in health care services

There is a statistically significant difference between students with a diagnosed mental health illness and those who weren't (Chi-square test p<0.001). 27.1% (N=148) of students with no history of a mental disorder didn't have depressive symptoms and 36.3% (N=198) had mild depression. Meanwhile, only 11.1% (N=15) of students with a history of mental disorders reported no depression. Moderate, moderately severe, and severe depression was significantly higher in students with a diagnosed mental disorder, especially in moderately severe depression where it's twice as high, and in severe depression where it's four times higher (Table 4.5.7).

Have you ever been diagnosed with one or more of the following?	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	148	27.1%	198	36.3%	108	19.8%	71	13.0%	21	3.8%
Yes	15	11.1%	29	21.5%	36	26.7%	33	24.4%	22	16.3%

Table 4.5.7 PHQ-9 and history of mental illness

There is a statistically significant difference in students with a concurrent physical illness compared with healthy students (Chi-square test $p<0.001$). Moderate, moderately severe, and severe depression was higher in students with a concurrent physical illness; moderate depression 30.2% vs 19.3%, moderately severe depression 21.6% vs 14%, and severe depression 10.3% vs 5.5% (Table 4.5.8).

Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	No depression		Mild depression		Moderate depression		Moderately severe depression		Severe depression	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	144	25.5%	202	35.8%	109	19.3%	79	14.0%	31	5.5%
Yes	19	16.4%	25	21.6%	35	30.2%	25	21.6%	12	10.3%

Table 4.5.8 PHQ-9 and concurrent physical illness

4.6 GAD-7 scores against groups

		GAD7_cat								p-value (Chi-square test)
		Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms		
		Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	
Do you identify as	Female	166	31.2%	184	34.6%	110	20.7%	72	13.5%	0.005
	Male	70	47.0%	40	26.8%	23	15.4%	16	10.7%	
Your age	18 – 20	26	25.5%	35	34.3%	28	27.5%	13	12.7%	0.017
	20 – 25	146	33.3%	146	33.3%	83	18.9%	63	14.4%	
	25 – 30	38	39.2%	29	29.9%	20	20.6%	10	10.3%	
	30 – 35	14	60.9%	6	26.1%	1	4.3%	2	8.7%	
	35 +	12	57.1%	8	38.1%	1	4.8%	0	0.0%	
Your current country of studying	Finland	73	36.5%	84	42.0%	27	13.5%	16	8.0%	<0.001
	Latvia	163	33.9%	140	29.1%	106	22.0%	72	15.0%	
Are you currently	Medical field student	161	35.3%	130	28.5%	99	21.7%	66	14.5%	0.003
	Non-medical field student	75	33.3%	94	41.8%	34	15.1%	22	9.8%	
Are you living	Alone	69	35.8%	63	32.6%	35	18.1%	26	13.5%	0.798
	With flatmates	61	38.1%	48	30.0%	34	21.3%	17	10.6%	
	With partner/family members	106	32.3%	113	34.5%	64	19.5%	45	13.7%	
Have you had/do you currently have COVID-19?	No	215	35.0%	203	33.1%	116	18.9%	80	13.0%	0.649
	Yes	21	31.3%	21	31.3%	17	25.4%	8	11.9%	
Are/Were you working during the pandemic in health care services?	No	153	30.8%	178	35.8%	96	19.3%	70	14.1%	0.002
	Yes	83	45.1%	46	25.0%	37	20.1%	18	9.8%	
Are/Were you working during the pandemic as a non-medical essential worker?	No	188	36.5%	161	31.3%	97	18.8%	69	13.4%	0.196
	Yes	48	28.9%	63	38.0%	36	21.7%	19	11.4%	
Are you planning on taking the vaccination if given the opportunity?	No	53	37.3%	48	33.8%	25	17.6%	16	11.3%	0.769
	Yes	183	34.0%	176	32.7%	108	20.0%	72	13.4%	

Have you ever been diagnosed with one or more of the following?	No	212	38.8%	185	33.9%	95	17.4%	54	9.9%	<0.001
	Yes	24	17.8%	39	28.9%	38	28.1%	34	25.2%	
Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	No	208	36.8%	185	32.7%	102	18.1%	70	12.4%	0.030
	Yes	28	24.1%	39	33.6%	31	26.7%	18	15.5%	
Are/were you pregnant during the pandemic?	No	235	34.6%	224	33.0%	133	19.6%	87	12.8%	0.345
	Yes	1	50.0%	0	0.0%	0	0.0%	1	50.0%	

Table 4.6.1 GAD-7 scores against groups

There is a significant difference between genders and anxiety levels (Chi-square test p=0.005). Most of the male respondents (47%, N=70) were without anxiety symptoms, while female respondents' scores were more equally distributed with higher percentages in the groups with mild, moderate, or severe anxiety symptoms (Table 4.6.2).

