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**Prevalence and Sex-Specific
Associated Factors of Depression and
Generalised Anxiety Disorder Symptoms
in the General Adult Population
of Latvia**

Summary of the Doctoral Thesis for obtaining
the scientific degree “Doctor of Science (*PhD*)”

Sector Group – Medical and Health Sciences
Sector – Clinical Medicine
Sub-Sector – Psychiatry

Rīga, 2023



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The Doctoral Thesis was developed at Rīga Stradiņš University, Latvia

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Abbreviations used in the Thesis

USA	United States of America
BAD	Bipolar affective disorder
BDNF	Brain-derived neurotrophic factor
CNS	Central nervous system
CSDS	Chronic social defeat stress
DALY's	Disability adjusted life years
DNA	Deoxyribonucleic acid
DSM	Diagnostic and Statistical Manual of Mental Disorders
EU	European Union
fMR	Functional Magnetic Resonance
GAD-7	Generalized Anxiety Disorder scale-7
GPs	General practitioners
GWAS	Genome-wide association study
IL	Interleukins
INF	Interferon
MINI	The Mini International Neuropsychiatric Interview
NHS	National Health Service
OR	Odds ratio
PHQ-9	The Patient Health Questionnaire -9
PET	Positron emission tomography
WHO	World Health Organisation
Register	Register of patients with mental and behavioural disorders
SD	Standard deviation or Standard deviations
CDPC	Centre for Disease Prevention and Control
ICD-10	World Health Organisation International Classification of Diseases, 10th Revision

CI	Confidence interval
TNF	Tumour necrosis factor
5-HT	5-Hydroxytryptamine or serotonin

Introduction

Mental health is an integral part of the health and well-being of society as a whole and of each individual, and as the World Health Organisation (WHO) Constitution defines health: “*Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity*”. Psychoemotional health is the foundation of basic human values such as independent thought and action, happiness and friendship.

Protecting and promoting the mental health of the population is a priority in modern public health policy. The WHO *Comprehensive Mental Health Action Plan 2013–2030* identifies the implementation of evidence-based practices as one of the guiding principles for population mental health. This means that mental health treatment, prevention and promotion strategies and their implementation measures should be based on scientific evidence and take into account the cultural context of the local community (World Health Organization, 2021).

Mental, neurological and substance use disorders forms a major burden on the health of the population. On a global scale, these disorders collectively contribute to 10.4 % of total disability-adjusted life years (DALYs), 2.3 % of potential life-years lost, and 28.5 % of years lived with disability. When examining specific disorders, depression stands out as the most burdensome, representing 24.5 % of the total DALYs attributed to these types of disorders. Following closely are anxiety disorders, migraines, and alcohol dependence, which account for 10.4 %, 8.7 %, and 6.9 % of the overall burden of DALYs associated with mental, neurological, and substance use disorders, respectively. (Whiteford et al., 2015).

The study, which collected data from 259 studies on the most common mental disorders, reported that almost one in five (17.6 %) respondents had suffered from these disorders in the last year, while 29.2 % had experienced these

disorders at least once in their lifetime (Steel, et al., 2014). According to the findings from the Burden of Mental and Neurological Disorders in Europe report, over the span of a year, more than a third of the European populace (38.2 %) experiences a mental disorder, with a majority of these individuals not receiving necessary treatment. The most common psychiatric disorders in Europe are anxiety disorders (14 %), insomnia (7 %), unipolar depression (6.9 %), somatoform disorders (6.3 %), alcohol and substance dependence (> 4 %) (Wittchen et al., 2011).

Mental disorders not only exert a detrimental influence on individuals' well-being but also exact a substantial economic toll. Research demonstrates, for instance, that patients with depression tend to utilize primary health care services more frequently (Shvartzman et al., 2005). A study conducted in 2012 assessed the direct and indirect expenses associated with mental disorders in Europe, revealing a sum of €789 billion (Olesen et al., 2012). Given the substantial financial implications linked to mental disorders, prominent scholars in the field emphasize the necessity for comprehensive research into these conditions, underscoring that research outcomes validate the investment and contribute to the betterment of society as a whole (Olesen et al., 2012).

Considering the aforementioned, it can be inferred that both international and national policy documents, in conjunction with global research data, advocate for an intensified focus on investigating mental health challenges within Latvian society.

Information from the Latvian Centre for Disease Prevention and Control's register shows that the total number of patients with mental and behavioural disorders on the register in 2021 was 93 652. The largest number of patients in the Register are diagnosed with organic psychiatric disorders (1 203.3 per 100 000 population), schizophrenia spectrum disorders (1 013.1 per 100 000 population) and mental retardation (927.4 per 100 000 population).

When interpreting the data, it is important to take into account the fact that only patients are included in the Register, and only patients who were diagnosed and treated by a psychiatrist and not by other specialists. This may partly explain the difference between the most common psychiatric disorders in international population studies being mood disorders, anxiety disorders, somatoform disorders and psychoactive substance use disorders (Wittchen et al., 2011), rather than the disorders most prevalent in the Latvian Register. For example, in 2021, the number of patients diagnosed with depressive disorders (any type, including organic depressive disorders) in the Register is 15 000, but according to previous studies in Latvia, the prevalence of depression in the Latvian population is 6.7 (Rancans et al., 2014), and the 12-month prevalence is 7.9 % (Vrublevska et al., 2017a), which means that more than 115 000 cases of depression should be registered. This means that the majority of cases of depression, and presumably also neurotic (anxiety) disorders, go undiagnosed and patients do not receive appropriate treatment.

Underdiagnosis of depressive and anxiety disorders is a problem not only in Latvia, but also worldwide. Available data show that only a small proportion of patients with anxiety or depressive disorders receive adequate medical care, despite the existence of effective treatment options. An analysis of data from nationally or regionally representative depression prevalence surveys in 21 countries found that only 16.5 % of all people with unipolar depression diagnosed in the last 12 months receive minimally adequate treatment (Thornicroft et al., 2017). In contrast, among patients diagnosed with anxiety disorders, only 27.6 % receive any treatment and only 9.8 % receive guideline-appropriate mental health care (Alonso et al., 2018)

Depressive and anxiety disorders, if left untreated, have a significant impact on the public health system and are associated with an economic burden in terms of direct medical costs, indirect workplace costs and the mortality costs

associated with suicide (Greenberg et al., 2015). Patients with somatic illnesses and untreated depression or generalised anxiety disorder are more likely to use secondary care facilities, which leads to excessive and unjustified costs (Kujanpää et al., 2016; Pálinkás et al., 2019). In addition, people with major depression are at risk of premature death (Plana-Ripoll et al., 2019). Untreated anxiety can have a significant impact on quality of life, particularly in the area of social functioning (Olatunji, Cisler, and Tolin, 2007), as well as occupational and physical functioning (McKnight et al., 2016). The disability and reduced quality of life associated with untreated anxiety are greater than in patients with chronic physical conditions such as heart disease or diabetes (Alonso and Lépine, 2007). We can conclude that early detection and treatment of depression and neurotic disorders is important to reduce disability, increase life expectancy and improve quality of life at the population level. Appropriate screening programmes could serve the purpose of early diagnosis. However, screening strategies need to be specific and targeted in order to make effective use of available resources. To facilitate early and timely recognition of these disorders, it is necessary to know their expected prevalence in the general population, common universal risk factors, as well as region-, culture- and socio-economic setting-specific associated factors. In the framework of this thesis, it was decided to focus on the prevalence and associated factors of one of the most common neurotic disorders (generalised anxiety disorder) and the most common mood disorder (depression) in the Latvian population, especially taking into account the fact that both disorders often develop and progress simultaneously (Ruscio et al., 2017). According to previous studies in Latvia and the results of epidemiological studies in other countries, the prevalence of depressive disorders in women is approximately twice as high as in men (Rancans et al., 2014; Vrublevska et al., 2017a; Whiteford et al., 2013). Also, the most common anxiety disorders, such as generalised anxiety (Wittchen et al., 1994), panic disorders (Kessler et al.,

1994), social anxiety disorder (Grant et al., 2005) are also more prevalent among women, suggesting that risk factors for depression and neurotic disorders may differ between the sexes and that targeted and effective screening strategies should take these differences into account.

Aim of the Thesis

The aim of the study is to determine the prevalence of clinically significant symptoms of depression and generalised anxiety disorder in the Latvian adult population and to identify sex-specific socio-demographic, health-related and health-associated factors of these disorders.

Objectives of the Thesis

1. Determining the prevalence of clinically significant symptoms of depression in Latvian adults;
2. Determining the prevalence of clinically significant symptoms of generalised anxiety disorder in Latvian adults;
3. Determining the prevalence of clinically significant depressive symptoms and symptoms of generalised anxiety disorder in Latvian adults in the stratum of socio-demographic, health-related and health-associated characteristics;
4. Identification of sex-specific associated socio-demographic, health-related and health influencing factors of clinically significant depressive symptoms and symptoms of generalised anxiety disorder in the Latvian adult population;

Hypothesis of the Thesis

H1: The socio-demographic, health-related and health influencing associated factors of clinically significant symptoms of depression and symptoms of generalised anxiety disorder in the Latvian adult population differ between women and men.

Scientific novelty

For the first time in Latvia, the prevalence of generalised anxiety disorder (GAD) in the general adult population, including socio-demographic characteristics, was determined. This is the first study in Latvia to establish representative and internationally comparable prevalence data for generalised anxiety disorder in the general population.

The prevalence of a current point prevalence of clinically significant depressive symptoms was determined, which had not been determined in the general Latvian adult population for more than 10 years. Similarities and differences with previous Latvian epidemiological studies and data from other countries were analysed.

For the first time in Latvia, sex-specific sociodemographic, health-related and health-associated factors were identified, given the significant sex-differences in the prevalence of depression and generalised anxiety disorder.

The identified sex-specific associated factors add to the global knowledge base on sex-related differences in the risk, comorbidity and course of depression and generalised anxiety disorder.

The defined sex-universal associations between the two disorders add to the global scientific knowledge base and evidence for the concept of shared aetiology and neuro-phenotypic inheritance of anxiety and depressive spectrum disorders.

Ethical considerations

The processing of personal data was based on the consent of the data subject (respondent). The personal data obtained were processed in accordance with the requirements of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and national laws and regulations. The data subject's (respondent's) consent to data processing was obtained prior to data collection. TNS Latvia Ltd informed the data subject about the confidentiality, the intended purpose of the use of the data, asking for consent to process the data for this specific purpose. The respondent was informed about how the personal data will be processed. Upon receipt of the data subject's explicit consent, it was recorded in the form of an audio recording and registered in electronic form. In addition, the respondent was asked to sign a printed consent form. In case the respondent agreed to be interviewed but did not want to sign the consent form, the interview was conducted. The audio-recording was coded according to the number of the specific interview, so that it will be identifiable if necessary. All research material containing personal data or sensitive information is stored in restricted folders.

Permission to conduct the study has been obtained from the Ethics Committee of Riga Stradiņš University (Decision No 6-2/8/811 of 26.09.2019). Ethical norms in accordance with the laws and regulations of the Republic of Latvia and the Declaration of Helsinki were observed during the implementation of the study (Finland, 2013).

1 Study materials and methods

The research design is a quantitative cross-sectional study of the Latvian adult population.

1.1 Study instrumentarium and data extraction methods

The research instrument was a questionnaire, which was administered in Latvian or Russian at the respondents' households by means of direct *Computer Assisted Personal Interviews (CAPI)*. The fieldwork was carried out by 56 professional interviewers from TNS Latvia, who were specially trained in the use of the survey instruments.

The questionnaire included the following four sections:

Section 1: Questionnaire with closed-ended questions on the respondent's socio-demographic data, health and healthcare, smoking habits, self-assessment of health specifically created for this study.

Section 2: "Patient Health Questionnaire 9" ;

Section 3: "Generalized Anxiety Disorder 7";

Section 4: MINI International Neuropsychiatric Interview, version 7.0.2

1.1.1 Questionnaire with closed questions on socio-demographics, health and healthcare, smoking habits, self-assessment of health

The questionnaire included the following sub-groups of questions:

- "*General information about the respondent*" (questions R1–R13):
general information about the respondent's socio-demographic data:
sex, age, place of residence, etc;

- “*Information about the respondent’s health and healthcare*” (questions V1–V2): questions about the frequency of visits to general practitioners (GPs), doctors-specialists, ambulance calls and hospital admissions in the last year.
- Question on self-assessment of health status: “*How do you assess your current health status?*” with the response options “good”, “quite good”, “average”, “quite bad” and “bad”.
- “*Information on smoking habits*”: have you smoked/used tobacco and nicotine-containing products in your life?

The questions and answer phrasing within this section closely resembled the inquiries previously employed in the Health Behaviour among Latvian Adult Population Survey (SPKC, 2022).

A translated and validated version of the first section of the questionnaire was not available, so a Russian translation (including back-translation) was carried out. The translation into Russian and the back-translation into Latvian were carried out by two different translators. The back-translated questionnaire was compared with the original questionnaire in Latvian.

Prior to the start of the fieldwork, the questionnaires and the sampling procedure were piloted with 31 target group participants, including respondents from different strata. The interviews led to further training of the interviewers.

In addition to the interviews, the questionnaire was validated in two focus groups (in Latvian and Russian). The content of the questionnaire in Latvian was piloted in a focus group with respondents matched to the target group of the study, whose spoken language at home is Latvian. The questionnaire in Russian was piloted in a focus group with respondents matched to the target group, whose spoken language at home is Russian. The aim of piloting the questionnaire in focus groups was to measure the perception and comprehensibility of the questionnaire, in order to make adjustments to the questions or the design of the

questionnaire if necessary. The information obtained in the focus groups was also used in the training of interviewers.

After the final version of the questionnaire in Latvian and Russian was agreed, the data coding manual was developed. The Latvian version of the questionnaire and its Russian translation were coded using NIPO's Nfield platform.

1.1.2 “Patient Health Questionnaire 9” (10 closed questions)

This questionnaire is a self-rating instrument for depression, consisting of nine statements constructed according to the nine diagnostic criteria for depression in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (*DSM-4*) of the American Psychiatric Association. Respondents are asked to make an assessment of their well-being over the past 2 weeks and to mark “0” if they have not experienced the problem in the statement at all over the past 2 weeks, “1” if the problem has bothered them for a few days over the past 2 weeks, “2” if the problem has bothered them for more than a week in total over the past 2 weeks, and “3” if the problem has bothered them almost every day over the past 2 weeks. Depression is detected if the *PHQ-9* total score ≥ 10 . This score threshold has been shown to maximise combined sensitivity (0.85) and specificity (0.85) (Negeri et al., 2021), and a previous study in the general population of Latvia also used a 10-point cut-off for depression (Rancans et al., 2014).

As the *PHQ-9* does not exclude depression due to organic causes or psychoactive substance use, in our study we use the term “*depression*” to refer to clinically significant depressive symptoms, but not as a synonym for Recurrent Depressive Disorder or Depressive Episode according to the current International Classification of Diseases, 10th edition (*ICD-10*) or *Major Depressive Disorder* according to the *DSM-V*. A similar terminological approach has been used in

other recent international studies (Costantini et al., 2021; Negeri et al., 2021; Wang et al., 2021). Throughout the thesis, the concepts of “*depression*” and “*clinically significant depressive symptoms*” will be used interchangeably as synonyms;

In previous studies, the PHQ-9 has shown good sensitivity and specificity and has better diagnostic properties than other diagnostic scales (such as the *Geriatric Depression Scale-15 (GDS-15)*) (Zhang et al., 2020). According to a recent meta-analysis, the PHQ-9 shows higher sensitivity than semi-structured interviews (structured clinical interview based on the DSM-III-R) (Levis, Benedetti, and Thombs, 2019). The PHQ-9 shows good psychometric performance in both general (Martin et al., 2006; Yu et al., 2012), and in specific populations such as older primary care patients (Aslan et al., 2020) or patients with cancer (Hartung et al., 2017). The PHQ-9 has also been used in previous studies conducted in both general and primary care populations in Latvia (Rancans et al., 2014, 2018). Taking all of the above into account, we can conclude that the PHQ-9 is a reliable instrument with categorical and dimensional analysis capabilities (Yuan et al., 2019). Translated versions of the instrument in Latvian and Russian have been validated in the Latvian population (Vrublevska, Trapencieris, and Rancans, 2018).

1.1.3 “Generalized Anxiety Disorder 7” (7 closed questions)

This anxiety self-assessment instrument is made up of 7 statements based on the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) core diagnostic criteria for generalised anxiety disorders. The scale was originally developed as a screening tool for generalised anxiety disorder in primary care settings. The respondent self-assesses the past two weeks by answering seven statements. The respondent scores “0” if the problem mentioned in the statement has not occurred at all in

the last 2 weeks, “1” if the problem has occurred some days in the last 2 weeks, “2” if the problem has occurred more than one week in total in the last 2 weeks and “3” if the problem has occurred almost every day in the last 2 weeks. Generalised anxiety disorder is detected when the score is at least 10. This score threshold has a proven maximum sensitivity of 89 % and specificity of 82 % for the detection of generalised anxiety disorder (Spitzer RL et al., 2006).

The scale is a self-assessment tool for generalised anxiety screening with proven reliability and good factorial, criterion and procedural validity (Spitzer RL et al., 2006). The GAD-7’s good internal validity and good psychometric performance have been demonstrated in studies conducted in primary care patient populations (Muñoz-Navarro et al., 2017), among patients with heterogeneous psychiatric disorders (Beard and Björgvinsson, 2014) and in outpatient populations (Rutter and Brown, 2017). Importantly in the context of the current study, the GAD-7 has also been shown to be a reliable and valid tool for detecting generalised anxiety in the general population (Löwe et al., 2008).

Translated versions of the tool in Latvian and Russian have been validated in the Latvian population. The scale showed good internal consistency – Cronbach’s alpha for the Latvian version is 0.87, for the Russian version – 0.85 (Vrublevska, Renemane, et al., 2022).

As the GAD-7 does not exclude anxiety due to organic causes or substance misuse, and assess generalised anxiety symptoms within 2 weeks, in our study we use the term “*generalised anxiety symptoms*” to refer to clinically significant generalised anxiety symptoms, but not as a synonym for a diagnosis of generalised anxiety disorder according to the ICD-10 or DSM-V, as in both cases the time criterion for a proven diagnosis is 6 months.

1.1.4 Mini International Neuropsychiatric Interview, version 7.0.2 (230 closed questions)

The MINI is a diagnostic interview that can be used to diagnose psychiatric disorders. Validity and reliability studies have been conducted comparing the MINI with the Structured Clinical Interview for DSM-III-R Patients (SDIC-P) (Sheehan et al., 1997) and the Composite International Diagnostic Interview (CIDI – a structured interview developed by WHO) (Lecrubier et al., 1997). The results of these studies show that the MINI has similar reliability and validity properties but can be administered in a much shorter time (mean 18.7 ± 11.6 minutes, median time 15 minutes) than the above-mentioned questionnaires (Sheehan et al., 1998). The MINI is made up of individual modules. Each of them contains some screening questions that exclude pathology, it is not necessary to answer all the questions in the module. In cases where a respondent is found to have a disorder in one of the interview modules, the interview time may be longer. In general, this type of modular design allows the identification of disorders in the shortest possible time.