Do you identify as	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Female	166	31.2%	184	34.6%	110	20.7%	72	13.5%
Male	70	47.0%	40	26.8%	23	15.4%	16	10.7%

Table 4.6.2 GAD-7 and gender

There is a significant difference among age groups (Chi-square test p=0.017). Most of the respondents older than 30 are without anxiety symptoms (age 30-35 60.9%, N=14) (age 35+ 57.1%, N=12). Mild anxiety symptoms were almost equally distributed among different age groups and moderate to severe anxiety symptoms were distributed with higher percentages in the 18-30 age groups (Table 4.6.3).

Age group	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
18 – 20	26	25.5%	35	34.3%	28	27.5%	13	12.7%
20 – 25	146	33.3%	146	33.3%	83	18.9%	63	14.4%
25 – 30	38	39.2%	29	29.9%	20	20.6%	10	10.3%
30 – 35	14	60.9%	6	26.1%	1	4.3%	2	8.7%
35 +	12	57.1%	8	38.1%	1	4.8%	0	0.0%

Table 4.6.3 GAD-7 and age distribution

There is a significant difference between the current country of studying (Chi-square test $p<0.001$). Higher levels of anxiety can be seen in those who are studying in Latvia, with moderate and severe anxiety symptoms being almost twice higher in Latvia compared with Finland (Table 4.6.4)

Your current country of studying	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Finland	73	36.5%	84	42.0%	27	13.5%	16	8.0%
Latvia	163	33.9%	140	29.1%	106	22.0%	72	15.0%

Table 4.6.4 GAD-7 and country of studying

The field of studying is statistically significant (Chi-square test $p=0.003$). Medical field students had higher percentages in the groups with moderate and severe anxiety symptoms (Table 4.6.5).

Are you currently	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Medical field student	161	35.3%	130	28.5%	99	21.7%	66	14.5%
Non-medical field student	75	33.3%	94	41.8%	34	15.1%	22	9.8%

Table 4.6.5 GAD-7 and field of study

Students working in healthcare services during the pandemic had a statistically significant difference compared with students who weren't (Chi-square test p=0.002). Almost half (45.1%, N=83) who were working didn't present any anxiety symptoms and overall had less mild and severe anxiety symptoms, with moderate anxiety symptoms being almost equally distributed (Table 4.6.6).

Are/Were you working during the pandemic in health care services?	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	153	30.8%	178	35.8%	96	19.3%	70	14.1%
Yes	83	45.1%	46	25.0%	37	20.1%	18	9.8%

Table 4.6.6 GAD-7 and working in health care services

There is a statistically significant difference between students diagnosed with a mental disorder (Chi-square test p<0.001). Students diagnosed with mental disorders had almost equally distributed higher percentages in the groups with mild, moderate or severe anxiety symptoms (25 – 29 %) (Table 4.6.7).

Have you ever been diagnosed with one or more of the following? Depression, mania/bipolar disorder, psychotic disorder...	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	212	38.8%	185	33.9%	95	17.4%	54	9.9%
Yes	24	17.8%	39	28.9%	38	28.1%	34	25.2%

Table 4.6.7 GAD-7 and history of mental illness

Similarly, students with a concurrent physical illness had higher percentages in the groups with mild, moderate, or severe anxiety symptoms (Chi-square test p=0.030). More than a third of students without a physical illness didn't present with anxiety symptoms (Table 4.6.8).

Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders, or other?	Without anxiety symptoms		Mild anxiety symptoms		Moderate anxiety symptoms		Severe anxiety symptoms	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
No	208	36.8%	185	32.7%	102	18.1%	70	12.4%
Yes	28	24.1%	39	33.6%	31	26.7%	18	15.5%

Table 4.6.8 GAD-7 and concurrent physical illness

5 DISCUSSION

This is, to the best of our knowledge, the first survey of Finnish and Latvian medical and non-medical students on the prevalence of depression and anxiety. The current study aimed to assess the levels of depression and anxiety during the COVID-19 pandemic, among undergraduate medical versus non-medical field students, both in Latvia and Finland. The secondary aim was to compare the prevalence of depression and anxiety between Latvia and Finland. Additionally, the study highlighted factors which were associated with higher levels of depression and anxiety.

Among the 681 participants, 42.7% reported a moderate-to-severe level of depression and 65.3% reported mild-to-severe level of anxiety. The findings of this study concluded that there were mainly six factors associated with a higher incidence of depression and anxiety ($p<0.05$). The female gender, irrespective of the country and field of study was shown to be associated with higher PHQ-9 and GAD-7 scores. The findings in this study are consistent with other studies where females were also found to have higher levels of depression and anxiety. Although the findings were statistically significant, 78.1% of the participants were female. Nevertheless, in almost all epidemiological studies there is an overrepresentation of females. (Xiong et al., 2020)

The main aim of our study was to compare medical field and non-medical field students. Medical students compared with the general population have higher levels of anxiety, the global prevalence rate of anxiety among medical students being 33.8% and almost 1 in 3 medical students have anxiety which is also higher than in the general population. Pressure for academic success, increased work-load, financial burdens, a fast-paced career, sleep deprivation and also challenging patient encounters can all be predisposing factors for increased level of anxiety among medical field students. Furthermore, many students applying to medical fields apply with the intention of helping the patients, but during the COVID-19 pandemic the feeling of inability to care for all patients can add to the mental toll of the students. (Quek et al., 2019) In our study medical field students demonstrated higher moderate and severe anxiety symptoms compared with non-medical field students. A meta-analysis which included comparison of the prevalence of anxiety between medical students and non-medical students found that there was no statistically significant difference between the groups. (Quek et al., 2019) On the other hand a study in Portugal found that medical students had more symptoms of anxiety compared with non-medical students, possibly explained by a higher number of female students in that sample. (Moreira de Sousa et al., 2018). More studies comparing the prevalence of anxiety between medical field and non-medical

field students are needed to draw meaningful conclusions. Additionally, none of the studies comparing the prevalence of anxiety between the beforementioned groups analyzed the prevalence during a pandemic, specifically the COVID-19 pandemic, which can partially explain why in our study medical field students exhibited higher levels of anxiety compared with non-medical field students.

In regard to depression, many studies report higher levels of depression among medical field students compared with general population. (Puthran et al., 2016) Our study found that there was no difference in the prevalence of depression between medical field and non-medical field students. Our findings were consistent with other studies and meta-analyses which found no differences between nursing students and non-nursing students as well as medical students and non-medical students. (Puthran et al., 2016; Tung et al., 2018) These finding could suggest the possibility of a problem which affects university students in general but is not unique to any course of study. (Bacchi & Licinio, 2015) Further studies comparing medical and non-medical field students are necessary to examine the factors resulting in depression among nursing students and students enrolled in other courses specifically.

One of the main aims of the study, comparing Latvia and Finland, was found to be significant. Students studying in Finland reported lower levels of both depression and anxiety. Moderate-to-severe levels of depression were 47.1% in Latvia and 32.5% in Finland. The moderate-to-severe levels of anxiety were also higher in Latvia 37% and 21.5%, respectively. The mean PHQ-9 scores in Latvia were 9.77 (SD=6.2) and in Finland 8.27 (SD=5.74), with a score $\geq$ 10 indicating a possible major depressive disorder (MDD). Likewise, the GAD-7 scores were higher in Latvia; 7.7 (SD=5.6) and in Finland 6.5 (SD=4.78), with a score ≥ 7 indicating a possible generalized anxiety disorder (GAD). To the best of our knowledge, no study has compared the two countries and furthermore in Latvia no studies have been previously published in English analyzing depression and anxiety among students. During the conduction of our study a new state of emergency was reinstated on 09.11.2020 with increased rules and restrictions, and it was extended until 06.04.2021. A curfew was introduced in Latvia 29.12.2020 and the weekend curfew was extended until 07.02.2021. This could partly explain the higher levels of depression and anxiety among students studying in Latvia compared with Finland. In addition, distance learning was implemented in almost all fields in Latvia. Compared with Finland, in Latvia all medical education is conducted remotely while in Finland practical classes still took place on-site. This could be associated with higher levels of anxiety and depressive symptoms as this causes the students to be worried regarding their future and their clinical skills.