MINI is a joint collaboration of USA and European psychiatrists and clinicians. Mental disorders are defined according to the diagnostic criteria of the *ICD-10* and *DSM-5* classifications. The MINI interview used included 17 diagnostic modules:

- A. Major depressive episode with or without psychotic symptoms
(current, past), major depressive disorder
- B. Suicidal ideation, self-harm and suicidal behaviour
- C. Episodes of mania and hypomania
- D. Panic disorder
- E. Agoraphobia
- F. Social phobia
- G. Obsessive compulsive disorder

- H. Post-traumatic stress disorder
- I. Alcohol use disorder / Excessive, harmful drinking
- J. Substance use disorder (Non-alcohol)
- K. Any psychotic disorder and mood disorders with psychotic symptoms
- L. Neurotic anorexia
- M. Neurotic bulimia
 - MB. Binge-eating disorder
- N. Generalised anxiety disorder
- O. The cause of the disturbance is/is not due to medication, psychoactive substances or organic CNS damage (as a diagnostic filter implemented in each MINI module)
- P. Antisocial personality disorder

The MINI interview can be carried out by specially trained interviewers, who do not have to be psychiatric professionals. In a study comparing a population-based diagnosis of psychiatric disorders between specially trained interviewers without medical training and interviewers with appropriate medical training, no significant differences were observed. The study concluded that the interviewer's background did not affect the correct use of the mental disorder measurement instruments and the diagnosis of mental disorders (Amstadter et al., 2010). In addition, the MINI interview has been used successfully in population studies in Latvia before.

Specific training was provided to the 56 interviewers involved in the study, during which the interviewers were educated about the aims and importance of the study, the prevalence and manifestation of mental disorders, and were specifically trained in the use of the MINI instrument. In total, 10 training sessions/lectures were organised under the guidance of leading

Latvian psychiatric specialists, one of which was led by the author of the MINI himself, Professor *David Sheehan*, during his visit to Latvia.

MINI copyright holders offer already linguistically validated questionnaires. Linguistic validation in languages other than English has been transferred by the MINI copyright holders to the MAPI Research Trust, 27 Rue de la Villette, 69003 Lyon, France. The rights to use the translated and validated versions of the latest version of MINI (7.0.2) were purchased from the copyright holder MAPI Research Trust.

1.2 Sampling method

The target population of the study was the adult population (i.e. over 18 years of age (inclusive)) in Latvia (including the territorially excluded, the poor, the unemployed, persons with disabilities (separate census and data analysis on these persons was not carried out, but the methodology of the study was designed in such a way that these persons could be included and represented in the study sample)).

Therefore, the target population size, according to the Central Statistical Office of the Republic of Latvia (CSO) data for the beginning of 2019 (the planning stage of the study), consisted of 1 561 155 people aged 18 and over (inclusive); In this context, the prevalence of mental disorders has been shown to differ significantly between gender groups (Weinberger et al., 2018; Whiteford et al., 2015) and age groups (Alonso et al., 2004; Vrublevska et al., 2017), the study population was sampled in **age and sex strata**.

Assuming a traditional confidence level (95 %) and margin of error (4–5 %), and assuming an expected prevalence of 50 % in the population (since the prevalence of many different traits is being studied, rather than a single trait), this is the first time a study of this type has been conducted in the country and the prevalence of mental health indicators in this target group is unknown,

The expected prevalence is traditionally chosen at this 50/50 level), the optimal sample size for a cross-sectional study with randomised stratified sampling was calculated to be a total of 3595 individuals (1798 women and 1797 men), while the minimum sample size required was: 2303 persons (1152 women and 1152 men).

A stratified multi-stage random sampling method (using the route method) was used to select the sample:

Step 1: Localities were selected according to region and level of urbanisation, ensuring appropriate proportions in the sample. From the list of all settlements in Latvia, the required number of survey points was determined by systematic probability sampling, using the population of the settlements as a measure of proportionality.

Step 2: The required number of respondents to be reached in each locality was determined by sampling the households selected according to a defined methodology. The number of sampling points in each locality was defined. It was assumed that one respondent per selected household would be interviewed.

Step 3: The interviewer designed the onward route according to the conditions of **the route method**. At the beginning of each route, the starting address (street, house and apartment number) was given. In urban areas, the address was given in the questionnaire. In municipalities, the starting address was chosen by the district coordinator – provided that the address had not been chosen as the starting address in any survey for at least one year. From the starting address, the subsequent choice of flats/houses was determined by the choice step. The choice step in the study was “2”, i.e. an interview had to be conducted in every second apartment/house.

Step 4: In each household selected by the route method, the interviewer selected one respondent according to a set methodology. The “Younger Male Principle” was used.

1.3 Reached sample, non-response

In the initial design, the objective was to secure a sample size of no less than 3500 valid interviews involving participants from the designated target group. Nonetheless, the progression of the Covid-19 pandemic led to the suspension of fieldwork after collecting 2687 valid qualitative interviews. While the anticipated sample size required for drawing comprehensive conclusions and making valid inferences to the target population was not attained, the minimum total sample size of 2303 individuals was successfully reached. In order to be able to adequately generalise the results and attribute them to the target population, weighting of the data have been used in the analysis of the data presented in the study. In order to achieve this sample size, interviewers visited a total of 14 506 addresses. After the first visit to technically accessible households, valid interviews were obtained from 44.9 % of the respondents, which corresponded to the target population of the study. The response rate of 2687 persons is considered adequate for a cross-sectional study using the sampling methodology described above. For example, the *2020 Health Behaviour among Latvian Adult Population Survey*, which used a similar recruitment methodology, achieved a response rate of 48.4 % (Centre for Disease Control and Prevention, 2020).

1.4 Description of the data collection process

The fieldwork was carried out between 25.11.2019 and 16.03.2020. One interview lasted on average 30.5 minutes. The fieldwork was carried out by 56 professional interviewers from TNS Latvia, who received training – they were specially trained and instructed to perform the work within the framework of the specific study, specifically trained in the use of the MINI instrument.

Upon arrival at the respondent's home, the interviewer informed the participant about the purpose of the study, the anonymity of the information obtained and the right to withdraw from the study. Before the interview, the interviewer obtained verbal consent from the participant to participate in the study.

1.5 Description of data quality control assurance

The fieldwork process ensured the quality of data collection, following the European Society for Opinion and Marketing Research (ESOMAR) guidelines. The data collection was carried out in accordance with the *European Society for Opinion and Marketing Research (ESOMAR)* market and social research codes and standards, as well as the global data collection standards of TNS Latvia.

During the fieldwork of the survey, SIA "TNS Latvia" regularly carried out quality control of the questionnaires (data) in order to prevent interviewer errors in time. TNS Latvia repeated telephone contacts and interviews with at least 10 % of respondents to check whether their socio-demographic characteristics and answers to selected questions on various topics were consistent with those recorded in the questionnaires. In total, 426 interviews were monitored.

1.6 Statistical data analysis

Data processing was carried out using the *International Business Machines Corporation's Statistical Package for the Social Sciences (IBM SPSS) Statistics* version 23.0. Descriptive statistical methods were used in this study: mean or median values for continuous variables, percentages for categorical variables and hierarchical multivariate logistic regression models separately for female and male populations. Results are presented using odds ratios (OR) with

95 % confidence intervals (CI). Results were considered statistically significant if the significance level (p) did not exceed 0.05. In order to adequately generalise the results to the study population, weighted (by sex, age, place of residence) indicators were used in the data analysis. **Thus, when comparing the different variables studied, the sum of the individual strata may not add up.**

2 Results

2.1 Characteristics of the study population

The final weighted sample included 2687 respondents (46.1 % (n = 1238) men and 53.9 % (n = 1449) women). The mean age of the participants was 49.9 years (standard deviation (SD) 18.2). The oldest participant was 96 years old. The modal age of the participants was 64 years and the median age was 49 years (interquartile range (IQR) 35–64). In order to adequately generalise the results to the study population, weighted (by sex, age, place of residence) indicators were used in the data analysis.

2.2 Adjustment of odds ratios for depression and generalised anxiety symptoms by basic sociodemographic characteristics

In the first stage of data analysis, binary logistic regression analysis was performed to support the need to analyse the associated factors of depression and generalised anxiety symptoms separately in the sex groups. Adjusted for all socio-demographic characteristics included in the analysis (n = 10) simultaneously, gender remains a statistically significant associated factor and the odds of clinically significant depressive symptoms are higher in women (vs. men, aOR1 1.54 (95 % CI 1.04–2.30), p = 0.03). Accordingly, in the second binary logistic regression analysis, all baseline sociodemographic groups were predicted to have generalised anxiety disorder symptoms. Similarly, when adjusted for all sociodemographic characteristics included in the analysis simultaneously, sex remained a statistically significant associated factor for generalised anxiety disorder symptoms: the odds of generalised anxiety disorder symptoms are higher in women (vs. men, aOR1 1.72 (95 % CI 1.03–2.86), p = 0.04). Therefore, further analysis of the study data and identification of clinically relevant factors associated with depression and generalised anxiety symptoms was performed separately for the sex groups.

2.3 Prevalence of clinically significant depressive symptoms in the general adult population of Latvia

According to *the PHQ-9*, 6.4 % (95 % CI 5.8–7.6) of study participants had clinically significant depressive symptoms. The prevalence of depressive symptoms is statistically significantly higher among women: 7.7 % (95 % CI 6.4–9.0) of women and 4.8 % (95 % CI 4.2–6.7) of men have clinically significant depressive symptoms, $p = 0.003$. The prevalence of depression increases with age: 5.3 % (95 % CI 4.2–6.9) in the 18–44 age group, 6.8 % (95 % CI 5.2–8.5) in the 45–64 age group and 7.9 % (95 % CI 6.3–10.0) in the 65+ age group, but the difference is not statistically significant ($p = 0.09$). Table 2.1 shows a more detailed prevalence of clinically significant depressive symptoms in all groups of independent variables analysed in this study.

Table 2.1

Point prevalence of clinically significant depressive symptoms in independent symptom groups

Independent variables	Among women		Among men		Total study population	
	n	%	n	%	n	%
Marital status						
Widow(-er)	36	10.5	5	10.0	41	10.4
Married but separated or divorced	19	7.7	11	7.6	30	7.7
Single	15	6.8	20	6.4	35	6.6
Married/ in a relationship	41	6.4	24	3.3	65	4.7
Higher education						
Primary/Incomplete Primary	10	26.3	1	5.9	11	20.0
Basic	9	6.6	16	9.4	25	8.2
Secondary/secondary professional	65	8.1	30	4.0	95	6.1
Higher	27	5.7	13	4.3	40	5.1
Income per month after tax and per family member						
Up to EUR 250	23	8.9	16	7.8	40	8.6
251–400 EUR	38	7.5	20	6.4	58	7.0
401–600 EUR	24	9.0	3	1.3	28	5.6
EUR 601 and over	16	6.5	9	3.1	24	4.5

Table 2.1 continued

Independent variables	Among women		Among men		Total study population	
	n	%	n	%	n	%
Personal income after tax of respondents						
Up to EUR 250	28	10.3	16	7.2	44	8.9
251–400 EUR	43	8.9	15	6.7	58	8.2
401–600 EUR	16	5.9	7	3.8	23	5.1
EUR 601 and over	22	6.3	19	3.7	41	4.8
Type of settlement						
Riga	45	9.5	23	5.3	67	7.4
City	34	6.3	13	3.1	47	5.0
Rural	33	7.5	24	6.1	57	6.8
Children under 18						
No minor children	79	8.5	50	5.7	129	7.1
1 minor child	22	8.6	7	3.8	29	6.6
2 minor children	6	3.2	4	3.1	10	3.2
3 or more minor children	4	5.3	0	0.0	4	3.2
Lifetime experience of tobacco and nicotine products						
Smoke occasionally or regularly	39	11.3	34	5.8	73	7.9
Rejected	10	5.7	9	3.6	19	4.5
Never smoked	63	6.8	16	3.9	79	5.9
Self-assessment of health						
Bad or rather bad	44	26.7	24	22.4	68	24.9
Average	48	8.3	28	6.3	76	7.4
Good and rather good	20	2.8	8	1.2	28	2.0
GP visits in the last year						
≥ 5 times	49	13.1	12	6.0	61	10.6
3–4 times	24	7.3	9	3.8	34	6.0
1–2 times	30	5.5	22	4.6	51	5.0
Not visited	8	3.9	17	5.2	25	4.7
Specialist visits in the last year						
≥ 5 times	33	13.9	15	11.1	48	12.8
3–4 times	25	10.4	3	2.4	28	7.7
1–2 times	24	4.5	18	5.0	42	4.7
Not visited	30	6.8	24	3.9	53	5.0

Table 2.1 continued

Independent variables	Among women		Among men		Total study population	
	n	%	n	%	n	%
Hospital admissions in the last year						
3 or more times	8	21.6	3	13.6	11	18.6
1–2 times	30	11.6	15	8.2	44	10.0
None	74	6.4	43	4.2	117	5.3
Ambulance calls in the last year						
3 or more times	7	20.0	1	7.1	8	16.3
1–2 times	27	16.2	12	10.4	39	13.8
None	77	6.2	47	4.2	125	5.3
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes	45	28.8	35	26.9	79	27.7
None	67	5.2	25	2.3	92	3.8
Alcohol use disorder in the last year identified by MINI						
Yes	6	10.0	25	8.5	31	8.8
None	106	7.6	35	3.7	141	6.0
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes	11	45.8	3	14.3	14	31.1
None	101	7.7	57	4.7	157	5.9
At least one anxiety disorder identified by MINI						
Yes	6	26.1	5	33.3	12	31.6
None	105	7.4	55	4.5	160	6.0
At least one eating disorder identified by MINI						
Yes	5	38.5	1	12.5	6	28.6
None	106	7.4	59	4.8	166	6.2
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes	13	14.9	6	7.8	19	11.6
None	99	7.3	54	4.7	153	6.1
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes	8	22.2	9	17.6	17	19.5
None	104	7.4	51	4.3	155	6.0
Antisocial personality disorder by MINI						
Yes	2	33.3	8	14.3	10	16.1
None	109	7.6	52	4.4	162	6.2
Generalized Anxiety Disorder on the GAD-7 scale						
Yes	44	61.1	24	72.7	68	64.8
None	68	4.9	36	3.0	103	4.0

In the data analysis of this study and for ease of understanding the results of the hierarchical multivariate analysis, the psychiatric disorders identified using the MINI interview were presented as follows:

- **“Suicidal ideation, self-harm and suicidal behaviour according to MINI results”**: the “B” question module “*Suicidal ideation, self-harm and suicidal behaviour*” revealed impairment in the last month before the interview;
- **“Alcohol use disorder in the last year identified by MINI”**: the “T” module “*Alcohol use disorders*” of the MINI identified a disorder in the last 12 months before the interview;
- **“Substance (non-alcohol) use disorders in the last year identified by MINI”**: the “*Psychoactive substance (non-alcohol) use disorders*” module identified a disorder in the last 12 months before the interview;
- **“At least one anxiety disorder identified by MINI”**: this group included respondents who were identified as having **at least one of the** following disorders in the MINI diagnostic interview modules: “*D: Panic disorder*” (at interview or in the last 12 months), “*E: Agoraphobia*” (at the time of the interview), “*F: Social phobia*” (in the last month before the interview), “*G: Obsessive-compulsive disorder*” (in the last month before the interview), “*H: Post-traumatic stress disorder*” (in the last month before the interview), “*N: Generalized anxiety disorder*” (in the last 6 months before the interview);
- **“At least one eating disorder identified by MINI”**: this group included respondents with **at least one of the** following eating disorders identified in the MINI diagnostic interview modules: “*L: Anorexia nervosa*” (in the last 3 months before the interview), “*M: Bulimia nervosa*” (in the last 3 months before the interview),

“*MB: Episodic impulsive overeating disorder*” (in the last 3 months before the interview);

- “*Any psychotic disorder during the interview or previously in life identified by MINI*”: “*Any psychotic disorders*” at the time of the interview or earlier in life, without specifying whether these were mood disorders with psychotic symptoms or isolated psychotic disorders, as defined by question module “K”.
- “*Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI*”: this group included respondents who, according to the module “*Manic and hypomanic episodes*” questions, had a manic episode during the interview or in earlier in life, and/or a hypomanic episode now or in the past, and/or hypomanic symptoms now or in the past;
- “*Antisocial personality disorder identified MINI*”: disorder identified in the “*Antisocial personality disorder*” module of interview.

2.4 Factors associated with clinically significant depressive symptoms (PHQ-9 \geq 10) in a female population

A hierarchical multivariable analysis including 3 logistic regression models was performed to further assess the potential associations of sociodemographic and health-related factors with clinically significant depressive symptoms (PHQ-9 \geq 10).

The first model analysed proximal factors, or factors theoretically more pathophysiologically related to depression. Recent genetic studies exploring the concept of *shared heritability* have found that unipolar depression correlates positively (although not always statistically significantly) with all psychiatric disorders tested (anorexia nervosa, attention deficit hyperactivity disorder,

schizophrenia, autism spectrum disorder, bipolar disorder, obsessive-compulsive disorder, anxiety disorders, etc.). A particularly strong genetic correlation was found for depression with anxiety disorders (Anttila et al., 2018). Another study has shown a strong genetic link between depression and disorders such as anxiety disorders, obesity and smoking. Each of these traits confers increased risk for the other traits in families, consistent with a positive genetic correlation between these phenotypes (Wang, Snieder and Hartman, 2022). Given this *genetic overlap* in risk genes, all psychiatric disorders detected in the study (by the MINI or GAD-7 scales) were included in the group of proximal factors. The self-rated health status of the respondents was also included in the proximal factors group, given that previous Latvian and global studies have shown a strong association between depression and self-rated health (Vrublevska et al., 2017a; Rantanen et al., 2019).

The second model included intermediate-level factors: basic sociodemographic factors that are more frequently mentioned as important risk factors for depression in the international literature. The group of mid-level factors included: age, , employment, marital status, education level, personal income level and average income per family member.

In the third model, the following distal factors were matched: type of settlement, presence of underage children, smoking experience and frequency of use of different health services (GP and specialist visits during the year, ambulance calls and hospitalisations in the last year).

In each subsequent model, only those independent characteristics that showed a statistically significant association with clinically significant depressive symptoms in terms of odds were retained.

The results of the univariate analysis in the female population are shown in Table 2.2. After adjustment for all proximal factors in the hierarchical analysis, in the *first model*, suicidality identified by the MINI, substance (non-alcohol) use

disorders in the past identified by the MINI, eating disorders by MINI, generalised anxiety disorder as measured by the GAD-7, and poor and average self-rated health remained statistically significant associations with clinically significant depressive symptoms in the female population (see Table 2.2).