The age of the participant had a significant effect on the PHQ-9 and GAD-7 scores. The younger the age group, the higher levels of depression and anxiety were reported. It can be noticed in Figures 4.3.2 and 4.4.2 the trend that PHQ-9 and GAD-7 scores are lower in the older age groups. The results of our research are consistent with the majority of previously published studies on the COVID-19 pandemic, which show that early adulthood has a higher prevalence of depressive and anxiety symptoms than other age groups, and studies also show that the younger the individual, the more severe the symptoms they experience. (Gambin et al., 2021) Our study didn't focus on the specific predictors and differences in symptoms severity regarding each age group. A study in Poland found similarly that younger age groups (18–29 and 30–44) had higher levels of depressive and generalized anxiety symptoms than older adults (45–59 and 60–85 years). Household relationship problems were the most significant predictors of depressive and generalized anxiety symptoms in all age groups, while external restrictions were one of the most significant predictors of depression and anxiety symptoms exclusively in the youngest generation. (Gambin et al., 2021)

In our study 9.8% have had COVID-19 during the conduction of the study. History of illness was associated with higher levels of depression, meanwhile anxiety was not statistically significant. 49.3% (N=33) of those with a diagnosed COVID-19 had moderate-to-severe depression. However, since only 9.8% have had COVID-19, a bigger sample size is needed to evaluate the correlation between COVID-19 and depression and anxiety.

Surprisingly, working in the healthcare services during the pandemic was associated with lower levels of depression and anxiety. Severe depression was almost four times lower in students working compared with those who weren't and almost half didn't present any anxiety symptoms and overall had less mild and severe anxiety symptoms. In contrast with our study, other studies found that healthcare workers were at a higher risk for developing depression and anxiety. However, a meta-analysis found that the prevalence of depression and anxiety was similar between healthcare workers and the general public. (Luo et al., 2020) These studies did not specifically focus on the students, and to the best of our knowledge there are no studies which show working in the healthcare services as a protective factor for mental health. This could be explained by having more up-to-date and accurate information regarding the pandemic and taking precautionary measures which is better available at hospitals and healthcare centers compared with other workplaces. In addition, while working the feeling of isolation and loneliness diminishes which could have a positive impact since isolation is correlated with higher levels of depression and anxiety.

Similarly to other studies, having a history of psychiatric illness or a concurrent physical illness are both associated with higher levels of depression and anxiety, which might be exacerbated by lack of access to mental health support and services during COVID-19 quarantine, social distancing and being more susceptible to more severe form of COVID-19 illness. Moderate, moderately severe, and severe depression was higher in students with a concurrent physical illness and history of mental disorder. Moderately severe depression was twice as high and severe depression four times higher in students with a history of mental disorder. Students with a concurrent physical illness or a history of mental disorder had higher levels of mild, moderate, or severe anxiety symptoms. Having a mental health disorder or a concurrent chronic illness already predisposes to higher levels of depression and anxiety when compared with healthy individuals, therefore the findings in this study were as expected. (Iob et al., 2020)

Limitations

The study has some limitations. First, our study was a cross-sectional study and investigating the mental condition of the students during various times of the COVID-19 pandemic will lead to a deeper understanding of the disease's psychological effects. Second, the PHQ-9 and GAD-7 were administered through semi-structured diagnostic interviews, with all results self-assessed, which can introduce self-bias. Third, there was no information pr published studies on the levels of depression and anxiety among students in Latvia prior to the onset of the pandemic. Our study samples were limited in comparison to other studies, but we believe that this was a representative sample. A larger sample including more students with a COVID-19 diagnosis and more pregnant women is needed in order draw definitive conclusions. Since this was an internet-based survey and given the anonymous nature of the survey we were unable to verify the identity or reliability of the respondents and this might have contributed to some bias in the study findings. Lastly a wide variety of screening instruments was used in different studies and these studies used different cut-off points, therefore some of the results aren't completely comparable with the PHQ-9 and GAD-7 but are indicative.

Despite these beforementioned limitations, we were able to form a conclusion and an understanding about the psychological impact of COVID-19 as a mental stressor and the findings point to an urgent need for more attention and intervention in this vulnerable and critical demographic.

6 CONCLUSIONS

1. Medical students showed higher levels of moderate to severe anxiety compared to non-medical students whereas there were no significant differences in depression levels. Further studies are needed to draw meaningful conclusions since the conclusion of different studies is not unanimous.
2. The prevalence of depression and anxiety was higher in students studying in Latvia compared with Finland. The mean PHQ-9 and GAD-7 scores in Latvia were almost above the cutoff scores, indicating a possible MDD and GAD diagnosis.
3. Additionally, we found that female gender, younger age and having a history of mental disorder and a concurrent physical illness were associated with a higher level of depression and anxiety. These findings are consistent with the majority of existing studies.
4. Surprisingly, students working in healthcare services reported lower levels of depression and anxiety. Severe depression was almost four times lower in students working compared with those who weren't and almost half didn't present any anxiety symptoms.

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Appendix

English version

1. Do you identify as
    a. Female
    b. Male

2. Your age
    a. 18 - 20
    b. 20 - 25
    c. 25 - 30
    d. 30 - 35
    e. 35 +

3. Your current country of studying
    a. Latvia
    b. Finland

4. Are you currently
    "Medical field student includes: medicine, dentistry, nursing and pharmacy students. If you are a higher education student studying anything besides the above-mentioned please choose "non-medical field student"
    a. Medical field student
    b. Non-medical field student

5. Are you living
    a. Alone
    b. With flatmates
    c. With partner/family members

6. Have you had/do you currently have COVID-19?
    a. Yes
    b. No

7. Are/Were you working during the pandemic in health care services?
    Frequently in contact with people e.g. at hospital, outpatient centers, pharmacy, corona testing points/centers, vaccination centers
    a. Yes
    b. No

8. Are/Were you working during the pandemic as a non-medical essential worker?
    Frequently in contact with people such as working at the grocery store, delivery services, waitress etc.
    a. Yes
    b. No

9. Are you planning on taking the vaccination if given the opportunity?
    a. Yes
    b. No

10. Have you ever been diagnosed with one or more of the following?
    "Depression, Mania/Bipolar disorder, Psychotic disorder (including schizophrenia), PTSD, Eating disorders, Compulsive disorder (OCD), Substance abuse or addiction disorder, Attention disorder ADD or ADHD, Personality disorder, Autism spectrum disorder"
    a. Yes
    b. No

11. Do you have any concurrent physical illnesses eg. asthma, diabetes, cardiovascular, autoimmune disorders or other?

a. Yes
b. No

12. Are/were you pregnant during the pandemic?
    a. Yes
    b. No

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

	Not at all (0 points)	Several days (1)	More than half of the days (2)	Nearly every day (3)
Little interest or pleasure in doing things	☐	☐	☐	☐
Feeling down, depressed or hopeless	☐	☐	☐	☐
Trouble falling or staying asleep, or sleeping too much	☐	☐	☐	☐
Feeling tired or having little energy	☐	☐	☐	☐
Poor appetite or overeating	☐	☐	☐	☐
Feeling bad about yourself -- or that you are a failure or have let yourself or family down	☐	☐	☐	☐
Trouble concentrating on things, such as reading the newspaper or watching television	☐	☐	☐	☐
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	☐	☐	☐	☐
Thoughts that you would be better off dead or of hurting yourself in some way	☐	☐	☐	☐

14. 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?
    a. Not difficult at all
    b. Somewhat difficult
    c. Very difficult
    d. Extremely difficult
    e. I didn't check off any problems in the previous question

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

	Not at all (0 points)	Several days (1)	More than half of the days (2)	Nearly every day (3)
Feeling nervous, anxious or on edge	○	○	○	○
Not being able to stop or control worrying	○	○	○	○
Worrying too much about different things	○	○	○	○
Trouble relaxing	○	○	○	○
Being so restless that it is hard to sit still	○	○	○	○
Becoming easily annoyed or irritable	○	○	○	○
Feeling afraid as if something awful might happen	○	○	○	○

16. 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?
    a. Not difficult at all
    b. Somewhat difficult
    c. Very difficult
    d. Extremely difficult
    e. I didn't check off any problems in the previous question