Table 2.2

Factors associated with clinically significant depressive symptoms (PHQ-9 \geq 10) in female population in univariate analysis and in the first model of hierarchical analysis ^{a, b}

Independent variables	OR^a	95 % CI	p	aOR1^b	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	7.36	4.81–11.27	< 0.001	3.92	2.27–6.76	< 0.001
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	1.33	0.56–3.19	0.52	0.62	0.19–2.05	0.43
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	10.50	4.58–24.07	< 0.001	5.83	1.94–17.53	0.002
At least one anxiety disorder identified by MINI						
Yes vs. No	4.85	1.92–12.25	0.001	0.59	0.14–2.52	0.48
At least one eating disorder identified by MINI						
Yes vs. No	8.10	2.61–25.13	< 0.001	7.90	1.55–40.30	0.01
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes vs. No	2.20	1.17–4.12	0.01	1.54	0.69–3.47	0.29
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	3.62	1.61–8.15	0.002	0.92	0.25–3.37	0.90
Antisocial personality disorder identified by MINI						
Yes vs. No	5.98	1.10–32.36	0.04	8.08	0.99–66.02	0.05
Generalized Anxiety Disorder identified by GAD-7						
Me vs. No	30.28	17.75–51.68	< 0.001	20.76	10.81–39.88	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good and rather Good	12.21	6.96–21.43	< 0.001	9.20	4.73–17.90	< 0.001
Average vs. Good and rather good	3.06	1.80–5.22	< 0.001	3.25	1.79–5.91	< 0.001

Table 2.2 continued

Independent variables	OR ^a	95 % CI	p	aOR1 ^b	95 % CI	p
Mid-level factors						
Age						
45–64 vs. 18–44	1.57	0.96–2.57	0.07	–	–	–
≥ 65 vs. 18–44	1.55	0.96–2.51	0.07	–	–	–
Ethnicity						
Russian vs. Latvian	1.29	0.84–1.98	0.25	–	–	–
Other vs. Latvian	2.21	1.26–3.89	0.006	–	–	–
Employment						
Economically inactive vs. employed person	1.84	1.02–3.33	0.04	–	–	–
Unemployed vs. employed person	1.92	0.91–4.04	0.08	–	–	–
Disabled person, vs. employed person	3.28	1.39–7.71	0.006	–	–	–
Non-employed pensioner vs. employed person	1.70	1.07–2.70	0.03	–	–	–
Marital status						
Widower vs. Married/In a Relationship	1.70	1.07–2.72	0.03	–	–	–
Married but separated/divorced vs. Married/ in a partnership	1.20	0.68–2.11	0.53	–	–	–
Single vs. married/in partnership	1.08	0.59–1.97	0.81	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	2.10	1.14–3.86	0.02	–	–	–
Secondary/ Professional Secondary vs. Higher	1.47	0.92–2.34	0.10	–	–	–
Income per month after tax and per family member						
Up to €250 vs. EUR 601 and more	1.46	0.75–2.85	0.26	–	–	–
251–400 EUR vs. 601 EUR and more	1.19	0.65–2.19	0.57	–	–	–
401–600 601 EUR and over	1.48	0.77–2.87	0.24	–	–	–

Table 2.2 continued

Independent variable	OR ^a	95 % CI	p	aOR1 ^b	95 % CI	p
Mid-level factors						
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	1.64	0.91–2.93	0.10	–	–	–
251–400 EUR vs. 601 EUR and more	1.42	0.84–2.41	0.19	–	–	–
401–600 601 EUR and over	0.90	0.46–1.76	0.77	–	–	–
Distal factors						
Type of settlement						
Riga vs. Rural	1.29	0.81–2.06	0.28	–	–	–
City vs. Rural	0.83	0.50–1.36	0.46	–	–	–
Children under 18						
2 and more vs. no minor children	0.45	0.23–0.86	0.02	–	–	–
1 child vs. no minor children	1.01	0.62–1.66	0.96	–	–	–
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	1.73	1.14–2.64	0.01	–	–	–
Rejection vs. Never smoked	0.83	0.42–1.65	0.59	–	–	–
GP visits in the last year						
≥ 5 times vs. not visited	3.48	1.64–7.38	0.001	–	–	–
3–4 times a year vs. not visited	1.85	0.83–4.12	0.13	–	–	–
1–2 times a year vs. not visited	1.33	0.61–2.90	0.48	–	–	–
Specialist visits in the last year						
≥ 5 times vs. not visited	2.26	1.34–3.81	0.002	–	–	–
3–4 times a year vs. not visited	1.62	0.93–2.83	0.09	–	–	–
1–2 times a year vs. not visited	0.66	0.38–1.15	0.14	–	–	–
Hospital admissions in the last year						
3 or more times vs. none	3.98	1.75–9.06	0.001	–	–	–
1–2 times vs. none	1.90	1.21–2.98	0.005	–	–	–
Ambulance calls in the last year						
3 or more times vs. none	4.07	1.75–9.47	0.001	–	–	–
1–2 times vs. none	2.91	1.81–4.66	< 0.001	–	–	–

^a OR: unadjusted odds ratio; ^b aOR1: odds ratio in the first model, adjusted by proximal factors

In the final (third) model of the hierarchical analysis, after adjustment for proximal, intermediate and distal factors (see Table 2.3), clinically significant depressive symptoms in the female population were associated with six proximal factors: suicidal ideation, self-harm and suicidal behaviour according to MINI (vs. no such disorders, aOR 3.86 (95 % CI 2.15–6.95), $p < 0.001$), Substance (non-alcohol) Use Disorders in the last year identified by MINI (vs. no such disorder, aOR 6.19 (95 % CI 1.88–20.38), $p = 0.003$), at least one eating disorder identified by MINI (vs. no eating disorder, aOR 11.24 (95 % CI 1.98–63.76), $p = 0.006$), generalised anxiety disorder identified by GAD-7 scale (vs. no generalised anxiety disorder, aOR 24.25 (95 % CI 11.91–49.39), $p < 0.001$). Also poor and rather poor self-rated health (vs. good and rather good, aOR 7.38 (95 % CI 3.31–16.47), $p < 0.001$) and average self-rated health (vs. good and rather good, aOR 3.10 (95 % CI 1.57–6.11), $p < 0.001$) maintained their statistically significant association with a higher odds ratio for depression among women. Among the mid-level factors, in the third model of the hierarchical analysis, belonging to the ethnic minority remained significantly associated with the highest odds of clinically significant depression (vs. Latvian, aOR 3.06 (95 % CI 1.49–6.28), $p = 0.002$) and female economically inactive status (vs. employed, aOR 4.01 (95 % CI 1.50–10.71), $p = 0.006$). Among the distal factors, hospitalisation in the last year with a frequency of 1–2 times was statistically significantly associated with the highest odds ratio of clinically significant depressive symptomatology (vs. none, aOR 2.10 (95 % CI 1.06–4.17), $p = 0.03$). As well, in the final model of analysis, women with 2 or more minor children had statistically significantly lower odds of suffering from depression (vs. no minor children, aOR 0.35 (95 % CI 0.12–0.98), $p = 0.04$).

Table 2.3

**Factors associated with clinically significant depressive symptoms
(PHQ-9 \geq 10) in female population in the second and third models
of hierarchical analysis^{c, d}**

Independent variables	aOR2 ^c	95 % CI	p	aOR3 ^d	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	3.48	1.87–6.48	< 0.001	3.86	2.15–6.95	< 0.001
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	–	–	–	–	–	–
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	6.12	1.91–19.63	0.002	6.19	1.88–20.38	0.003
At least one anxiety disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–
At least one eating disorder identified by MINI						
Yes vs. No	9.73	1.79–52.91	0.008	11.24	1.98–63.76	0.006
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Antisocial personality disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–
Generalized Anxiety Disorder identified by GAD-7 scale						
Me vs. No	26.25	12.92–53.33	< 0.001	24.25	11.91–49.39	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good	8.39	3.66–19.24	< 0.001	7.38	3.31–16.47	< 0.001
Average vs. Good	2.82	1.41–5.65	0.003	3.10	1.57–6.11	0.001
Mid-level factors						
Age						
45–64 vs. 18–44	1.06	0.31–3.61	0.92	–	–	–
\geq 65 vs. 18–44	1.32	0.62–2.84	0.47	–	–	–
Ethnicity						
Russian vs. Latvian	1.40	0.80–2.46	0.24	1.25	0.69–2.27	0.45
Other vs. Latvian	2.39	1.09–5.23	0.03	3.06	1.49–6.28	0.002

Table 2.3 continued

Independent variable	aOR2 ^c	95 % CI	p	aOR3 ^d	95 % CI	p
Employment						
Economically inactive vs. employed person	3.55	1.32–9.53	0.01	4.01	1.50–10.71	0.006
Unemployed vs. employed person	1.89	0.61–5.87	0.27	1.60	0.53–4.83	0.41
Disabled person vs. employed person	1.30	0.34–4.89	0.70	1.17	0.31–4.37	0.81
Non-employed pensioner vs. employed person	1.60	0.54–4.75	0.40	1.32	0.59–2.97	0.50
Marital status						
Widower vs. Married/In a Relationship	1.48	0.66–3.32	0.34	–	–	–
Married but separated/divorced vs. Married/ in a partnership	1.09	0.49–2.43	0.83	–	–	–
Single vs. married/in partnership	1.38	0.62–3.09	0.43	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	1.24	0.48–3.18	0.66	–	–	–
Secondary/Professional secondary vs. Higher	1.61	0.83–3.13	0.16	–	–	–
Income per month after tax per family member						
Up to €250 vs. EUR 601 and more	0.80	0.28–2.30	0.68	–	–	–
251–400 EUR vs. 601 EUR and more	0.59	0.22–1.61	0.30	–	–	–
401–600 601 EUR and over	1.72	0.69–4.28	0.25	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	0.46	0.15–1.44	0.18	0.46	0.18–1.18	0.10
251–400 EUR vs. 601 EUR and more	0.56	0.20–1.52	0.25	0.58	0.25–1.31	0.19
401–600 601 EUR and over	0.37	0.14–0.99	0.05	0.66	0.29–1.53	0.34
Distal factors						
Type of settlement						
Riga vs. Rural	–	–	–	1.47	0.75–2.87	0.26
City vs. Rural	–	–	–	0.89	0.46–1.72	0.73

Table 2.3 continued

Independent variable	aOR2 ^c	95 % CI	p	aOR3 ^d	95 % CI	p
Distal factors						
Children under 18						
2 and more vs. no minor children	–	–	–	0.35	0.12–0.98	0.04
1 child vs. no minor children	–	–	–	0.80	0.38–1.70	0.56
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	–	–	–	1.74	0.95–3.20	0.07
Rejection vs. Never smoked	–	–	–	0.52	0.20–1.35	0.18
GP visits in the last year						
≥ 5 times vs. not visited	–	–	–	2.69	0.94–7.69	0.06
3–4 times a year vs. not visited	–	–	–	1.77	0.61–5.18	0.29
1–2 times a year vs. not visited	–	–	–	2.44	0.88–6.76	0.08
Specialist visits in the last year						
≥ 5 times vs. not visited	–	–	–	0.90	0.41–1.95	0.79
3–4 times a year vs. not visited	–	–	–	0.83	0.38–1.81	0.64
1–2 times a year vs. not visited	–	–	–	0.60	0.29–1.21	0.15
Hospital admissions in the last year						
3 or more times vs. none	–	–	–	2.21	0.68–7.12	0.19
1–2 times vs. none	–	–	–	0.76	0.38–1.51	0.43
NMPD calls in the last year						
3 or more times vs. none	–	–	–	0.87	0.24–3.15	0.83
1–2 times vs. none	–	–	–	2.10	1.06–4.17	0.03

^c aOR2: odds ratio in the second model, adjusted by proximal and intermediate factors;

^d aOR3: odds ratio in the third model, adjusted for proximal, intermediate and distal factors

2.5 Factors associated with clinically significant depressive symptoms (PHQ-9 ≥ 10) in a male population

The results of the univariate analysis in the male population are shown in Table 2.4. After adjusting by all proximal factors in the hierarchical analysis, in the first model, suicidality identified by the MINI, antisocial personality disorder,

generalised anxiety disorder identified by the GAD-7 scale, and poor and average self-rated health remained statistically significant associations with clinically significant depressive symptoms in the male population (see Table 2.4).

Table 2.4

Factors associated with clinically significant depressive symptoms (PHQ-9 \geq 10) in male population in univariate analysis and in the first model of hierarchical analysis ^{a, b}

Independent variables	OR^a	95 % CI	p	aOR^b	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	15.54	8.94–27.02	< 0.001	4.59	2.18–9.63	< 0.001
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	2.38	1.40–4.06	0.001	1.43	0.70–2.91	0.32
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	4.01	1.22–13.16	0.02	1.22	0.19–7.71	0.84
At least one anxiety disorder identified by MINI						
Yes vs. No	11.81	3.95–35.31	< 0.001	1.39	0.25–7.87	0.71
At least one eating disorder identified by MINI						
Yes vs. No	2.38	0.24–23.19	0.45	0.95	0.03–27.97	0.98
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes vs. No	1.72	0.72–4.14	0.22	0.84	0.21–3.33	0.80
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	4.49	2.05–9.85	< 0.001	3.22	0.97–10.68	0.05
Antisocial personality disorder identified by MINI						
Yes vs. No	3.57	1.60–7.94	0.002	5.62	2.02–15.64	0.001
Generalized Anxiety Disorder identified by GAD-7 scale						
Me vs. No	88.51	38.52–203.38	< 0.001	30.26	10.02–91.42	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good and rather good	25.23	10.89–58.45	< 0.001	21.02	7.65–57.75	< 0.001
Average vs. Good and rather good	5.95	2.67–13.28	< 0.001	6.36	2.52–16.00	< 0.001

Table 2.4 continued

Independent variables	OR ^a	95 % CI	p	aOR ^b	95 % CI	p
Mid-level factors						
Age						
45–64 vs. 18–44	0.93	0.51–1.68	0.81	–	–	–
≥ 65 vs. 18–44	1.25	0.63–2.48	0.52	–	–	–
Ethnicity						
Russian vs. Latvian	0.93	0.53–1.63	0.80	–	–	–
Other vs. Latvian	0.56	0.17–1.91	0.36	–	–	–
Employment						
Economically inactive vs. employed person	1.34	0.43–4.20	0.61	–	–	–
Unemployed vs. employed person	2.33	1.09–4.99	0.03	–	–	–
Disabled person vs. employed person	2.23	0.82–6.09	0.12	–	–	–
Non-employed pensioner vs. employed person	1.51	0.78–2.94	0.22	–	–	–
Marital status						
Widower vs. married/in partnership	3.28	1.19–9.01	0.02	–	–	–
Married but separated/divorced vs. Married/ in a partnership	2.56	1.24–5.32	0.01	–	–	–
Single vs. married/in partnership	2.02	1.09–3.72	0.02	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	2.17	1.02–4.58	0.04	–	–	–
Secondary / secondary Professional vs. Higher	0.93	0.48–1.81	0.84	–	–	–
Income per month after tax and per family member						
Up to €250 vs. EUR 601 and more	2.82	1.21–6.59	0.02	–	–	–
251–400 EUR vs. 601 EUR and more	2.27	1.003–5.13	0.05	–	–	–
EUR 401–600 vs. 601 EUR and more	0.49	1.14–1.74	0.27	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	2.06	1.04–4.07	0.04	–	–	–
251–400 EUR vs. 601 EUR and more	1.89	0.94–3.79	0.07	–	–	–
EUR 401–600 vs. 601 EUR and more	1.01	0.42–2.47	0.98	–	–	–

Table 2.4 continued

Independent variables	OR ^a	95 % CI	p	aOR ^b	95 % CI	p
Distal factors						
Type of settlement						
Riga vs. Rural	0.85	0.47–1.54	0.60	–	–	–
City vs. Rural	0.49	0.25–0.98	0.04	–	–	–
Children under 18						
2 and more vs. no minor children	0.35	0.12–1.03	0.06	–	–	–
1 child vs. no minor children	0.64	0.28–1.45	0.28	–	–	–
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	1.50	0.82–2.74	0.19	–	–	–
Rejection vs. Never smoked	0.94	0.42–2.14	0.89	–	–	–
GP visits in the last year						
≥ 5 times vs. not visited	1.17	0.55–2.52	0.68	–	–	–
3–4 times a year vs. not visited	0.76	0.33–1.72	0.51	–	–	–
1–2 times a year vs. not visited	0.89	0.46–1.71	0.72	–	–	–
Specialist visits in the last year						
≥ 5 times vs. not visited	3.05	1.55–6.01	0.001	–	–	–
3–4 times a year vs. not visited	0.70	0.22–2.18	0.54	–	–	–
1–2 times a year vs. not visited	1.29	0.69–2.41	0.43	–	–	–
Hospital admissions in the last year						
3 or more times vs. none	3.32	0.89–12.41	0.07	–	–	–
1–2 times vs. none	2.03	1.10–3.76	0.02	–	–	–
Ambulance calls in the last year						
3 or more times vs. none	0.85	0.05–14.23	0.91	–	–	–
1–2 times vs. none	2.61	1.34–5.07	0.005	–	–	–

^a OR: unadjusted odds ratio; ^b aOR1: odds ratio in the first model, adjusted by proximal factors

In the final model of the hierarchical analysis (see Table 2.5), clinically significant depressive symptoms in the male population were statistically significantly associated with five proximal factors: suicidal ideation, self-harm

and suicidal behaviour according to the MINI results (vs. no these disorders, aOR 5.56 (95 % CI 2.51–12.34), $p < 0.001$), antisocial personality disorder identified by MINI (vs. no such disorder, aOR 7.89 (95 % CI 2.63–23.62), $p < 0.001$), and generalised anxiety disorder on the GAD-7 scale (vs. no generalised anxiety disorder, aOR 52.29 (95 % CI 15.84–172.66), $p < 0.001$). Also poor/rather poor self-rated health (vs. good and rather good, aOR 29.76 (95 % CI 9.74–90.91), $p < 0.001$) and average self-rated health (vs. good and rather good, aOR 7.53 (95 % CI 2.76–20.56), $p < 0.001$) maintained their statistically significant association with a higher odds ratio of depression among men. Among the intermediate-level factors, none retained a statistically significant association with higher odds of clinically significant depression in the third model of the hierarchical analysis. Among the distal factors, living in urban areas of Latvia was statistically significantly associated with lower odds of clinically significant depressive symptoms (vs. rural areas, aOR 0.25 (95 % CI 0.09–0.67), $p = 0.006$).

Table 2.5

**Factors associated with clinically significant depressive symptoms
(PHQ-9 \geq 10) in male population in models 2 and 3
of hierarchical analysis^{c, d}**

Independent variables	OR2 ^c	95 % CI	p	aOR3 ^d	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	7.59	3.70–15.57	< 0.001	5.56	2.51–12.34	< 0.001
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	–	–	–	–	–	–
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	–	–	–	–	–	–
At least one anxiety disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–
At least one eating disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–

Table 2.5 continued

Independent variables	OR2^c	95 % CI	p	aOR3^d	95 % CI	p
Proximal factors						
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Antisocial personality disorder identified by MINI						
Yes vs. No	7.28	3.02–17.52	< 0.001	7.89	2.63–23.62	< 0.001
Generalized Anxiety Disorder identified by GAD-7 scale						
Me vs. No	Not possible to calculate			52.29	15.84–172.66	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good and rather good	19.54	6.96–54.86	< 0.001	29.76	9.74–90.91	< 0.001
Average vs. Good and rather good	1.81	0.75–4.36	0.19	7.53	2.76–20.56	< 0.001
Mid-level factors						
Age						
45–64 vs. 18–44	0.83	0.31–2.19	0.70	–	–	–
≥ 65 vs. 18–44	0.65	0.10–4.34	0.65	–	–	–
Ethnicity						
Russian vs. Latvian	0.67	0.33–1.33	0.25	–	–	–
Other vs. Latvian	0.34	0.10–1.20	0.09	–	–	–
Employment						
Economically inactive vs. employed person	1.41	0.27–7.38	0.69	–	–	–
Unemployed vs. employed person	0.98	0.25–3.75	0.97	–	–	–
Disabled person vs. employed person	0.39	0.09–1.65	0.20	–	–	–
Non-employed pensioner vs. employed person	1.65	0.31–8.75	0.56	–	–	–

Table 2.5 continued

Independent variables	OR2 ^c	95 % CI	p	aOR3 ^d	95 % CI	p
Mid-level factors						
Marital status						
Widower vs. married/in partnership	2.23	0.76–6.54	0.14	–	–	–
Married but separated/divorced vs. Married/ in a partnership	1.05	0.40–2.74	0.93	–	–	–
Single vs. married/in partnership	1.18	0.48–2.86	0.72	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	1.81	0.71–4.60	0.21	–	–	–
Secondary/Professional secondary vs. Higher	0.79	0.36–1.76	0.57	–	–	–
Income per month after tax per family member						
Up to €250 vs. EUR 601 and more	1.32	0.33–5.27	0.70	–	–	–
251–400 EUR vs. 601 EUR and more	1.11	0.34–3.66	0.86	–	–	–
EUR 401–600 vs. 601 EUR and more	1.05	0.32–3.39	0.94	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	0.88	0.21–3.72	0.86	–	–	–
251–400 EUR vs. 601 EUR and more	0.94	0.26–3.45	0.93	–	–	–
EUR 401–600 vs. 601 EUR and more	1.04	0.31–3.44	0.95	–	–	–
Distal factors						
Type of settlement						
Riga vs. Rural	–	–	–	0.92	0.41–2.09	0.85
City vs. Rural	–	–	–	0.25	0.09–0.67	0.006
Children under 18						
2 and more vs. no minor children	–	–	–	0.20	0.03–1.14	0.07
1 child vs. no minor children	–	–	–	0.97	0.33–2.87	0.96

Table 2.5 continued

Independent variables	OR2 ^c	95 % CI	p	aOR3 ^d	95 % CI	p
Distal factors						
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	–	–	–	0.58	0.24–1.40	0.23
Rejection vs. Never smoked	–	–	–	0.66	0.23–1.87	0.43
GP visits in the last year						
≥ 5 times vs. not visited	–	–	–	0.83	0.23–2.93	0.77
3–4 times a year vs. not visited	–	–	–	0.53	0.14–1.92	0.33
1–2 times a year vs. not visited	–	–	–	1.54	0.58–4.08	0.38
Specialist visits in the last year						
≥ 5 times vs. not visited	–	–	–	1.64	0.53–5.05	0.39
3–4 times a year vs. not visited	–	–	–	0.30	0.04–1.63	0.15
1–2 times a year vs. not visited	–	–	–	1.19	0.50–2.85	0.70
Hospital admissions in the last year						
3 or more times vs. none	–	–	–	2.56	0.34–19.00	0.36
1–2 times vs. none	–	–	–	0.84	0.30–2.40	0.75
Ambulance calls in the last year						
3 or more times vs. none	–	–	–	0.41	0.02–10.01	0.58
1–2 times vs. none	–	–	–	1.71	0.55–5.32	0.35

^c aOR2: odds ratio in the second model, adjusted by proximal and intermediate factors;

^d aOR3: odds ratio in the third model, adjusted for proximal, intermediate and distal factors

2.6 Prevalence of generalised anxiety disorder (GAD-7 ≥ 10) in the general Latvian adult population

The prevalence of symptoms of generalised anxiety disorder according to the GAD-7 (≥ 10 points) in the Latvian population was 3.9 % (95 % CI 3.2–4.6). The point prevalence of symptoms of generalised anxiety disorder is statistically significantly higher among women (4.9 % (95 % CI 3.8–5.9)) than among men (2.7 % (95 % CI 2.0–3.8)), $p = 0.004$. No statistically significant difference was found between age groups ($p = 0.6$). The detailed prevalence of generalised

anxiety symptoms in all independent trait groups analysed in this study is presented in Table 2.6.