Appendix 1 Survey in English

Finnish version

1. Sukupuoli
    a. Mies
    b. Nainen

2. Ikä
    a. 18 - 20
    b. 20 - 25
    c. 25 - 30
    d. 30 - 35
    e. 35 +

3. Maa, jossa opiskelet tällä hetkellä
    a. Latvia
    b. Suomi

4. Oletko tällä hetkellä
    Tässä tutkimuksessa terveysalan opiskelijaksi luokitellaan lääketieteen, hammaslääketieteen, sairaan- tai lähihoitajan ja farmasian alan opiskelijat. Jos olet korkeakouluopiskelija, joka opiskelee jotain muuta kuin edellämainitut alat, valitse "ei-terveysalan opiskelija"
    a. Terveysalan opiskelija
    b. Ei-terveysalan opiskelija

5. Asumismuoto
    a. Yksin
    b. Kämppäkaveri
    c. Kumppanin / perheen kanssa

6. Onko sinulla tällä hetkellä tai oliko sinulla COVID-19 tautia?
    a. Kyllä
    b. Ei

7. Työskenteletkö / työskentelitkö pandemian aikana terveydenhuollon palveluissa?
    Paljon kontaktissa ihmisten kanssa, esim. sairaalassa, avohoitokeskuksissa, apteekissa, koronatestauspisteissä, rokoteklinikoissa
    a. Kyllä
    b. Ei

8. Olitko/oletko pandemian aikana töissä alalla, jossa on paljon ihmiskontaktia (ei terveydenhuollon palveluissa)
    Esimerkiksi ruokakaupassa, jakelupalveluissa, tarjoilijana jne
    a. Kyllä
    b. Ei

9. Aiotko ottaa rokotuksen, jos se on mahdollista
    a. Kyllä
    b. Ei

10. Onko sinulla koskaan diagnosoitu yksi tai useampi seuraavista?
    Masennus, mania / kaksisuuntainen mielialahäiriö, psykoottinen häiriö (mukaan lukien skitsofrenia), PTSD, syömishäiriöt, pakonomainen häiriö (OCD), päihteiden väärinkäyttö- tai riippuvuushäiriö, tarkkaavaisuushäiriö ADD tai ADHD, persoonallisuushäiriö, autisminkirjon häiriö
    a. Kyllä
    b. Ei

11. Onko sinulla samanaikaisesti fyysisiä sairauksia, esimerkiksi astmaa, diabetesta, sydämen tai verenkiertoelimistön sairaus, autoimmuuni tai muu sairaus?
    a. Kyllä
    b. Ei

12. Olitko/oletko raskaana pandemian aikana?
    a. Kyllä
    b. Ei

13. Kuinka usein viimeisen kahden viikon aikana ovat seuraavanlaiset ongelmat vaivanneet sinua?

	Ei ollenkaan (0 pistettä)	Useina päivinä (1)	Enemmän kuin puolet ajasta (2)	Lähes joka päivä (3)
Vain vähäistä mielenkiintoa tai mielihyvää erilaisten asioiden tekemisestä	☐	☐	☐	☐
Alakuloisuutta, masentuneisuutta, toivottomuutta	☐	☐	☐	☐
Vaikeuksia nukahtaa, pysyä unessa tai liiallista nukkumista	☐	☐	☐	☐
Väsymystä tai voimattomuutta	☐	☐	☐	☐
Ruokahaluttomuutta tai liiallista syömistä	☐	☐	☐	☐
Huonommuuden tai epäonnistumisen tunteita tai tunne siitä, että olet tuottanut pettymyksen itsellesi tai perheellesi	☐	☐	☐	☐
Vaikeutta keskittyä asioihin kuten sanomalehden lukemiseen tai television katseluun	☐	☐	☐	☐
Puhumisen tai liikkumisen hitautta, jonka muutkin voisivat huomata tai vastakohtaisesti rauhattomuutta tai liikehtimistä paljon tavallista enemmän	☐	☐	☐	☐
Ajatuksia, että olisi parempi, jos olisit kuollut tai että haluaisit	☐	☐	☐	☐

14. Jos sinulla on ollut jokin ongelma, niin kuinka vaikeaa sinun on ollut huolehtia työstäsi, kotiasioistasi tai tulla toimeen muiden ihmisten kanssa näiden ongelmien vuoksi?
    a. Ei lainkaan
    b. Hieman vaikeaa

c. Hyvin vaikeaa
d. Erittäin vaikeaa
e. Minulla ei ole ollut ongelmaa edellisessä kysymyksessä

15. Kuinka usein viimeisen kahden viikon aikana ovat seuraavanlaiset ongelmat vaivanneet sinua?

	Ei lainkaan (0 pistettä)	Useana päivänä (1)	Suurimpana osana päivistä (2)	Lähes joka päivä (3)
Hermostuneisuuden, ahdistuneisuuden tai kireyden tunne	⬭	⬭	⬭	⬭
En ole voinut lopettaa tai hallita huolestumistani	⬭	⬭	⬭	⬭
Liiallinen huolestuneisuus erilaisista asioista	⬭	⬭	⬭	⬭
Vaikeus rentoutua	⬭	⬭	⬭	⬭
Niin levoton olo, että on vaikea pysyä aloillaan	⬭	⬭	⬭	⬭
Taipumus harmistua tai ärsyyntyä helposti	⬭	⬭	⬭	⬭
Pelko siitä, että jotakin kauheaa saattaisi tapahtua	⬭	⬭	⬭	⬭

16. Jos sinulla on ollut jokin ongelma, niin kuinka vaikeaa sinun on ollut huolehtia työstäsi, kotiasioistasi tai tulla toimeen muiden ihmisten kanssa näiden ongelmien vuoksi?
    a. Ei lainkaan
    b. Hieman vaikeaa
    c. Hyvin vaikeaa
    d. Erittäin vaikeaa
    e. Minulla ei ole ollut ongelmaa edellisessä kysymyksessä

Appendix 2 Survey in Finnish

Latvian version

1. Dzimums
    a. Vīrietis
    b. Sieviete

2. Vecums
    a. 18 - 20
    b. 20 - 25
    c. 25 - 30
    d. 30 - 35
    e. 35 +

3. Valsts, kur pašlaik studējat
    a. Latvijā
    b. Somijā

4. Vai jūs šobrīd esat
    Medicīnas jomas studenti: medicīnas, zobārstniecības, māsu un farmācijas studenti. Ja esat augstākās izglītības students, kurš studē kaut ko citu, salaidinājumā ar iepriekšminēto, lūdzu, izvēlieties "nemedicīnas jomas students"
    a. Medicīnas jomas studenti
    b. Nemedicīnas jomas students

5. Tu dzīvo
    a. Viens
    b. Ar dzīvokļa biedriem
    c. Ar partneri / ģimenes locekļiem

6. Vai jums bija / ir šobrīd COVID-19?
    a. Jā
    b. Nē

7. Vai jūs pandēmijas laikā strādājāt veselības aprūpes dienestos, bieži sazinoties ar citiem cilvēkiem?
    Piemērām, slimnīcā, ambulatorā iestādē, aptiekā, COVID19 noteikšanas punktos, vakcinācijas centros
    a. Jā
    b. Nē

8. Vai jūs pandēmijas laikā strādājāt kā nemedicīnas servisa darbinieks, bieži sazinoties ar citiem cilvēkiem?
    Piemēram, pārtikas preču veikalā, piegādes pakalpojumos, par viesmīgi restorānā utt.
    a. Jā
    b. Nē

9. Vai plānojat vakcinēties pret COVID19, ja jums būs iespēja?
    a. Jā
    b. Nē

10. Vai jums kādreiz ir diagnosticēts viens vai vairāki no šim saslimšanam?
    Depresija, mānija / bipolāri traucējumi, psihotiski traucējumi (ieskaitot šizofrēniju), PTSS, ēšanas traucējumi, kompulsīvi traucējumi (OCD), vielu ļaunprātīga izmantošana vai atkarības traucējumi, uzmanības traucējumi ADD vai ADHD, personības traucējumi, autisma spektra traucējumi
    a. Jā
    b. Nē

11. Vai jums ir fiziskas slimības, piemēram, astma, diabēts sirds un asinsvadu, autoimūnas slimības vai citas?
    a. Jā
    b. Nē