Table 2.6

**Prevalence of the generalized anxiety disorder symptom score
in sex and independent trait groups**

Independent variables	Among women		Among men		Total for both sexes	
	n	%	n	%	n	%
Age						
18–44 y.o.	30	5.5	18	3.0	48	4.2
45–64 y.o.	24	5.0	12	2.8	36	3.9
65 g.v. and older	17	4.0	3	1.4	21	3.3
Ethnicity						
Latvian	39	4.6	20	2.7	9	3.7
Russian	26	5.5	11	2.7	37	4.2
Cite	6	4.4	3	3.1	59	3.9
Employment						
Economically inactive (on parental leave, unpaid worker in a family business)	9	4.9	2	2.9	11	4.3
Unemployed	8	8.2	5	4.5	14	6.7
Disabled person	4	8.5	4	6.8	8	7.6
Non-employed pensioner	17	3.8	2	0.8	19	2.7
Employed person	34	5.1	19	2.5	53	3.7
Marital status						
Widow(er)	17	5.0	1	2.0	18	4.6
Married but separated/divorced	14	5.7	7	4.9	21	5.4
Single	11	4.9	11	3.5	22	4.1
Married/ in a relationship	30	4.7	14	1.9	44	3.2
Higher education						
Primary/Incomplete Primary	7	18.4	0	0.0	7	12.7
Basic	8	5.8	7	4.1	14	4.6
Secondary/Professional secondary	36	4.5	16	2.1	52	3.4
Higher	21	4.4	11	3.6	32	4.1
Income per month after tax per family member						
Up to EUR 250	14	5.4	10	4.8	24	5.2
251–400 EUR	23	4.5	12	3.8	35	4.3
401–600 EUR	17	6.3	0	0.0	17	3.4
EUR 601 and over	10	4.0	5	1.7	15	2.8

Table 2.6 continued

Independent variables	Among women		Among men		Total for both sexes	
	n	%	n	%	n	%
Personal income after tax of respondents						
Up to EUR 250	17	6.3	10	4.5	27	5.5
251–400 EUR	27	5.6	5	2.2	32	4.5
401–600 EUR	10	3.7	3	1.6	14	3.1
EUR 601 and over	16	4.6	13	2.5	29	3.4
Type of settlement						
Riga	25	5.3	12	2.8	37	4.1
City	25	4.7	8	1.9	33	3.5
Rural	21	4.8	14	3.5	35	4.2
Children under 18						
No minor children	39	4.2	24	2.7	63	3.5
1 minor child	24	9.4	5	2.7	29	6.6
2 minor children	6	3.2	4	3.1	10	3.2
3 or more minor children	3	3.9	0	0.0	3	2.4
Lifetime experience of tobacco and nicotine products						
Smoke occasionally or regularly	30	8.7	24	4.1	54	5.8
Rejected	9	5.1	4	1.6	13	3.1
Never smoked	33	3.6	6	1.5	39	2.9
Self-assessment of health						
Bad or quite bad	23	13.9	12	11.2	35	12.9
Medium	29	5.0	15	3.4	44	4.3
Good and quite good	19	2.7	6	0.9	26	1.9
GP visits in the last year						
≥ 5 times	28	7.5	2	1.0	30	5.2
3–4 times	21	6.4	10	4.2	31	5.5
1–2 times	17	3.1	8	1.7	25	2.5
Not visited	6	2.9	13	4.0	19	3.6
Specialist visits in the last year						
≥ 5 times	21	8.8	9	6.7	30	8.0
3–4 times	23	9.6	2	1.6	25	6.8
1–2 times	15	2.8	8	2.2	23	2.6
Not visited	12	2.7	14	2.3	26	2.5
Hospital admissions in the last year						
3 or more times	3	8.1	0	0.0	3	5.2
1–2 times	25	9.7	11	6.1	37	8.4
None	43	3.7	22	2.1	65	3.0

Table 2.6 continued

Independent variables	Among women		Among men		Total for both sexes	
	n	%	n	%	n	%
NMPD calls in the last year						
3 or more times	6	17.1	0	0.0	6	12.2
1–2 times	16	9.6	4	3.5	20	7.1
None	50	4.0	29	2.6	79	3.4
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes	30	19.4	26	20.0	56	19.6
None	41	3.2	8	0.7	49	2.0
Alcohol use disorder in the last year identified by MINI						
Yes	5	8.3	17	5.8	22	6.2
None	67	4.8	17	1.8	83	3.6
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes	6	25.0	3	14.3	9	20.0
None	66	4.6	31	2.5	96	3.6
Episode of major depression during the interview or earlier in life identified by MINI						
Yes	23	18.1	12	18.5	35	18.2
None	48	3.6	22	1.9	70	2.8
At least one eating disorder identified by MINI						
Yes	2	15.4	1	12.5	3	14.3
None	69	4.8	33	2.7	102	3.8
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes	12	13.8	3	3.9	15	9.1
None	60	4.4	31	2.7	90	3.6
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes	11	31.4	4	7.8	16	18.4
None	60	4.2	29	2.4	89	3.4
Antisocial personality disorder by MINI						
Yes	1	16.7	0	0.0	1	1.6
None	71	4.9	34	2.9	104	4.0
Clinically significant symptoms of depression on the PHQ-9						
Yes	44	39.3	24	40.0	68	39.8
None	28	2.1	9	0.8	37	1.5

2.7 Associated factors of generalised anxiety disorder symptoms (GAD-7 \geq 10) in female population

A hierarchical multivariable analysis including 3 logistic regression models was performed to assess in more detail the possible associations of sociodemographic and health-related factors with generalised anxiety disorder symptoms (GAD-7 \geq 10).

The first model analysed proximal factors, or factors that have a theoretically pathophysiologically stronger link to generalised anxiety. Given the previously mentioned concept of *shared heritability for anxiety disorders* with other psychiatric disorders (Anttila et al., 2018; Wang, Snieder and Hartman, 2022) and the overlap of risk genes, all psychiatric disorders detected in the study (by MINI interview or PHQ-9 scale) were included in the group of proximal factors. Self-rated health was also included in the proximal factors group, taking into account the demonstrated association of both anxiety disorders and depression with self-rated health (Kjeldsberg et al., 2022).

The second model included intermediate-level factors: basic sociodemographic factors, which are more frequently cited in the international literature as significant risk factors for generalised anxiety disorder. The group of mid-level factors included: age, employment, marital status, education level, personal income level and sum of income per family member. Given that among men with diagnosed generalised anxiety disorder there were no respondents who answered that their family had a monthly income per family member of “€ 401–600”, the income per family member groups were defined differently in the following analysis compared to the regression analysis on depressive symptoms. The groups for this independent variable were defined as “up to 250 €/month”, “251–400 €/month” and “401 €/month and more”.

In the third model, the following distal factors were matched: type of settlement, presence of underage children, smoking experience and frequency of use of different health services (GP and specialist visits during the year, ambulance calls and hospital admissions in the last year). Similarly, among men with generalised anxiety symptoms, there were no respondents with 3 or more hospitalisations in a year and this variable was also grouped differently from the grouping for the regression analysis of depressive symptoms. Accordingly, “not hospitalized once during the year”, “1 time per year”, “2 or more times per year” in regression analysis for both women and men. However, when analysing the frequency of ambulance calls during the year, it was found that among men there were also no respondents with 3 or more calls, so this independent variable was grouped differently (“No ambulance calls” vs. “1 or more times”) in the regression analysis for men only, since among women it was the frequency of 3 or more ambulance calls per year that stood out as statistically significant in the analysis. In each subsequent model, only those independent characteristics that showed a statistically significant association with clinically significant depressive symptoms, expressed as odds ratios, were retained.

The results of the univariate analysis are presented in Table 2.7. After adjusting for all independent characteristics included in the group of proximal factors, suicidal ideation and behaviour identified by MINI, syndromes or symptoms of abnormally elevated mood at interview or earlier in life on the MINI, and clinically significant depressive symptoms on the PHQ-9 scale maintained statistically significant associations with the highest odds ratios of generalised anxiety disorder in the female population (see Table 2.7).

Table 2.7

**Factors associated with generalised anxiety disorder symptoms
(GAD-7 \geq 10) in a female population in univariate and
hierarchical analyses in the first model ^{a, b}**

Independent variables	OR ^a	95 % CI	p	aOR ^b	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	7.32	4.42–12.12	< 0.001	2.06	1.08–3.93	0.03
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	1.73	0.66–4.55	0.26	0.88	0.26–2.98	0.83
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	6.69	2.56–17.52	< 0.001	2.13	0.65–7.00	0.21
Episode of major depression during the interview or earlier in life identified by MINI						
Yes vs. No	5.87	3.45–10.02	< 0.001	1.61	0.80–3.20	0.18
At least one eating disorder identified by MINI						
Yes vs. No	4.05	0.93–17.58	0.06	1.07	1.18–6.47	0.94
Any psychotic disorder during the interview or previously in life identified by MINI						
Yes vs. No	3.45	1.77–6.71	< 0.001	2.24	0.96–5.20	0.06
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	10.56	5.00–22.32	< 0.001	7.24	2.59–20.27	< 0.001
Antisocial personality disorder identified by MINI						
Yes vs. No	3.09	0.31–30.92	0.34	0.71	0.05–9.40	0.80
Clinically significant symptoms of depression on the PHQ-9 scale						
Me vs. No	30.28	17.75–51.68	< 0.001	17.66	9.22–33.84	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good or rather good	5.79	3.09–10.87	< 0.001	1.66	0.75–3.67	0.21
Medium vs. Good or rather good	1.85	1.03–3.32	0.04	1.11	0.56–2.21	0.76
Mid-level factors						
Age						
45–64 vs. 18–44	0.89	0.51–1.54	0.68	–	–	–
\geq 65 vs. 18–44	0.72	0.39–1.32	0.29	–	–	–
Ethnicity						
Russian vs. Latvian	1.20	0.72–1.99	0.48	–	–	–
Other vs. Latvian	0.91	0.37–2.21	0.84	–	–	–

Table 2.7 continued

Independent variables	OR^a	95 % CI	p	aOR^b	95 % CI	p
Mid-level factors						
Employment						
Economically inactive vs. employed person	0.97	0.46–2.06	0.94	–	–	–
Unemployed vs. employed person	1.71	0.77–3.80	0.19	–	–	–
Disabled person vs. employed person	1.72	0.58–5.14	0.33	–	–	–
Non-employed pensioner vs. employed person	0.72	0.40–1.31	0.29	–	–	–
Marital status						
Widower vs. Married/In a relationship	1.09	0.60–2.01	0.77	–	–	–
Married but separated/divorced vs. Married/ in a partnership	1.19	0.62–2.30	0.60	–	–	–
Single vs. married/in partnership	1.02	0.50–2.08	0.96	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	1.91	0.96–3.82	0.07	–	–	–
Secondary/Professional secondary vs. Higher	0.99	0.57–1.72	0.98	–	–	–
Income per month after tax per family member						
Up to €250 vs. 401 EUR and more	1.06	0.55–2.05	0.87	–	–	–
251–400 EUR vs. 401 EUR and more	0.87	0.49–1.54	0.63	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	1.44	0.72–2.91	0.30	–	–	–
251–400 EUR vs. 601 EUR and more	1.23	0.65–2.33	0.52	–	–	–
EUR 401–600 vs. 601 EUR and more	0.82	0.37–1.83	0.63	–	–	–
Distal factors						
Type of settlement						
Riga vs. Rural	1.11	0.61–2.00	0.74	–	–	–
City vs. Rural	0.98	0.54–1.76	0.94	–	–	–

Table 2.7 continued

Independent variables	OR ^a	95 % CI	p	aOR ^b	95 % CI	p
Distal factors						
Children under 18						
2 and more vs. no minor children	0.73	0.34–1.57	0.42	–	–	–
1 child vs. no minor children	2.34	1.38–3.96	0.002	–	–	–
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	2.62	1.57–4.37	< 0.001	–	–	–
Rejection vs. Never smoked	1.45	0.68–3.12	0.34	–	–	–
GP visits in the last year						
≥ 5 times vs. not visited	2.70	1.09–6.68	0.03	–	–	–
3–4 times a year vs. not visited	2.32	0.92–5.88	0.08	–	–	–
1–2 times a year vs. not visited	1.06	0.41–2.74	0.91	–	–	–
Specialist visits in the last year						
≥ 5 times vs. not visited	3.40	1.65–6.97	0.001	–	–	–
3–4 times a year vs. not visited	3.68	1.81–7.48	< 0.001	–	–	–
1–2 times a year vs. not visited	1.01	0.47–2.18	0.97	–	–	–
Hospital admissions in the last year						
2 or more times vs. none	3.49	1.78–6.84	< 0.001	–	–	–
1 time vs. none	2.30	1.27–4.16	0.006	–	–	–
Ambulance calls in the last year						
3 or more times vs. none	4.85	1.92–12.30	0.001	–	–	–
1–2 times vs. none	2.47	1.36–4.47	0.003	–	–	–

^a OR: unadjusted odds ratio; ^b aOR1: odds ratio in the first model, adjusted by proximal factors

In the final model of the hierarchical analysis (see Table 2.8), generalised anxiety symptoms in the female population were associated with three proximal factors: suicidal ideation, self-harm and suicidal behaviour according to the MINI results (vs. absence of these disorders, aOR 3.10 (95 % CI 1.57–6.14), $p = 0.001$), syndromes or symptoms of abnormally elevated mood during the

interview or earlier in life identified by MINI (vs. no such disorder, aOR 9.39 (95 % CI 2.96–29.76), $p < 0.001$) and clinically significant depressive symptoms on the PHQ-9 scale (vs. no depression, aOR 24.43 (95 % CI 12.46–47.88), $p < 0.001$). Among the mid-level factors in the second model of the hierarchical analysis, after adjusting for proximal and mid-level factors, non-employed retiree status was statistically significantly associated with the lowest odds of generalised anxiety disorder (vs. employed person, aOR 0.18 (95 % CI 0.04–0.88), $p = 0.03$), but in the third model of the analysis this factor did not retain its statistically significant role as a protective factor. Among the distal factors, in the third model of the hierarchical analysis, the following factors maintained a statistically significant association with higher odds of generalised anxiety in the female population: having one minor child (vs. no minor children, aOR 3.63 (95 % CI 1.65–8.00), $p = 0.001$), having seen a specialist 3–4 times in the last year (vs. no visits, aOR 4.39 (95 % CI 1.65–11.66), $p = 0.003$) and ≥ 5 times a year (vs. no visits in a year, aOR 3.24 (95 % CI 1.14–9.23), $p = 0.03$), and ambulance calls 3 or more times in the last year (vs. no visits, aOR 4.21 (95 % CI 1.14–15.45), $p = 0.03$).

Table 2.8

**Factors associated with generalised anxiety disorder symptoms
(GAD-7 ≥ 10) in female population in models 2 and 3
of hierarchical analysis^{c, d}**

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	2.60	1.25–5.40	0.01	3.10	1.57–6.14	0.001
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	–	–	–	–	–	–
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	–	–	–	–	–	–
Episode of major depression during the interview or earlier in life identified by MINI						
Yes vs. No	–	–	–	–	–	–

Table 2.8 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	P
Proximal factors						
At least one eating disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	10.61	3.35–33.64	< 0.001	9.39	2.96–29.76	< 0.001
Antisocial personality disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–
Clinically significant symptoms of depression on the PHQ-9 scale						
Me vs. No	38.95	19.25–78.79	< 0.001	24.43	12.46–47.88	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good and rather good	–	–	–	–	–	–
Medium vs. Good and rather good	–	–	–	–	–	–
Mid-level factors						
Age						
45–64 vs. 18–44	0.43	0.18–1.03	0.06	–	–	–
≥ 65 vs. 18–44	0.92	0.18–4.69	0.92	–	–	–
Ethnicity						
Russian vs. Latvian	0.92	0.46–1.81	0.80	–	–	–
Other vs. Latvian	0.45	0.13–1.58	0.21	–	–	–
Employment						
Economically inactive vs. employed person	0.46	0.15–1.41	0.17	0.51	0.19–1.36	0.18
Unemployed vs. employed person	0.44	0.10–1.91	0.27	1.10	0.37–3.26	0.86
Disabled person. long-term disabled vs. employed person	0.64	0.14–3.00	0.57	0.89	0.21–3.71	0.87
Non-employed pensioner vs. employed person	0.18	0.04–0.88	0.03	0.60	0.24–1.47	0.26

Table 2.8 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Mid-level factors						
Marital status						
Widower vs. Married/In a Patrimonial Relationship	1.62	0.56–4.71	0.37	–	–	–
Married but separated/divorced vs. Married/ in a partnership	1.96	0.74–5.16	0.17	–	–	–
Single vs. married/in partnership	0.55	0.20–1.49	0.24	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	1.06	0.38–2.98	0.91	–	–	–
Secondary/ Professional secondary vs. Higher	0.57	0.27–1.20	0.14	–	–	–
Income per month after tax and per family member						
Up to €250 vs. 401 EUR and more	0.86	0.31–2.36	0.76	–	–	–
251–400 EUR vs. 401 EUR and more	0.74	0.27–2.03	0.56	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	1.81	0.48–6.83	0.38	–	–	–
251–400 EUR vs. 601 EUR and more	2.78	0.89–8.67	0.08	–	–	–
EUR 401–600 vs. 601 EUR and more	1.58	0.56–4.43	0.39	–	–	–
Distal factors						
Type of settlement						
Riga vs. Rural	–	–	–	0.65	0.30–1.39	0.27
City vs. Rural	–	–	–	0.84	0.39–1.83	0.66
Children under 18						
2 and more vs. no minor children	–	–	–	1.57	0.58–4.25	0.38
1 child vs. no minor children	–	–	–	3.63	1.65–8.00	0.001
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	–	–	–	1.93	0.96–3.85	0.06
Rejection vs. Never smoked	–	–	–	1.20	0.45–3.21	0.72

Table 2.8 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Distal factors						
GP visits in the last year						
≥ 5 times vs. not visited	–	–	–	0.95	0.26–3.49	0.94
3–4 times a year vs. not visited	–	–	–	1.75	0.51–6.08	0.38
1–2 times a year vs. not visited	–	–	–	1.11	0.32–3.84	0.86
Specialist visits in the last year						
≥ 5 times vs. not visited	–	–	–	3.24	1.14–9.23	0.03
3–4 times a year vs. not visited	–	–	–	4.39	1.65–11.66	0.003
1–2 times a year vs. not visited	–	–	–	1.41	0.54–3.68	0.48
Hospital admissions in the last year						
3 or more times vs. none	–	–	–	1.65	0.62–4.42	0.32
1–2 times vs. none	–	–	–	2.13	0.97–4.65	0.06
Ambulance calls in the last year						
3 or more times vs. none	–	–	–	4.21	1.14–15.45	0.03
1–2 times vs. none	–	–	–	1.62	0.74–3.58	0.23

^caOR2: odds ratio in the second model, adjusted by proximal and intermediate factors;

^daOR3: odds ratio in the third model, adjusted for proximal, intermediate and distal factors

2.8 Associated factors of generalised anxiety disorder symptoms (GAD-7 ≥ 10) in male population

The results of the univariate analysis **in the male population** are presented in Table 2.9. In the first model of the hierarchical analysis, after adjustment for all proximal factors, statistically significantly higher odds ratios for generalised anxiety symptoms were observed for men with suicidal ideation, self-harm and suicidal behaviour according to the MINI interview, and for men with clinically significant depressive symptoms according to the PHQ-9 self-rating scale (see Table 2.9). Given that there were no men in the study who were simultaneously diagnosed with generalised anxiety disorder and antisocial personality disorder, the odds ratio for generalised anxiety disorder could not be calculated in the regression analysis.