12. Vai jūs esat / bijāt stāvokli pandēmijas laikā?
    a. Jā
    b. Nē

13. Cik bieži pēdējo 2 nedēļu laikā Jūs ir apgrūtinājušas kādas no šādām problēmām?

	Nemaz (0 punkts)	Vienu vai dažas dienas (1)	Vairumā dienu (2)	Katru vai gandrīz katru dienu (3)
Interešu un dzīvesprieka trūkums	☐	☐	☐	☐
Slikts/nomākts garastāvoklis, nospiestība vai bezcerības sajūta	☐	☐	☐	☐
Grūtības iemigt, caurs/trausls miegs vai pārāk ilga gulēšana	☐	☐	☐	☐
Nogurums vai enerģijas trūkums	☐	☐	☐	☐
Pazemināta ēstgriba vai pārēšanās	☐	☐	☐	☐
Neapmierinātība ar sevi – sajūta, ka esat neveiksminieks/-ce vai arī esat pievīlis/-usi savas vai ģimenes cerības	☐	☐	☐	☐
Grūtības koncentrēties, piemēram, lasīt avīzi vai skatīties tv	☐	☐	☐	☐
Kustības un runa bija tik lēna, ka citi cilvēki to varēja pamanīt. vai pretēji – bijāt tik satraukts un rosīgs, ka kustību aktivitāte kļuva lielāka nekā parasti	☐	☐	☐	☐
Domas, ka labāk būtu nomirt vai kaut kā ievainot sevi	☐	☐	☐	☐

14. Ja Jūs uz kādu no 9 apgalvojumiem atbildējāt apstiprinoši, novērtējiet, cik lielas grūtības Jums radīja darbs, nodarbošanās ar sadzīves lietām vai saskarsme ar cilvēkiem
    a. Nebija grūti
    b. Nedaudz grūti

c. Ļoti grūti
d. Ārkārtīgi grūti
e. Es ne uz kādu no 9 apgalvojumiem atbildējāt apstiprinoši

15. Cik bieži pēdējo 2 nedēļu laikā Jūs saskārāties ar kādu no turpmāk minētajām problēmām?

	Nemaz (0 punkts)	Dažas dienas (1)	Vairāk par nedēļu (2)	Gandrīz katru dienu (3)
Jutāt nervozitāti, raizes vai sasprindzinājumu	☐	☐	☐	☐
Nespējāt nomierināties vai kontrolēt satraukumu	☐	☐	☐	☐
Pārmērīgi satraucāties par dažādām lietām	☐	☐	☐	☐
Bija grūtības atslābināties	☐	☐	☐	☐
Bijāt tik nemierīgs/-a, ka nespējāt nosēdēt uz vietas	☐	☐	☐	☐
Viegli kļuvāt aizkaitināms/-a	☐	☐	☐	☐
Jutāt bailes, ka varētu notikt kaut kas šausmīgs	☐	☐	☐	☐

16. Ja Jūs uz kādu no 7 apgalvojumiem atbildējāt apstiprinoši, novērtējiet, cik lielas grūtības Jums radīja darbs, nodarbošanās ar sadzīves lietām vai saskarsme ar cilvēkiem
    a. Nebija grūti
    b. Nedaudz grūti
    c. Ļoti grūti
    d. Ārkārtīgi grūti
    e. Es ne uz kādu no 7 apgalvojumiem atbildējāt apstiprinoši

Appendix 3 Survey in Latvian

Ethics

The topic of this diploma work was approved by the Scientific Ethics Committee on 04.01.2021.

DOCUMENTATION PAGE

This Diploma Thesis

"THE PREVALENCE OF DEPRESSION AND ANXIETY AMONG MEDICAL FIELD AND NON-MEDICAL FIELD STUDENTS IN LATVIA AND FINLAND"

was developed at the Faculty of Medicine of the University of Latvia.

With my signature, I attest, that this research has been carried out without aid or assistance. Used information was obtained only from indicated sources and the electronically submitted copy of this diploma work complies with printout.

Author: Amal Al Jamal
(name, surname) *(signature)*

I recommend the work for presentation.

Supervisor: Anzela Kertudo, MD, MBA _____ 05.05.2021
(position, name, surname, degree) *(siganture)* *(date)*

Reviewer: _____ _____ _____
(position, name, surname, degree) *(signature)* *(date)*

The diploma thesis was submitted to the Faculty of Medicine on: _____
(date)

International students' coordinator, _____
(signature)

The diploma thesis is presented at the meeting of the State Examination Commission of Higher Professional Study Program „Medicine"_____2020. Protocol No. _____

Secretary of Commission: _____ _____
(position, name, surname, degree) *(signature)*