Table 2.9

**Factors associated with generalised anxiety disorder symptoms
(GAD-7 \geq 10) in male population in univariate analysis and
in the first model of hierarchical analysis ^{a,b}**

Independent variables	OR^a	95 % CI	p	aOR^b	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	34.20	15.04–77.77	< 0.001	12.88	4.63–35.83	< 0.001
Alcohol use disorder in the last year identified by MINI						
Yes vs. No	3.40	1.71–6.79	0.001	1.98	0.69–5.69	0.20
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	6.37	1.77–22.97	0.005	4.49	0.73–27.49	0.10
Episode of major depression during the interview or earlier in life identified by MINI						
Yes vs. No	11.63	5.42–24.94	< 0.001	1.90	0.55–6.57	0.31
At least one eating disorder identified by MINI						
Yes vs. No	4.42	0.45–43.49	0.20	3.15	0.03–365.09	0.63
Any psychotic disorder during the interview or previously in life identified by MINI						
Yes vs. No	1.45	0.43–4.94	0.55	0.56	0.07–4.21	0.57
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	3.65	1.27–10.49	0.01	0.70	0.14–3.55	0.67
Antisocial personality disorder identified by MINI						
Yes vs. No	Can't work it out					
Clinically significant symptoms of depression on the PHQ-9 scale						
Me vs. No	88.51	38.52–203.38	< 0.001	38.75	12.84–116.97	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good and rather good	14.02	5.18–37.94	< 0.001	1.71	0.41–7.10	0.46
Medium vs. Good and rather good	3.98	1.55–10.22	0.004	1.79	0.52–6.14	0.35

Table 2.9 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Mid-level factors						
Age						
45–64 vs. 18–44	0.93	0.44–1.94	0.84	–	–	–
≥ 65 vs. 18–44	0.50	0.15–1.64	0.26	–	–	–
Ethnicity						
Russian vs. Latvian	1.02	0.48–2.15	0.96	–	–	–
Other vs. Latvian	1.17	0.34–4.03	0.80	–	–	–
Employment						
Economically inactive vs. employed person	1.34	0.34–5.33	0.67	–	–	–
Unemployed vs. employed person	1.96	0.74–5.17	0.18	–	–	–
Disabled person vs. employed person	3.12	1.07–9.05	0.04	–	–	–
Non-employed pensioner vs. employed person	0.31	0.07–1.38	0.12	–	–	–
Marital status						
Widower vs. Married/In a Patrimonial Relationship	0.72	0.06–7.97	0.79	–	–	–
Married but separated/divorced vs. Married/ in a partnership	2.67	1.07–6.66	0.03	–	–	–
Single vs. married/in partnership	1.89	0.86–4.19	0.11	–	–	–
Higher education						
Primary/Incomplete Primary vs. Higher	1.00	0.37–2.66	0.99	–	–	–
Secondary/Professional secondary vs. Higher	0.59	0.27–1.29	0.19	–	–	–
Income per month after tax per family member						
Up to €250 vs. 401 EUR and more	4.84	1.67–14.03	0.004	–	–	–
251–400 EUR vs. 401 EUR and more	3.71	1.32–10.43	0.01	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	1.78	0.77–4.14	0.18	–	–	–
251–400 EUR vs. 601 EUR and more	0.95	0.35–2.63	0.93	–	–	–
EUR 401–600 vs. 601 EUR and more	0.74	0.22–2.45	0.62	–	–	–

Table 2.9 continued

Independent variables	OR ^a	95 % CI	p	aOR ^b	95 % CI	p
Distal factors						
Type of settlement						
Riga vs. Rural	0.76	0.34–1.68	0.49	–	–	–
City vs. Rural	0.55	0.23–1.32	0.18	–	–	–
Children under 18						
2 and more vs. no minor children	0.94	0.34–2.64	0.91	–	–	–
1 child vs. no minor children	1.11	0.43–2.86	0.82	–	–	–
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	2.80	1.14–6.90	0.02	–	–	–
Rejection vs. Never smoked	1.02	0.28–3.74	0.97	–	–	–
GP visits in the last year						
≥ 5 times vs. not visited	0.30	0.07–1.20	0.09	–	–	–
3–4 times a year vs. not visited	1.10	0.47–2.55	0.83	–	–	–
1–2 times a year vs. not visited	0.44	0.18–1.06	0.07	–	–	–
Specialist visits in the last year						
≥ 5 times vs. not visited	2.98	1.25–7.08	0.01	–	–	–
3–4 times a year vs. not visited	0.85	0.22–3.32	0.81	–	–	–
1–2 times a year vs. not visited	1.00	0.42–2.39	0.99	–	–	–
Hospital admissions in the last year						
2 or more times vs. none	1.91	0.48–7.65	0.36	–	–	–
1 time vs. none	3.09	1.40–6.81	0.005	–	–	–
Ambulance calls in the last year						
Yes vs. Not	1.22	0.43–3.47	0.71	–	–	–

^a OR: unadjusted odds ratio; ^b aOR1: adjusted odds ratio in the first model

In the final model of the hierarchical analysis (see Table 2.10), generalised anxiety symptoms in the male population were significantly associated with two proximal factors: suicidal ideation, self-harm and suicidal behaviour according to the MINI results (vs. no such disorder, aOR 14.73 (95 % CI 4.56–47.61), $p < 0.001$) and clinically significant depressive symptoms on the PHQ-9 scale (vs. no clinically significant depression, aOR 130.28 (95 % CI 30.60–554.68), $p < 0.001$). Among the mid-level factors in the final (third model) of the hierarchical analysis, primary school/incomplete primary or basic

education was significantly associated with lower odds of generalised anxiety symptoms (vs. higher education, aOR 0.12 (95 % CI 0.02–0.79), p = 0.03).

Among the distal factors, in the third model of the hierarchical analysis, the following factors remained statistically significantly associated with higher odds of generalised anxiety in the male population: smoking tobacco and nicotine-containing products episodically or regularly (vs. never smoked, aOR 6.77 (95 % CI 1.50–30.49), p = 0.01) and visiting the GP 3–4 times in the last year (vs. no visits in a year, aOR 6.49 (95 % CI 1.08–38.91), p = 0.04).

Table 2.10

**Factors associated with generalised anxiety disorder symptoms
(GAD-7 \geq 10) in male population in models 2 and 3
of hierarchical analysis^{c, d}**

Independent variables	aOR^c	95 % CI	p	aOR^d	95 % CI	p
Proximal factors						
Suicidal ideation, self-harm and suicidal behaviour identified by MINI						
Yes vs. No	22.33	4.96–100.47	< 0.001	14.73	4.56–47.61	< 0.001
Alcohol use disorder in the last year after identified by MINI						
Yes vs. No	–	–	–	–	–	–
Substance (non-alcohol) use disorder in the last year identified by MINI						
Yes vs. No	–	–	–	–	–	–
Episode of major depression during the interview or earlier in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
At least one eating disorder identified by MINI						
Yes vs. No	–	–	–	–	–	–
Any psychotic disorder during the interview of previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Syndromes or symptoms of abnormally elevated mood during the interview or previously in life identified by MINI						
Yes vs. No	–	–	–	–	–	–
Antisocial personality disorder post-MINI						
Yes vs. No	–	–	–	–	–	–

Table 2.10 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Proximal factors						
Clinically significant symptoms of depression on the PHQ-9 scale						
Me vs. No	103.80	24.04–448.24	< 0.001	130.28	30.60–554.68	< 0.001
Self-assessment of health						
Bad and rather bad vs. Good	–	–	–	–	–	–
Medium vs. Good	–	–	–	–	–	–
Mid-level factors						
Age						
45–64 vs. 18–44	1.07	0.19–5.99	0.94	–	–	–
≥ 65 vs. 18–44	3.83	0.07–212.48	0.51	–	–	–
Ethnicity						
Russian vs. Latvian	1.66	0.38–7.26	0.50	–	–	–
Other vs. Latvian	3.83	0.52–28.45	0.19	–	–	–
Employment						
Economically inactive vs. employed person	7.06	0.41–120.88	0.18	–	–	–
Unemployed vs. employed person	0.74	0.08–6.47	0.79	–	–	–
Disabled person, long-term disabled vs. employed person	3.88	0.40–37.56	0.24	–	–	–
Non-employed pensioner vs. employed person	0.08	0.001–5.80	0.24	–	–	–
Marital status						
Widower vs. Married/In a Patrimonial Relationship	0.27	0.01–12.48	0.50	–	–	–
Married but separated/divorced vs. Married/ in a partnership	0.94	0.11–7.74	0.96	–	–	–
Single vs. married/in partnership	1.26	0.20–7.95	0.81	–	–	–

Table 2.10 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Mid-level factors						
Higher education						
Primary/Incomplete Primary vs. Higher	1.0	0.01–0.88	0.04	0.12	0.02–0.79	0.03
Secondary Professional secondary vs. Higher	0.42	0.10–1.82	0.24	0.42	0.10–1.81	0.24
Income per month after tax per family member						
Up to €250 vs. 401 EUR and more	6.73	0.64–70.68	0.11	–	–	–
251–400 EUR vs. 401 EUR and more	3.92	0.65–23.74	0.14	–	–	–
Personal income after tax of respondents						
Up to €250 vs. EUR 601 and more	0.22	0.01–3.33	0.27	–	–	–
251–400 EUR vs. 601 EUR and more	0.73	0.07–7.69	0.79	–	–	–
EUR 401–600 vs. 601 EUR and more	0.84	0.06–12.09	0.90	–	–	–
Distal factors						
Type of settlement						
Riga vs. Rural	–	–	–	0.43	0.12–1.53	0.19
City vs. Rural	–	–	–	0.73	0.19–2.88	0.66
Children under 18						
2 and more vs. no minor children	–	–	–	4.34	0.79–23.74	0.09
1 child vs. no minor children	–	–	–	2.83	0.65–12.67	0.16
Lifetime experience of tobacco and nicotine products						
Smoke now and then or regularly vs. never smoked	–	–	–	6.77	1.50–30.49	0.01
Rejection vs. Never smoked	–	–	–	3.19	0.56–18.12	0.19
GP visits in the last year						
≥ 5 times vs. not visited	–	–	–	0.15	0.01–1.45	0.10
3–4 times a year vs. not visited	–	–	–	6.49	1.08–38.91	0.04
1–2 times a year vs. not visited	–	–	–	0.88	0.20–3.78	0.86

Table 2.10 continued

Independent variables	aOR ^c	95 % CI	p	aOR ^d	95 % CI	p
Distal factors						
Specialist visits in the last year						
≥ 5 times vs. not visited	–	–	–	2.80	0.56–14.02	0.21
3–4 times a year vs. not visited	–	–	–	0.32	0.03–3.57	0.35
1–2 times a year vs. not visited	–	–	–	0.44	0.11–1.80	0.26
Hospital admissions in the last year						
2 or more times vs. none	–	–	–	0.96	0.09–10.32	0.97
1 time vs. none	–	–	–	4.05	0.95–17.30	0.06
Ambulance calls in the last year						
And vs. have not been	–	–	–	0.38	0.06–2.57	0.32

^c aOR2: odds ratio in the second model, adjusted for proximal and intermediate factors;

^d aOR3: odds ratio in the third model, adjusted for proximal, intermediate and distal factors

3 Discussion

3.1 Prevalence of clinically significant symptoms of depression and generalised anxiety disorder in the general population

The Thesis provides updated information on the prevalence of depression in Latvia, which has not been measured for more than 10 years, and supplements it with an in-depth and detailed analysis of the sociodemographic factors associated with this disorder. One of the key principles of good research is reproducibility, which means that the results of a study can be confirmed by repeating the study using the same or similar methodology (Reproducibility and Replicability in Science, 2019). Thus, the results of the current study, which was conducted in a representative sample of the population, can be compared with previous epidemiological studies conducted with a similar methodology.

The prevalence of depressive disorders (6.4 %) is in line with the overall prevalence of depressive disorders (6.38 %) reported by other European countries (Arias-de la Torre et al., 2021) and the results of a previous epidemiological study in Latvia, where the prevalence of depression score was 6.7 % (E. Rancāns et al., 2014). The overall pooled point prevalence of depression from the 68 studies pooled in the meta-analysis (19 of them conducted in Europe) is 12.9 % (Lim et al., 2018) is higher compared to our results. However, as concluded in the above meta-analysis, there is a large heterogeneity between the reported results: statistically significant differences in prevalence rates were found depending on the instruments used, the human development index of the country of the study and the year of publication.

There are no data on the prevalence of anxiety disorders in the Latvian population, as no screening for symptoms or generalised anxiety disorders has been carried out in the general population. The current study provides information on the prevalence of clinically significant symptoms of generalised anxiety disorder in Latvia, as well as an in-depth analysis of associated

sex-specific sociodemographic and health-related factors. The only Latvian data on the prevalence of generalised anxiety disorder among primary care patients were published in 2018 (Ivanovs et al., 2018). The point prevalence of generalised anxiety disorder in the primary care population according to the GAD-7 screening results was 10.1 %, but given the higher prevalence of generalised anxiety disorder in primary care patients (Roy-Byrne and Wagner, 2004), this result cannot be extrapolated to the general population in Latvia. Another Latvian study published in 2022 assessed anxiety in the general population during a COVID-19 emergency by means of a web-based survey, and found that 15.2 % of participants had significant anxiety, but as anxiety was assessed during a pandemic emergency, this result cannot be extrapolated to the general population under normal conditions either (Vrublevska, Perepjolkina, et al., 2022). In addition, a different methodological approach (online survey) and diagnostic tool (*State-Trait Anxiety Inventory*) were used and the data from the two studies cannot be accurately compared.

The point prevalence of generalised anxiety disorder symptoms found in the thesis study (3.9 %) is consistent with published data on the average prevalence of subthreshold generalised anxiety disorder in the general population (4.4 %) according to a systematic review of epidemiological studies in Europe and North America (Haller et al., 2014). Our findings exhibit a minor disparity when contrasted with the outcomes of a Chinese cross-sectional study conducted by Yu and colleagues, which employed a comparable methodology. In their research, they identified a point prevalence of 5.3 % for generalized anxiety disorder within the general population (Yu, S. Singh, et al., 2018).

3.2 Gender differences in the prevalence of clinically significant symptoms of depression and generalised anxiety disorder

Depression was significantly more prevalent among women than men, according to the study. Moreover, when adjusted for all 10 main socio-demographic characteristics analysed, female sex remained significantly associated with higher odds ratios for depressive symptoms. Similar conclusions were reached in a recently published population-based study analysing data from respondents in 27 European countries (Arias-de la Torre et al., 2021). The authors found a similar trend: the prevalence of depression was higher in women (7.74 %) than in men (4.89 %), with similar gender differences in all countries included, except Finland and Croatia. In a previous study in Latvia, the odds ratio for depression was twice as high in women as in men (E. Rancāns et al., 2014). The study also found that symptoms of generalised anxiety disorder were significantly more prevalent among women: this trend has also been observed in other epidemiological studies in the general population (McLean et al., 2011). But, for example, among primary care patients in the UK, the prevalence of anxiety in women was almost twice that in men (Martín-Merino et al., 2009).

3.3 Universal gender-specific associations of generalised anxiety and depressive symptoms

In the current study, the only factor that was statistically significantly associated with both clinically significant depressive symptoms and generalised anxiety symptoms in women and men was suicidality defined by the MINI interview: suicidal behaviour, self-harm and suicidal ideation. Suicide and suicidal behaviour are a significant and pressing problem worldwide: approximately 700 000 people die by suicide every year. It is the fourth leading cause of death among 15–29 year olds worldwide. According to WHO, 703 000 people committed suicide in 2019. The global age-standardised suicide

rate was 9.0 per 100 000 population in 2019. These rates ranged from fewer than two suicide deaths per 100 000 to more than 80 per 100 000 population, depending on the country. In our country, the age-standardised suicide rate is 16.1 per 100 000 people, which is higher than the global and European rate (10.5 per 100 000) (World Health Organization, 2021). In the global literature, there is evidence that the majority of people who later commit suicide have seen a doctor or mental health professional in the 12 months before their death (Luoma, Martin, and Pearson, 2002). This highlights the need for training of health professionals and the development of algorithms to enhance the ability of health workers to identify people at risk. Depression, like substance use disorders and psychotic disorders, is a well-studied and known risk factor for suicide (Bertolote et al., 2004; Darvishi et al., 2015; Ferrari et al., 2013), but anxiety disorders and generalised anxiety disorder are relatively less frequently mentioned as suicide risk indicators in the global literature. According to available data, suicides associated with anxiety disorders accounted for 6 % of the outpatient population (Bertolote et al., 2004). According to a previous study of Latvian primary care patients in 2015, the presence of any anxiety disorder was statistically significantly associated with increased odds of suicidality in the primary care population (Renemane, Kivite-Urtane and Rancans, 2021).

In both female and male populations, clinically significant depressive symptoms on the PHQ-9 increased the odds of generalised anxiety disorder, and vice versa: the presence of generalised anxiety disorder symptoms increased the odds ratio of clinically significant depression. This is in line with the global literature on the strong aetiopathogenetic link and frequent comorbidity of these disorders (Saha et al., 2021). In patients with a major depressive episode, coexisting anxiety symptoms (or “anxious-depressive states”) increase the severity of depression, impair functional impairment, quality of life and increase economic burden (Culpepper, 2016).

Given the cross-sectional study design, we cannot conclusively conclude on causality and specify whether suicidality contributes to the development of depression and generalised anxiety or vice versa. What should be considered from the perspective of a health care practitioner is that suicidal behaviour, clinically significant depression and generalised anxiety symptoms have been shown in the Latvian general population to be three psychiatric disorders that are statistically significantly associated with each other in both sexes, but that suicidal behaviour or ideation was found to be associated with higher odds ratios of depression in the male population in particular than in the female population (aOR 5.56 vs. 3.86) and significantly higher odds ratios for generalised anxiety symptoms (aOR 14.73 vs. 3.10). Of particular note, among men with generalised anxiety disorder, 72.2 % of respondents also had depression (aOR 130.28), whereas among women this association was slightly less pronounced: 61.1 % of women with symptoms of generalised anxiety disorder also had symptoms of depression (aOR of clinically significant depression 24.43). A recent meta-analysis of studies showed that women have a higher risk of (non-fatal) suicide attempts (OR 1.96) and men a higher risk of suicide death (HR 2.50) (Miranda-Mendizabal et al., 2019). The data from our study should be interpreted with caution, given the very wide confidence interval for the odds ratios of depression in relation to generalised anxiety in the male population, but it is worth testing in follow-up studies the hypothesis that it is symptoms of generalised anxiety that are more strongly associated with suicidal behaviour in men and that it is symptoms of tension, nervousness, worry and anxiety that might serve as a better indicator for the early recognition of suicidality risk in men. Professionals should therefore be appropriately trained to pay particular attention to symptoms of anxiety, nervousness, tension in men, which may be masking symptoms of depression and may be a precursor to suicidality.

3.4 Gender-specific associated factor for depressive symptoms

Two previous Latvian epidemiological studies (E. Rancāns et al., 2014; Vrublevska et al., 2017) also found that poor health status is a predictive factor for depression. In our study, poor subjective self-rated health status was associated with current clinically significant depressive symptoms in both sexes, but in men it was associated with 29.76 times higher odds of depression compared with subjectively healthy men. When interpreting these results, it should be noted that the confidence interval for the estimated odds was quite wide. Because of the small number of male respondents in the group with good self-rated health ($n = 8$), several alternative logistic regression estimates were performed, combining groups of respondents with good/average self-rated health for comparison with respondents with poor self-rated health, and respondents with average/poor self-rated health with respondents with good self-rated health, but in all alternative estimates the confidence interval for the estimated odds remained wide, suggesting that no categorical conclusions can be drawn about the importance of self-rated health for men and that further information is needed. At the same time, for women, the association was less pronounced, with poor subjectively assessed health increasing the odds of depression by only 7.38 times the conventional confidence interval. Due to the cross-sectional design of the study, it is not possible to draw conclusions about causality or to clearly infer which pattern of associations between depression and poor health assessment is dominant. According to the available studies, individuals with pre-existing physical illness and poor health self-esteem are at higher risk of depression (Rantanen et al., 2019), but depression *per se* can also worsen subjective health ratings due to low self-esteem and depressed mood, which are key symptoms of major depression. In addition, objectively presenting somatic disorders increase the risk of depression, which in turn increases the likelihood

of these somatic disorders becoming chronic and worsens their course (Moussavi et al., 2007).

3.5 Generalized anxiety disorder is a gender-specific associated factor

In both male and female populations, generalised anxiety symptoms were associated with more frequent use of healthcare services. In the male population, higher odds of generalised anxiety disorder were found in the group of people with 3–4 *visits to a GP in* the last year, while in the female population, higher odds of generalised anxiety disorder were found in the group of people with 3 or more ambulance calls in the last year, as well as more frequent visits to specialist doctors. In the group of women with 3–4 visits to specialist-doctors in the last year, the odds ratio for depression was 4.39, while in the group of women with 5 or more visits to specialist-doctors it was 3.24. In Germany, Berger et al., found that patients with generalised anxiety disorder were significantly more likely to have been referred to a general practitioner and to a specialist during the year than a matched control group. People with generalised anxiety disorder were more likely to consult a GP for sleep disorders, digestive disorders and substance use disorders than for anxiety symptoms (Berger et al., 2009). Other studies also confirm that people with generalised anxiety disorder are more likely to present to primary care with complaints of somatic illnesses and symptoms, pain and sleep disturbances than with complaints of anxiety (Wittchen et al., 2002).

Yu et al., A cross-sectional study in China examined the association of generalised anxiety disorder (GAD-7 score ≥ 10) with self-reported healthcare utilisation in the past 6 months. Respondents with generalised anxiety disorder reported significantly lower health-related quality of life and higher healthcare utilisation than the control group: higher total number of visits to healthcare

providers, emergency calls and hospital admissions (Yu, S. S. Singh, et al., 2018).

Although Wittchen et al., already found an association between depression and generalised anxiety disorder with high rates of primary care use in 2002, it should be highlighted that this study also found that laboratory test requests, prescription renewals and follow-up/check-up visits were less frequent in primary care patients with generalised anxiety disorder compared with other primary care patients. This finding is risky to interpret unequivocally, but it could suggest that although people with generalised anxiety disorder are more likely to attend their first GP appointments, they are less likely to engage in additional testing, medication or follow-up visits. This could suggest that generalised anxiety may be associated with a high, but not necessarily regular, use of health services (Wittchen et al., 2002). Speculatively, this could explain why, in our study among men, a frequency of GP visits of exactly 3–4 x/year is associated with generalised anxiety symptoms, whereas a frequency of ≥ 5 x/year is not. In future studies in Latvia, patient surveys may include indicators and questions to track how regularly and consistently patients with generalised anxiety symptoms see GPs and specialists, with the aim of obtaining more accurate data.

In our study, generalised anxiety symptoms among women were associated with *visits to specialist doctors*, which might suggest that generalised anxiety in women in Latvia manifests itself more in somatic symptoms, for which women seek explanations from specialist doctors. This assumption may be indirectly supported by the fact that women are more prone to somatisation reactions and that somatic symptom disorder is 10 times more common among women (Kurlansik and Maffei, 2016).

3.6 Associated factors of depressive symptoms in the female population

In the final model of the hierarchical analysis, *economic inactivity* maintained its statistically significant association with a higher odds ratio for depressive symptoms in the female population. Data from foreign studies show that the risk of depression is twice as high among economically inactive young people (Sellström, Bremberg, and O'Campo, 2011). However, in the current study, economic inactivity (maternity leave, unpaid work in the family business) was particularly associated with depressive symptoms in women. It is possible that economically inactive women are particularly vulnerable to chronic distress and negative life events due to financial dependency, limited decision-making capacity, insecurity of home ownership and less social support. The current study found that depression in women is not related to economic problems in general (e.g. level of personal or family income) but specifically to economic inactivity (inability to actively earn money). There have been no previous studies in Latvia on the level of financial dependency or elements of patriarchal forms of family relationships, but the theoretical assumption may be that financial dependency during periods of economic inactivity is an important factor in the development of mental health problems. For example, one recent study during the COVID-19 pandemic in the United States found that the proportion of women who experienced at least one form of economic violence during maternity leave was quite high (around 65 %) (Johnson, 2021).

Substance use disorders (non-alcohol): previous studies have described a higher risk of starting to use illicit drugs during the follow-up period in people who had a history of major depression before the initial assessment (Swendsen et al., 2010). It is clear from epidemiological studies and developmental psychopathology studies that substance use disorders are generally much more prevalent in men than in women (McHugh et al., 2018). In the WHO World

Mental Health Surveys as a whole, when combined and adjusted for independent variables, women were between 3 and 5 times less likely to use alcohol, cocaine, cannabis and tobacco. However, the study also found that the gender gap in alcohol, cannabis and cocaine use has been narrowing recently (Degenhardt et al., 2008). The fact that gender differences vary between countries and decrease over time could suggest that social and cultural factors influence gender differences. A recent nationally representative population-based study in the United States showed that women with unipolar depression and/or anxiety disorders were more likely than women without depression or anxiety disorders to have a substance use disorder (Zhou et al., 2019). Our study found a statistically significant association of substance use disorders with depression among women specifically in the Latvian general population. Due to the fact that global studies show that people with depression and comorbid substance use disorders are less likely to receive the necessary treatment (Han, Olfson, and Mojtabai 2017), In the Latvian context, special attention should be paid to women with substance use disorders, with the aim of recognising and treating possible comorbid depressive disorders in a timely manner.

At least one eating disorder (neurotic anorexia, bulimia or compulsive overeating disorder) *identified by the MINI interview* increased the odds of depression in women. The results of the current study are in line with the global literature on the relationship between depression and eating disorders. The study of women aged 15 to 25 found that those with a lifetime history of unipolar depressive disorder or anxiety disorder were four times more likely to have an eating disorder in their lifetime (Garcia et al., 2020). Given that comorbid depressive and anxiety symptoms in eating disorders are associated with greater symptom severity, poorer prognosis and poorer outcomes, especially in young women (Brand-Gothelf et al., 2014) It is important to educate health

professionals about the relationship between these disorders, especially in the female population, and to promote early recognition of both spectrum disorders.

The next factor found to increase the odds of depression among women was *“other” (minority)*: our results are in line with those of the recent European Social Survey (ESS-3), which analysed information on 36 970 respondents aged 21 and over from 23 European countries, of whom 13.3 % were immigrants and 6.2 % were ethnic minorities. Immigrants and ethnic minorities were found to have more depressive symptoms than the native population in most of the countries analysed (Missinne and Bracke 2012). Possible risk factors explaining this association are differences in socioeconomic status, greater social isolation or ethnic discrimination. For example, a UK study demonstrated the harmful effects of ethnic discrimination on mental health (Karlsen et al., 2005). From a practical perspective, these results highlight the need for policy makers to pay attention to making depression prevention interventions and information accessible to ethnic minorities. There is also a need for additional research on possible aspects of social isolation or ethnic discrimination in ethnic minority populations.

According to our study, *having at least 2 minor children* reduced a woman’s odds of depression. The available data on the impact of parity on mental health are mixed: there are studies that highlight the positive impact of having children on the psychological well-being of fathers rather than mothers (Nelson-Coffey et al., 2019), there are studies that have found that higher pregnancy rates are directly associated with higher prevalence of depressive symptoms later in life (Li et al., 2019). In Eastern but not Western European countries, childlessness and having one child compared with having two children were associated with more pronounced depressive symptoms (Grundy, van den Broek, and Keenan 2019), which is also consistent with the results of our study: it is having 2 or more children rather than 1 minor child that reduces the odds

of depression in women. A Chinese study of 500 000 people found that having more children was associated with reduced depression prevalence in women but not in men. For women, each additional child was associated with a 9 % lower chance of depression (Wang et al., 2020). However, the interpretation of this result should also take into account findings from psychological research: having children and the experience of parenthood, its quality and its impact on a person's psycho-emotional health are also highly dependent on socio-economic and cultural factors (Nelson, Kushlev, and Lyubomirsky, 2014; Umberson, Pudrovska, and Reczek, 2010), which could partly explain the conflicting results across countries and cultural regions.

3.7 Associated factors of depressive symptoms in a male population

Only in the male population was antisocial personality disorder statistically significantly associated with a higher odds ratio for depressive symptoms. On the one hand, it is a well-known and established fact that personality disorders and depression can develop comorbidly (Corruble, Ginestet, and Guelfi 1996). Moreover, the presence of personality disorders doubles the odds of a worse outcome and of patients' resistance to treatment (McGlashan et al., 2000; Newton-Howes et al., 2013). On the other hand, in the global literature, some authors hypothesise that men (more often than women) with depression first show atypical symptoms that are more difficult to detect with currently used diagnostic tools for depression. It has been shown that gender dimorphism in the prevalence of depression disappears when the diagnostic criteria for depression are adjusted to include symptoms that are more typical of men (Martin, Neighbors, and Griffith 2013). The concept of Male Depressive Syndrome (MDS) has emerged, expanding the typical symptoms of depression to include additional symptoms such as anger, aggression, distractibility,

avoidance, suppression of emotions, excitability, irritability, substance misuse and risk-seeking behaviours (Herreen, Rice, and Zajac, 2022; Rice et al., 2013). In clinical presentation, externalising symptoms may mask typical depressive symptoms. And, for example, a study published in 2021 found that patients with high MDS scores had stronger accentuation of emotionally unstable personality, impulsivity and antisocial personality than patients with low MDS scores (Sedlinská et al., 2021). Given the results of our study and the evidence of poorer quality of care in patients with coexisting personality disorders who were admitted to a psychiatric hospital for treatment of anxiety or depressive disorders, it is necessary to emphasise the need for health professionals to focus on men with variables or symptoms of antisocial personality (Williams et al., 2020).

Living in Latvian cities outside Riga: European epidemiological studies have shown that groups with a higher than average prevalence of depressive disorders live in densely populated areas (Arias-de la Torre et al., 2021). Already at the end of the 20th century, meta-analyses showed that urbanisation is associated with a higher prevalence of psychiatric disorders (Reddy and Chandrashekar 1998), however, in our study, living in Latvian cities was associated with lower odds of depression for men compared with living in rural areas: among men, the proportion of people with clinically significant depressive symptoms was 3.5 % in rural areas and 1.9 % in Latvian cities. There are studies showing that depression and anxiety disorders are more likely to be associated with socioeconomic factors of residence or lower social interaction (Generaal et al., 2019). This can also be applied to rural areas in Latvia, given the shrinking population in rural areas (ESPON, 2017), lower than average monthly wages of workers in rural areas (Oficiālās statistikas portāls, 2023) and, possibly in the era of virtual reality and the internet, less real and qualitative social interaction and less support. The quality and extent of social interactions in urban and rural areas,

as well as their relationship with psychiatric symptoms, could be a research question for future studies in Latvia.

3.8 Associated factors of generalised anxiety disorder symptoms in a female population

A meta-analysis of studies on comorbidities between bipolar disorder and anxiety disorders found that the lifetime comorbidity between bipolar disorder and generalised anxiety disorder was 14.4 % (95 % TI 10.8–18.3) (Nabavi, Mitchell, and Nutt 2015). In relation to gender differences: epidemiological studies to date have been relatively inconsistent, with some reporting a higher prevalence of anxiety disorders specifically in women with bipolar disorder (Chen and Dilsaver 1995; Goldstein, Herrmann, and Shulman 2006), while others found equivalent rates among both sexes of people with bipolar disorder (Hawke et al., 2013). In the Latvian population, it was women who were statistically significantly associated with generalised anxiety *symptoms or syndromes at the time of the interview or earlier in life*. What should be taken into account from a practical point of view is the fact that, compared to individuals with uncomplicated bipolar disorder, bipolar disorder with accompanying anxiety disorders is associated with more suicide attempts and suicidal ideation (Frank et al., 2002; Lee and Dunner 2008; Preti et al., 2016), thus it is important for health professionals to be mindful of the risk of comorbid development of these disorders, particularly in the female population. The timely and correct association of these two spectrum disorders is particularly relevant, also in view of the fact that antidepressants, the mainstay of long-term pharmacological treatment of anxiety, may adversely affect the course of bipolar disorder.

Having one minor child in the female population in our study was associated with a higher odds ratio for generalised anxiety symptoms. As already mentioned in the section on associated factors of depressive symptoms, studies

on the impact of parenting on mental health show conflicting results. Focusing specifically on the subjective experience of stress and anxiety symptoms, parents have reported higher levels of stress than non-parents, with mothers reporting higher levels of stress and depressive symptoms than fathers (Nomaguchi, Milkie, and Bianchi 2005; Wills and Petrakis 2019). Organising childcare is a major stressor for parents, with negative implications for mental health, especially for employed mothers (Craig and Mullan 2010; Nomaguchi et al., 2005). Other studies have found that having children is associated with better mental health outcomes: for example, Australian mothers aged 30–34 years (Holton, Fisher, and Rowe 2010). The results of our study suggest that having one minor child increases the odds of generalised anxiety, which could be due to new and unfamiliar child-rearing experiences, or possibly a lack of adequate social support. Studies have shown that mothers who have access to a support network (e.g. a partner, family members or other mothers) reported reduced levels of anxiety and stress (Racine et al., 2019). Future research could aim to explore whether mothers of minor children with accompanying generalised anxiety symptoms in Latvia might suffer from insufficient social support.

3.9 Associated factors of generalised anxiety disorder symptoms in a male population

Smoking: in our study, it was men who were associated with higher odds of generalised anxiety symptoms. Evidence suggests that people with high anxiety are more likely to smoke (Swendsen et al., 2010). Several factors have been proposed to explain this, including the use of cigarettes to reduce anxiety (i.e. self-medication) and the increased susceptibility of anxious people to take up smoking in response to peer pressure (Patton et al., 1998; Tjora et al., 2011). But the reverse causality should also be considered: cigarette smoke and nicotine affect several biological mechanisms involved in the development of anxiety disorders, including various neurotransmitter systems, neurogenesis,

mitochondrial function, inflammatory responses and the immune system, and contribute to oxidative stress. Scientists suggest that these mechanisms may underlie how exposure to cigarette smoke may enhance anxiety symptoms and anxiety disorders (Moylan et al., 2013).

Lower education as a protective factor for generalised anxiety disorder in the male population. This finding was rather unexpected, as the most common finding in the global literature is that low educational attainment is associated with both anxiety disorders and depression, and it is higher educational attainment that has a protective effect, with this effect persisting across the life course (Bjelland et al., 2008). However, for Latvian men, lower educational attainment was statistically significantly associated with lower odds ratios for generalised anxiety symptoms. Theoretical explanations could include a more predictable work environment, structured employed hours and less direct interaction with people in people with less education than those with higher education (Battams et al., 2014; Wieclaw et al., 2008). In practical terms, future research in the Latvian population would need to re-examine the robustness of the association found and possibly conduct qualitative data collection (interviews with respondents) to explore the causes of the association.

3.10 Advantages and disadvantages of the study

The main advantage of the study is its large, nationally representative sample, which allows extrapolating the data to the entire population of Latvia. Another advantage is the use of validated and internationally recognised instruments for depressive symptoms, generalised anxiety disorder symptoms and comorbid psychiatric disorders. Interviews with respondents were conducted by specially trained interviewers who were available in person to clarify questions from the self-assessment part of the questionnaire. The fieldwork for the study was conducted just before the COVID-19 pandemic, which means that

the data collected can serve as an excellent “baseline” for future studies comparing the prevalence of depression and generalised anxiety disorder symptoms before and after the pandemic. The fieldwork was stopped on 16.03.2020, with the first declaration of a State of Emergency in the country, while data on the first COVID-19 patient in Latvia appeared on 02.03.2020; the main results from questionnaires collected between January 2020 and March 2020 were compared with the overall results and no significant differences were found, so there is no reason to believe that the COVID-19 pandemic had a significant impact on the results of the study.

Several methodological limitations should be taken into account when interpreting and evaluating the results of this study. As this study is a cross-sectional quantitative study by design, the analysis of the results can only infer associations and not causal relationships. The use of the PHQ-9 to assess current depressive symptoms does not allow to distinguish between unipolar and bipolar depression or to exclude depression caused by psychoactive substance use and other medical disorders. Similarly, the use of the GAD-7 does not allow the exclusion of anxiety due to substance misuse or organic/somatic causes. As both scales are self-rating instruments, the results may be influenced by the respondent’s current situational emotional state and subjective interpretation of symptoms. Although the baseline socio-demographic data do not significantly differ from the study sample, voluntary recruitment may lead to so-called *nonresponse bias*, whereby people who refused to participate in the study may have different characteristics (in our case prevalence of psychiatric symptoms/traumas, etc.) than the survey respondents (Cheung et al., 2017).

Conclusions

1. The study hypothesis was confirmed and led to the identification of both universal gender-specific and gender-unique socio-demographic, health-related and health determinants associated with depression and generalised anxiety disorder symptoms.
2. The prevalence of clinically significant depressive symptom points in the general adult population in Latvia is 6.4 % and is higher among women than men: 7.7 % and 4.8 % respectively, which is in line with the results of a study conducted in Latvia in 2011 and global data.
3. The prevalence of the symptom point of generalised anxiety disorder in the Latvian population is 3.9 %, statistically significantly higher among women (4.9 %) than among men (2.7 %), which is in line with international studies.
4. In the Latvian general population, suicidal behaviour, clinically significant depression and generalised anxiety symptoms have been shown to be three mental disorders that are statistically significantly associated with each other in both sexes, but in the male population suicidality was associated with higher odds ratios for depression than for women and especially higher odds ratios for generalised anxiety symptoms. The absolute majority of men with generalised anxiety disorder also had clinically significant depression and/or suicidal behaviour. Thus, when employed with Latvian men in practice, professionals should pay special attention to symptoms of anxiety, nervousness, and tension, which can serve as indicators of possible comorbid depression and suicidality, and help to recognise these disorders early and reduce the risk of fatal suicidality in men.
5. The study data confirm significant associations with depression for the following target populations already described in the Latvian Centre for Disease Prevention and Control's "Clinical Algorithm for Depression Recognition, Management, Treatment and Care": people with a history

of suicide attempts or self-harm, anxiety disorders, poor physical health and health self-esteem, and substance abuse;

6. The Latvian Centre for Disease Prevention and Control's "Clinical Algorithm for the Recognition, Management, Treatment and Care of Depression" can be supplemented with additional depression screening target populations: women with eating disorders, ethnic minorities (especially women), economically inactive women (on maternity leave or unpaid person in family business), women with NMPD calls in the last year, and men with antisocial personality traits: anger, irritability, neglect of social norms.
7. The existing algorithm should highlight that in the Latvian context, special attention should be paid to women with substance use disorders, with the aim of identifying and treating possible co-occurring depressive disorders early, given the higher chances of depression among women with substance use disorders.
8. From a practical perspective, the results highlight the need for policy makers to pay attention to making depression prevention interventions and information accessible to ethnic minorities. Additional research is also needed on possible contributing aspects of depressive disorders (e.g. social isolation or ethnic discrimination) in the ethnic minority female population.
9. Having two or more minor children is a protective factor for depression in women and should be highlighted in family planning information materials.
10. For both genders, the associated factors of generalised anxiety disorder were more frequent use of healthcare services: for women, frequency of specialist visits starting from 3x/year and NMPD calls 3 or more times in the last year. For men, visits to general practitioners 3–4 times in the last year; this finding both highlights the target populations for screening and indicates a potential reduction in the burden on the healthcare system

through early recognition and treatment of these disorders. The unique associated factors of generalised anxiety disorder for women are abnormal elevated mood syndromes or symptoms and having one minor child, while for men it is smoking tobacco and nicotine-containing products; These identified associated factors of generalised anxiety disorder may serve as indicators for identifying screening target populations for a similar, currently undeveloped, future algorithm for the recognition and treatment of anxiety disorders

List of publications, reports and patents on the subject of the Thesis

Publications in international peer-reviewed journals (indexed in SCOPUS):

1. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. Anxiety Screening among the General Population of Latvia and Associated Factors. *Medicina* (Kaunas). 2022 Aug 26;58(9):1163. doi: 10.3390/medicina58091163. PMID: 36143841; PMCID: PMC9505088. (*Medicina* **IF: 2.98**)
2. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. Point prevalence and sex-specific associated factors of depression in Latvian general population. *Front Psychiatry*. 2023 Mar 28;14:1065404. doi: 10.3389/fpsy.2023.1065404. PMID: 37056405; PMCID: PMC10086173. (*Frontiers in Psychiatry* **IF: 5.43**)

Published before the start of PhD studies:

3. Vinogradova, Vineta Viktorija, Vrublevska, Jeļena and Rancāns, Elmārs. "Latvian Family Physicians" Experience and Attitude in Diagnosing and Managing Depression" Proceedings of the Latvian Academy of Sciences. Section B. Natural, Exact, and Applied Sciences., vol.73, no.2, 2019, pp.164-170. <https://doi.org/10.2478/prolas-2019-0026>

Abstracts of international conferences indexed in Web of Science:

1. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. Prevalence of alcohol use disorder among the Latvian general population and associations with the PHQ-9 screening results and sociodemographic factors. *Eur Psychiatry*. 2022 Sep 1;65(Suppl 1):S240. doi: 10.1192/j.eurpsy.2022.619. PMCID: PMC9563368.
2. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. Prevalence of anxiety disorders included in The Mini-International Neuropsychiatric Interview (M.I.N.I.) among the general population of Latvia in 2019-2020. *European Neuropsychopharmacology*. Dec 2021 (Suppl 1): Volume 53; Article number: P.0031; pages: S23-S24. DOI: 10.1016/j.euroneuro.2021.10.038
3. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. Prevalence of anxiety symptoms among the general population of Latvia in 2019-2020. *Nordic Journal of Psychiatry*. 2021 DEC 31 Supplement1, volume 75; PageS29-S29; DOI: 10.1080/08039488.2021.2019945
4. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. Prevalence of suicidal behaviours and its correlates in latvian general population: 2019-2020. *Eur Psychiatry*. 2021 Aug 13;64(Suppl 1):S591-2. doi: 10.1192/j.eurpsy.2021.1578. PMCID: PMC9480168.

5. Vinogradova VV, Kivite-Urtane A, Vrublevska J, Rancans E. The results of PHQ-9 screening of latvian general population in 2019-2020. Eur Psychiatry. 2021 Aug 13;64(Suppl 1):S323. doi: 10.1192/j.eurpsy.2021.867. PMID: PMC9471690.

Presentation of an oral or poster paper at international scientific conferences:

1. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***The results of PHQ-9 screening among the general population of Latvia in 2019-2020***, 29th European Congress of Psychiatry, 10/04/21 -13/04/21, online. Poster;
2. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***Prevalence of suicidal behaviours and its correlates in Latvian general population: 2019-2020***, 29th European Congress of Psychiatry, 10/04/21 -13/04/21, online. Poster;
3. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***The results of screening of anxiety symptoms among the general population of Latvia in 2019-2020***, 33rd Nordic Congress of Psychiatry, 17/06/21 - 18/06/21, online. Poster;
4. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***The results of screening of anxiety symptoms in Latvian general population in 2019-2020***, RSU Research week 2021: Knowledge for Use in Practice, 24/03/21 → 26/03/21, Riga, Latvia. Oral presentation;
5. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***Prevalence of anxiety disorders included in The Mini-International Neuropsychiatric Interview (M.I.N.I.) among the general population of Latvia in 2019-2020***, 34th Congress of the European College of Neuropsychopharmacology (ECNP), 2/10/21 - 5/10/21, Lisbon, Portugal. Poster presentation;
6. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***Prevalence of alcohol use disorder among the Latvian general population and associations with the PHQ-9 screening results and sociodemographic factors***, 30th European Congress of Psychiatry, 4/06/22 - 7/06/22, Budapest, Hungary (online), Poster presentation;
7. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***Prevalence and associated factors of obsessive-compulsive disorder among the general population of Latvia***, 31st European Congress of Psychiatry: Social Cohesion, a Common Goal for Psychiatry, 25/03/23 - 28/03/23, Paris, France. Poster presentation;
8. Vineta V.Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. ***Prevalence and associated socio-demographic factors of suicidal behaviour in the general population of Latvia***, RSU International Research Conference 2023: Knowledge for Use in Practice, 29/03/23 - 31/03/23, Riga, Latvia. Poster;

9. Vineta V. Vinogradova, Anda Kivite-Urtane, Jelena Vrublevska, Elmar Rancan. *Sex-specific differences in the associated factors of depressive symptoms: a population-based study*, RSU International Research Conference 2023: Knowledge for Use in Practice, 29/03/23 → 31/03/23, Riga, Latvia. Oral presentation;

List of references

1. Alonso, J. et al. ESEMeD/MHEDEA 2000 Investigators, European Study of the Epidemiology of Mental Disorders (ESEMeD) Project. 2004. Sampling and methods of the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatr Scand Suppl.* (420):8–20. doi: 10.1111/j.1600-0047.2004.00326. PMID: 15128383.
1. Alonso, J. et al. 2018. Treatment Gap for Anxiety Disorders Is Global: Results of the World Mental Health Surveys in 21 Countries. *Depression and Anxiety* 35(3):195–208. doi: 10.1002/da.22711.
2. Alonso, J., and Lépine, J.P. 2007. Overview of Key Data from the European Study of the Epidemiology of Mental Disorders (ESEMeD). *Journal of Clinical Psychiatry* 68(SUPPL. 2):3–9.
3. Arias-de la Torre, J. et al. 2021. Prevalence and Variability of Current Depressive Disorder in 27 European Countries: A Population-Based Study. *The Lancet Public Health* 6(10):e729–38. doi: 10.1016/S2468-2667(21)00047-5.
4. Aslan, J. et al. 2020. Psychometric Properties of the Patient Health Questionnaire-9 in Elderly Chilean Primary Care Users. *Frontiers in Psychiatry* 11(November):1–8. doi: 10.3389/fpsy.2020.555011.
5. Battams, S. et al. 2014. Workplace Risk Factors for Anxiety and Depression in Male-Dominated Industries: A Systematic Review. *Health Psychology and Behavioral Medicine* 2(1):983–1008. doi: 10.1080/21642850.2014.954579.
6. Beard, C., and Björgvinsson, T. 2014. Beyond Generalized Anxiety Disorder: Psychometric Properties of the GAD-7 in a Heterogeneous Psychiatric Sample. *Journal of Anxiety Disorders* 28(6):547–52. doi: 10.1016/j.janxdis.2014.06.002.
7. Bertolote, J.M., Fleischmann, A., De Leo, D. and Wasserman, D. 2004. Psychiatric Diagnoses and Suicide: Revisiting the Evidence. *Crisis* 25(4):147–55. doi: 10.1027/0227-5910.25.4.147.
8. Bjelland, I. et al. 2008. Does a Higher Educational Level Protect against Anxiety and Depression? The HUNT Study. *Social Science & Medicine* (1982) 66(6):1334–45. doi: 10.1016/j.socscimed.2007.12.019.
9. Brand-Gothelf, A., Leor, S., Apter, A., and Fennig, S. 2014. The Impact of Comorbid Depressive and Anxiety Disorders on Severity of Anorexia Nervosa in Adolescent Girls. *The Journal of Nervous and Mental Disease* 202(10):759–62. doi: 10.1097/NMD.0000000000000194.
10. Chen, Y. W. and Dilsaver, S. C. 1995. Comorbidity for Obsessive-Compulsive Disorder in Bipolar and Unipolar Disorders. *Psychiatry Research* 59(1–2):57–64. doi: 10.1016/0165-1781(95)02752-1.

11. Cheung, K. L., Ten Klooster, P. M., Smit, C., de Vries, H. and Pieterse, M. E. 2017. The Impact of Non-Response Bias Due to Sampling in Public Health Studies: A Comparison of Voluntary versus Mandatory Recruitment in a Dutch National Survey on Adolescent Health. *BMC Public Health* 17(1):1–10. doi: 10.1186/s12889-017-4189-8.
12. Corruble, E., Ginestet, D. and Guelfi, J. D. 1996. Comorbidity of Personality Disorders and Unipolar Major Depression: A Review. *Journal of Affective Disorders* 37(2–3):157–70. doi: 10.1016/0165-0327(95)00091-7.
13. Costantini, L. et al. 2021. Screening for Depression in Primary Care with Patient Health Questionnaire-9 (PHQ-9): A Systematic Review. *Journal of Affective Disorders* 279:473–83. doi: 10.1016/j.jad.2020.09.131.
14. Craig, L. and Mullan, K. 2010. Parenthood, Gender and Work-Family Time in the United States, Australia, Italy, France, and Denmark. *Journal of Marriage and Family* 72(5):1344–61. doi: <https://doi.org/10.1111/j.1741-3737.2010.00769.x>.
15. Culpepper, L. 2016. Impact of Anxious Symptoms and Comorbid Anxiety Disorders on Functional Impairment in Depressed Patients. *The Journal of Clinical Psychiatry* 77(5):e604. doi: 10.4088/JCP.14076tx1c.
16. Darvishi, N., Farhadi, M., Haghtalab, T. and Poorolajal, J. 2015. Alcohol-Related Risk of Suicidal Ideation, Suicide Attempt, and Completed Suicide: A Meta-Analysis. *PLoS One* 10(5):e0126870. doi: 10.1371/journal.pone.0126870.
17. Degenhardt, L. et al. 2008. Toward a Global View of Alcohol, Tobacco, Cannabis, and Cocaine Use: Findings from the WHO World Mental Health Surveys. *PLoS Medicine* 5(7):e141. doi: 10.1371/journal.pmed.0050141.
18. ESPON. Policy Brief. Shrinking rural regions in Europe. Available at: <https://www.espon.eu/sites/default/files/attachments/ESPON%20Policy%20Brief%20on%20Shrinking%20Rural%20Regions.pdf> [accessed:14.08.23].
19. Ferrari, A. J. et al. 2013. Burden of Depressive Disorders by Country, Sex, Age, and Year: Findings from the Global Burden of Disease Study 2010. *PLoS Medicine* 10(11):e1001547. doi: 10.1371/journal.pmed.1001547.
20. Frank, E. et al. 2002. Clinical Significance of Lifetime Panic Spectrum Symptoms in the Treatment of Patients with Bipolar I Disorder. *Archives of General Psychiatry* 59(10):905–11. doi: 10.1001/archpsyc.59.10.905.
21. Garcia, S. C. et al. 2020. Increased Rates of Eating Disorders and Their Symptoms in Women with Major Depressive Disorder and Anxiety Disorders. *The International Journal of Eating Disorders* 53(11):1844–54. doi: 10.1002/eat.23366.
22. Generaal, E., Timmermans, E. J., Dekkers, J. E. C., Smit, J. H. and Penninx, B. W. J. H. 2019. Not Urbanization Level but Socioeconomic, Physical and Social Neighbourhood Characteristics Are Associated with Presence and Severity of Depressive and Anxiety Disorders. *Psychological Medicine* 49(1):149–61. doi: 10.1017/s0033291718000612.

23. Goldstein, B. I., Herrmann, N. and Shulman, K. I. 2006. Comorbidity in Bipolar Disorder among the Elderly: Results from an Epidemiological Community Sample. *The American Journal of Psychiatry* 163(2):319–21. doi: 10.1176/appi.ajp.163.2.319.
24. Grant, B. F. et al. 2005. The Epidemiology of Social Anxiety Disorder in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of Clinical Psychiatry* 66(11):1351–61. doi: 10.4088/jcp.v66n1102.
25. Greenberg, P. E., Fournier, A. A., Sisitsky, T., Pike, C. T. and Kessler, R. C. 2015. The Economic Burden of Adults with Major Depressive Disorder in the United States (2005 and 2010). *Journal of Clinical Psychiatry* 76(2):155–62. doi: 10.4088/JCP.14m09298.
26. Grundy, E., van den Broek, T. and Keenan, K. 2019. Number of Children, Partnership Status, and Later-Life Depression in Eastern and Western Europe. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences* 74(2):353–63. doi: 10.1093/geronb/gbx050.
27. Haller, H., Cramer, H., Lauche, R., Gass, F. and Dobos, G. J. 2014. The Prevalence and Burden of Subthreshold Generalized Anxiety Disorder: A Systematic Review. *BMC Psychiatry* 14(1). doi: 10.1186/1471-244X-14-128.
28. Han, B., Olfson, M. and Mojtabai, R. 2017. Depression Care among Depressed Adults with and without Comorbid Substance Use Disorders in the United States. *Depression and Anxiety* 34(3):291–300. doi: 10.1002/da.22592.
29. Hartung, T. J. et al. 2017. The Hospital Anxiety and Depression Scale (HADS) and the 9-Item Patient Health Questionnaire (PHQ-9) as Screening Instruments for Depression in Patients with Cancer. *Cancer* 123(21):4236–43. doi: 10.1002/cncr.30846
30. Hawke, L. D., Provencher, M. D., Parikh, S. V. and Zagorski, B. 2013. Comorbid Anxiety Disorders in Canadians with Bipolar Disorder: Clinical Characteristics and Service Use. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie* 58(7):393–401. doi: 10.1177/070674371305800704.
31. Health Behaviour among Latvian Adult Population. Slimību profilakses un kontroles centrs.2022. Available at: <https://www.spkc.gov.lv/lv/media/18708/download?attachment>. [accessed 15.04.23].
32. Herreen, D., Rice, S. and Zajac, I. 2022. Brief Assessment of Male Depression in Clinical Care: Validation of the Male Depression Risk Scale Short Form in a Cross-Sectional Study of Australian Men. *BMJ Open* 12(3):e053650. doi: 10.1136/bmjopen-2021-053650.
33. Holton, S., Fisher, J. and Rowe, H. 2010. Motherhood: Is It Good for Women's Mental Health? *Journal of Reproductive and Infant Psychology* 28(3):223–39. doi: 10.1080/02646830903487359.

34. Ivanovs, R. et al. 2018. Association of Depression and Anxiety with Cardiovascular Co-Morbidity in a Primary Care Population in Latvia: A Cross-Sectional Study. *BMC Public Health* 18. doi: doi: 10.1186/s12889-018-5238-7.
35. Johnson, L. 2021. Exploring Factors Associated with Pregnant Women's Experiences of Material Hardship during COVID-19: A Cross-Sectional Qualtrics Survey in the United States. *BMC Pregnancy and Childbirth* 21(1):755. doi: 10.1186/s12884-021-04234-1.
36. Karlsen, S., Nazroo, J. Y., McKenzie, K., Bhui, K. and Weich, S. 2005. Racism, Psychosis and Common Mental Disorder among Ethnic Minority Groups in England. *Psychological Medicine* 35(12):1795–1803. doi: 10.1017/S0033291705005830.
37. Kessler, R. C. et al. 1994. Lifetime and 12-Month Prevalence of DSM-III-R Psychiatric Disorders in the United States. Results from the National Comorbidity Survey. *Archives of General Psychiatry* 51(1):8–19. doi: 10.1001/archpsyc.1994.03950010008002.
38. Kjeldsberg, M., Tschudi-Madsen, H., Bruusgaard, D. and Natvig, B. 2022. Factors Related to Self-Rated Health: A Survey among Patients and Their General Practitioners. *Scandinavian Journal of Primary Health Care* 40(2):320–28. doi: 10.1080/02813432.2021.2022341.
39. Kujanpää, T., Jokelainen, J., Auvinen, J. and Timonen, M. 2016. Generalised Anxiety Disorder Symptoms and Utilisation of Health Care Services. A Cross-Sectional Study from the “Northern Finland 1966 Birth Cohort”. *Scandinavian Journal of Primary Health Care* 34(2):151–58. doi: 10.3109/02813432.2016.1160631.
40. Kurlansik, S. L. and Maffei, M. S. 2016. Somatic Symptom Disorder. *American Family Physician* 93(1):49–54.
41. Lecrubier, Y. et al. 1997. The Mini International Neuropsychiatric Interview (MINI): A Short Diagnostic Structured Interview: Reliability and Validity According to the CIDI. *European Psychiatry* 12(5):224–31. doi: 10.1016/S0924-9338(97)83296-8.
42. Lee, J. H. and Dunner, D. L. 2008. The Effect of Anxiety Disorder Comorbidity on Treatment Resistant Bipolar Disorders. *Depression and Anxiety* 25(2):91–97. doi: 10.1002/da.20279.
43. Levis, B., Benedetti, A. and Thombs, B. D. 2019. Accuracy of Patient Health Questionnaire-9 (PHQ-9) for Screening to Detect Major Depression: Individual Participant Data Meta-Analysis. *The BMJ* 365. doi: 10.1136/bmj.11476.
44. Li, F. et al. 2019. Reproductive History and Risk of Depressive Symptoms in Postmenopausal Women: A Cross-Sectional Study in Eastern China. *Journal of Affective Disorders* 246:174–81. doi: 10.1016/j.jad.2018.12.031.

45. Lim, G. Y. et al. 2018. Prevalence of Depression in the Community from 30 Countries between 1994 and 2014 /692/699/476/1414 /692/499 Article. *Scientific Reports* 8(1):1–10. doi: 10.1038/s41598-018-21243-x.
46. Löwe, B. et al. 2008. Validation and Standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the General Population. *Medical Care* 46(3):266–74. doi: 10.1097/MLR.0b013e318160d093.
47. Luoma, J. B., Martin, C. E. and Pearson, J. L. 2002. Contact with Mental Health and Primary Care Providers before Suicide: A Review of the Evidence. *The American Journal of Psychiatry* 159(6):909–16. doi: 10.1176/appi.ajp.159.6.909.
48. Martín-Merino, E., Ruigómez, A., Wallander, M. A., Johansson, S. and García-Rodríguez, L. A. 2009. Prevalence, Incidence, Morbidity and Treatment Patterns in a Cohort of Patients Diagnosed with Anxiety in UK Primary Care. *Family Practice* 27(1):9–16. doi: 10.1093/fampra/cmp071.
49. Martin, A., Rief, W., Klaiberg, A. and Braehler, E. 2006. Validity of the Brief Patient Health Questionnaire Mood Scale (PHQ-9) in the General Population. *General Hospital Psychiatry* 28(1):71–77. doi: 10.1016/j.genhosppsych.2005.07.003.
50. Martin, L.A., Neighbors, H. W. and Griffith, D. M. 2013. The Experience of Symptoms of Depression in Men vs Women: Analysis of the National Comorbidity Survey Replication. *JAMA Psychiatry* 70(10):1100–1106. doi: 10.1001/jamapsychiatry.2013.1985.
51. McGlashan, T. H. et al. 2000. The Collaborative Longitudinal Personality Disorders Study: Baseline Axis I/II and II/II Diagnostic Co-Occurrence. *Acta Psychiatrica Scandinavica* 102(4):256–64. doi: <https://doi.org/10.1034/j.1600-0447.2000.102004256.x>.
52. McHugh, R. K., Votaw, V. R., Sugarman, D. E. and Greenfield, S. H. 2018. Sex and Gender Differences in Substance Use Disorders. *Clinical Psychology Review* 66:12–23. doi: 10.1016/j.cpr.2017.10.012.
53. McKnight, P. E., Monfort, S. S., Kashdan, T. B., Blalock, D. V. and Calton, J. M. 2016. Anxiety Symptoms and Functional Impairment: A Systematic Review of the Correlation between the Two Measures. *Clinical Psychology Review* 45:115–30. doi: 10.1016/j.cpr.2015.10.005.
54. McLean, C.P., Asnaani, A., Litz, B.T. and Hofmann, S.G. 2011. Gender Differences in Anxiety Disorders: Prevalence, Course of Illness, Comorbidity and Burden of Illness. *Journal of Psychiatric Research* 45(8):1027–35. doi: 10.1016/j.jpsychires.2011.03.006.
55. Miranda-Mendizabal, A. et al. 2019. Gender Differences in Suicidal Behavior in Adolescents and Young Adults: Systematic Review and Meta-Analysis of Longitudinal Studies. *International Journal of Public Health* 64(2):265–83. doi: 10.1007/s00038-018-1196-1.

56. Missinne, S. and Bracke, P. 2012. Depressive Symptoms among Immigrants and Ethnic Minorities: A Population Based Study in 23 European Countries. *Social Psychiatry and Psychiatric Epidemiology* 47(1):97–109. doi: 10.1007/s00127-010-0321-0.
57. Moussavi, S. et al. 2007. Depression, Chronic Diseases, and Decrements in Health: Results from the World Health Surveys. *Lancet* 370(9590):851–58. doi: 10.1016/S0140-6736(07)61415-9.
58. Moylan, S., Jacka, F. N., Pasco, J. A. and Berk, M. 2013. How Cigarette Smoking May Increase the Risk of Anxiety Symptoms and Anxiety Disorders: A Critical Review of Biological Pathways. *Brain and Behavior* 3(3):302–26. doi: 10.1002/brb3.137.
59. Muñoz-Navarro, R. et al. 2017. Screening for Generalized Anxiety Disorder in Spanish Primary Care Centers with the GAD-7. *Psychiatry Research* 256:312–17. doi: 10.1016/j.psychres.2017.06.023.
60. Nabavi, B., Mitchell, A. J. and Nutt, D. 2015. A Lifetime Prevalence of Comorbidity Between Bipolar Affective Disorder and Anxiety Disorders: A Meta-Analysis of 52 Interview-Based Studies of Psychiatric Population. *EBioMedicine* 2(10):1405–19. doi: 10.1016/j.ebiom.2015.09.006.
61. National Academies of Sciences, Engineering, and Medicine. 2019. Reproducibility and Replicability in Science. Washington, DC: The National Academies Press
62. Negeri, Z. F. et al. 2021. Accuracy of the Patient Health Questionnaire-9 for Screening to Detect Major Depression: Updated Systematic Review and Individual Participant Data Meta-Analysis. *BMJ (Clinical Research Ed.)* 375:n2183. doi: 10.1136/bmj.n2183.
63. Nelson-Coffey, S. K., Killingsworth, M., Layous, M., Cole, S. W. and Lyubomirsky, S. 2019. Parenthood Is Associated With Greater Well-Being for Fathers Than Mothers. *Personality & Social Psychology Bulletin* 45(9):1378–90. doi: 10.1177/0146167219829174.
64. Nelson, S. K., Kushlev, K. and Lyubomirsky, S. 2014. The Pains and Pleasures of Parenting: When, Why, and How Is Parenthood Associated with More or Less Well-Being? *Psychological Bulletin* 140(3):846–95. doi: 10.1037/a0035444.
65. Newton-Howes, G. et al. 2013. Influence of Personality on the Outcome of Treatment in Depression: Systematic Review and Meta-Analysis. *Journal of Personality Disorders* 28(4):577–93. doi: 10.1521/pedi_2013_27_070.
66. Nomaguchi, K. M., Milkie, M. A. and Bianchi, S. M. 2005. Time Strains and Psychological Well-Being: Do Dual-Earner Mothers and Fathers Differ? *Journal of Family Issues* 26(6):756–92. doi: 10.1177/0192513X05277524.
67. Oficiālās statistikas portāls. Latvijas oficiālā statistika. 01.03.23. Strādājošo mēneša vidējā darba samaksa reģionos (eiro) 2021–2022. Available at: <https://stat.gov.lv/lv/statistikas-temas/darbs/alga/tabulas/dsv041-stradajoso-menesa-videja-darba-samaksa-regionos-eiro> [accessed: 15.08.23.].

68. Olatunji, B. O., Cisler, J. M. and Tolin, D. F. 2007. *Quality of Life in the Anxiety Disorders : A Meta-Analytic Review*. 27:572–81. doi: 10.1016/j.cpr.2007.01.015.
69. Olesen, J., Gustavsson, A., Svensson, M., Wittchen, H. U. and Jönsson, B. 2012. The Economic Cost of Brain Disorders in Europe. *European Journal of Neurology* 19(1):155–62. doi: 10.1111/j.1468-1331.2011.03590.x.
70. Pálkás, A. et al. 2019. Associations between Untreated Depression and Secondary Health Care Utilization in Patients with Hypertension and/or Diabetes. *Social Psychiatry and Psychiatric Epidemiology* 54(2):255–76. doi: 10.1007/s00127-018-1545-7.
71. Patton, G. C. et al. 1998. Depression, Anxiety, and Smoking Initiation: A Prospective Study over 3 Years. *American Journal of Public Health* 88(10):1518–22. doi: 10.2105/ajph.88.10.1518.
72. Plana-Ripoll, O. et al. 2019. A Comprehensive Analysis of Mortality-Related Health Metrics Associated with Mental Disorders: A Nationwide, Register-Based Cohort Study. *The Lancet* 394(10211):1827–35. doi: 10.1016/S0140-6736(19)32316-5.
73. Preti, A., Vrublevska, J., Veroniki, A. A., Huedo-Medina, T. B. and Fountoulakis, K. N. 2016. Prevalence, Impact and Treatment of Generalised Anxiety Disorder in Bipolar Disorder: A Systematic Review and Meta-Analysis. *Evidence-Based Mental Health* 19(3):73–81. doi: 10.1136/eb-2016-102412.
74. Racine, N., Plamondon, A., Hentges, R., Tough, S. and Madigan, S. 2019. Dynamic and Bidirectional Associations between Maternal Stress, Anxiety, and Social Support: The Critical Role of Partner and Family Support. *Journal of Affective Disorders* 252:19–24. doi: 10.1016/j.jad.2019.03.083.
75. Rancans, E., Vrublevska, J., Snikere, S., Koroleva, J. and Trapencieris, M. 2014. The Point Prevalence of Depression and Associated Sociodemographic Correlates in the General Population of Latvia. *Journal of Affective Disorders* 156:104–10. doi: 10.1016/j.jad.2013.11.022.
76. Rancans, E., Trapencieris, M., Ivanovs, R. and Vrublevska, J. 2018. Validity of the PHQ-9 and PHQ-2 to Screen for Depression in Nationwide Primary Care Population in Latvia. *Annals of General Psychiatry* 1–8. doi: 10.1186/s12991-018-0203-5.
77. Rantanen, A. T., Korkeila, J. J. A., Kautiainen, H. and Korhonen, P. E. 2019. Poor or Fair Self-Rated Health Is Associated with Depressive Symptoms and Impaired Perceived Physical Health: A Cross-Sectional Study in a Primary Care Population at Risk for Type 2 Diabetes and Cardiovascular Disease. *European Journal of General Practice* 25(3):143–48. doi: 10.1080/13814788.2019.1635114.
78. Reddy, V. M. and Chandrashekar, C. R. 1998. Prevalence of Mental and Behavioural Disorders in India : A Meta-Analysis. *Indian Journal of Psychiatry* 40(2):149–57.

79. Renemane, L., Kivite-Urtane, A. and Rancans, E. 2021. Suicidality and Its Relation with Physical and Mental Conditions: Results from a Cross-Sectional Study of the Nationwide Primary Care Population Sample in Latvia. *Medicina (Kaunas, Lithuania)* 57(9). doi: 10.3390/medicina57090970.
80. Rice, S. M., Fallon, B. J., Aucote, H. M. and Möller-Leimkühler, A. M. 2013. Development and Preliminary Validation of the Male Depression Risk Scale: Furthering the Assessment of Depression in Men. *Journal of Affective Disorders* 151(3):950–58. doi: 10.1016/j.jad.2013.08.013.
81. Roy-Byrne, P. P. and Wagner, A. 2004. Primary Care Perspectives on Generalized Anxiety Disorder. *Journal of Clinical Psychiatry* 65(SUPPL. 13):20–26. PMID: 15384933.
82. Ruscio, A. M. et al. 2017. Cross-Sectional Comparison of the Epidemiology of DSM-5 Generalized Anxiety Disorder Across the Globe. *JAMA Psychiatry* 74(5):465–75. doi: 10.1001/jamapsychiatry.2017.0056.
83. Rutter, L. A. and Brown, T. A. 2017. Psychometric Properties of the Generalized Anxiety Disorder Scale-7 (GAD-7) in Outpatients with Anxiety and Mood Disorders. *Journal of Psychopathology and Behavioral Assessment* 39(1):140–46. doi: 10.1007/s10862-016-9571-9.
84. Saha, S. et al. 2021. Co-Morbidity between Mood and Anxiety Disorders: A Systematic Review and Meta-Analysis. *Depression and Anxiety* 38(3):286–306. doi: 10.1002/da.23113.
85. Sedlinská, T. et al. 2021. Male Depression Syndrome Is Characterized by Pronounced Cluster B Personality Traits. *Journal of Affective Disorders* 292:725–32. doi: 10.1016/j.jad.2021.05.114.
86. Sellström, E., Bremberg, S. and O'Campo, P. 2011. Yearly Incidence of Mental Disorders in Economically Inactive Young Adults. *European Journal of Public Health* 21(6):812–14. doi: 10.1093/eurpub/ckq190.
87. Sheehan, D. V. et al. 1997. The Validity of the Mini International Neuropsychiatric Interview (MINI) According to the SCID-P and Its Reliability. *European Psychiatry* 12(5):232–41. doi: [https://doi.org/10.1016/S0924-9338\(97\)83297-X](https://doi.org/10.1016/S0924-9338(97)83297-X).
88. Sheehan, D. V. et al. 1998. The Mini-International Neuropsychiatric Interview (M.I.N.I.): The Development and Validation of a Structured Diagnostic Psychiatric Interview for DSM-IV and ICD-10. *The Journal of Clinical Psychiatry* 59 Suppl 2:22–57.
89. Shvartzman, P. et al. 2005. Health Services Utilization by Depressive Patients Identified by the MINI Questionnaire in a Primary Care Setting. *Scandinavian Journal of Primary Health Care* 23(1):18–25. doi: 10.1080/02813430510018383.
90. Spitzer, R. L., Kroenke, K., Williams, J. B. and Löwe, B. 2006. A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine* 166(10):1092–97. doi: 10.1001/archinte.166.10.1092.

91. Swendsen, J. et al. 2010. Mental Disorders as Risk Factors for Substance Use, Abuse and Dependence: Results from the 10-Year Follow-up of the National Comorbidity Survey. *Addiction (Abingdon, England)* 105(6):1117–28. doi: 10.1111/j.1360-0443.2010.02902.x.
92. Thornicroft, G. et al. 2017. Undertreatment of People with Major Depressive Disorder in 21 Countries. *The British Journal of Psychiatry: The Journal of Mental Science* 210(2):119–24. doi: 10.1192/bjp.bp.116.188078.
93. Tjora, T., Hetland, J., Aarø, L. E. and Øverland, S. 2011. Distal and Proximal Family Predictors of Adolescents' Smoking Initiation and Development: A Longitudinal Latent Curve Model Analysis. *BMC Public Health* 11:911. doi: 10.1186/1471-2458-11-911.
94. Umberson, D., Pudrovska, T. and Reczek, C. 2010. Parenthood, Childlessness, and Well-Being: A Life Course Perspective. *Journal of Marriage and the Family* 72(3):612–29. doi: 10.1111/j.1741-3737.2010.00721.x.
95. Vrublevska, J. et al. 2017. The 12-Month Prevalence of Depression and Health Care Utilization in the General Population of Latvia. *Journal of Affective Disorders* 210(August 2016):204–10. doi: 10.1016/j.jad.2016.12.031.
96. Vrublevska, J. et al. 2022. Determinants of Anxiety in the General Latvian Population During the COVID-19 State of Emergency. *Frontiers in Public Health* 10:854812. doi: 10.3389/fpubh.2022.854812.
97. Vrublevska, J., Renemane, L., Kivite-Urtane, A. and Rancans, E. 2022. Validation of the Generalized Anxiety Disorder Scales (GAD-7 and GAD-2) in Primary Care Settings in Latvia. *Frontiers in Psychiatry* 13:972628. doi: 10.3389/fpsy.2022.972628.
98. Vrublevska, J., Trapencieris, M. and Rancans, E. 2018. Adaptation and Validation of the Patient Health Questionnaire-9 to Evaluate Major Depression in a Primary Care Sample in Latvia. *Nordic Journal of Psychiatry* 72(2):112–18. doi: 10.1080/08039488.2017.1397191.
99. Wang, H., Chen, M., Xin, T. and Tang, K. 2020. Number of Children and the Prevalence of Later-Life Major Depression and Insomnia in Women and Men: Findings from a Cross-Sectional Study of 0.5 Million Chinese Adults. *BMC Psychiatry* 20(1):267. doi: 10.1186/s12888-020-02681-2.
100. Wang, L., Kroenke, K., Stump, T. E. and Monahan, P. O. 2021. Screening for Perinatal Depression with the Patient Health Questionnaire Depression Scale (PHQ-9): A Systematic Review and Meta-Analysis. *General Hospital Psychiatry* 68:74–82. doi: 10.1016/j.genhosppsych.2020.12.007.
101. Weinberger, A. H. et al. 2018. Trends in Depression Prevalence in the USA from 2005 to 2015: Widening Disparities in Vulnerable Groups. *Psychological Medicine* 48(8):1308–15. doi: 10.1017/S0033291717002781.

102. Whiteford, H. A. et al. 2013. Global Burden of Disease Attributable to Mental and Substance Use Disorders: Findings from the Global Burden of Disease Study 2010. *Lancet (London, England)* 382(9904):1575–86. doi: 10.1016/S0140-6736(13)61611-6.
103. Whiteford, H. A., Ferrari, A. J., Degenhardt, L. and Feigin, V. 2015. *The Global Burden of Mental, Neurological and Substance Use Disorders: An Analysis from the Global Burden of Disease Study 2010*. 1–14. doi: 10.1371/journal.pone.0116820
104. Wieclaw, J. et al. 2008. Psychosocial Working Conditions and the Risk of Depression and Anxiety Disorders in the Danish Workforce. *BMC Public Health* 8(1):280. doi: 10.1186/1471-2458-8-280.
105. Williams, R. et al. 2020. Impact of Co-Morbid Personality Disorder on Quality of Inpatient Mental Health Services for People with Anxiety and Depression. *Personality and Mental Health* 14(4):336–49. doi: <https://doi.org/10.1002/pmh.1484>.
106. Wills, L. and Petrakis, M. 2019. The Self in Motherhood: A Systematised Review of Relational Self-Construal and Wellbeing in Mothers. *Advances in Mental Health* 17(1):72–84. doi: 10.1080/18387357.2018.1476066.
107. Wittchen, H. U. et al. 2011. The Size and Burden of Mental Disorders and Other Disorders of the Brain in Europe 2010. *European Neuropsychopharmacology* 21(9):655–79. doi: 10.1016/j.euroneuro.2011.07.018.
108. Wittchen, H. U., Zhao, S., Kessler, R. C. and Eaton, W. W. 1994. DSM-III-R Generalized Anxiety Disorder in the National Comorbidity Survey. *Archives of General Psychiatry* 51(5):355–64. doi: 10.1001/archpsyc.1994.03950050015002.
109. Wittchen, H. U. et al. 2002. Generalized Anxiety and Depression in Primary Care: Prevalence, Recognition, and Management. *The Journal of Clinical Psychiatry* 63 Suppl 8:24–34.
110. World Health Organisation. Comprehensive Mental Health Action Plan 2013–2030. 21.09.2021. Available at: <https://www.who.int/publications/i/item/9789240031029> [accessed 17.07.23.].
111. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA*. 2013 Nov 27;310(20):2191–4. doi: 10.1001/jama.2013.281053. PMID: 24141714.
112. Yu, W. et al. 2018. Generalized Anxiety Disorder in Urban China: Prevalence, Awareness, and Disease Burden. *Journal of Affective Disorders* 234:89–96. doi: 10.1016/j.jad.2018.02.012.
113. Yu, X., Tam, W. W., Wong, P. T., Lam, T. H. and Stewart, S. M. 2012. The Patient Health Questionnaire-9 for Measuring Depressive Symptoms among the General Population in Hong Kong. *Comprehensive Psychiatry* 53(1):95–102. doi: 10.1016/j.comppsy.2010.11.002.

114. Zhang, H. et al. 2020. Comparison of the Geriatric Depression Scale-15 and the Patient Health Questionnaire-9 for Screening Depression in Older Adults. *Geriatrics and Gerontology International* 20(2):138–43. doi: 10.1111/ggi.13840.
115. Zhou, J., Ko, J. Y., Haight, S. C. and Tong, V. T. 2019. Treatment of Substance Use Disorders Among Women of Reproductive Age by Depression and Anxiety Disorder Status, 2008–2014. *Journal of Women's Health* (2002) 28(8):1068–76. doi: 10.1089/jwh.2018.7597.

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