Prevalence and variability of depressive symptoms in Europe: update using representative data from the second and third waves of the European Health Interview Survey (EHIS-2 and EHIS-3)

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Summary

Background Assessing the prevalence of clinically relevant depressive symptoms and their possible variation by country and over time could be a valuable resource to inform the development of public health policies and preventive resources to reduce mental health burden. We aimed to assess cross-national differences in the point prevalence of clinically relevant depressive symptoms in Europe in 2018–20, and to evaluate point prevalence differences between countries and over time between 2013–15 and 2018–20.

Methods In this population-based study, data from participants in the second and third waves of the European Health Interview Survey (EHIS-2 from 2013 to 2015 and EHIS-3 from 2018 to 2020) from 30 European countries were used (n=542 580). From the total sample, 283 692 participants belonging to EHIS-3 were included in the study (52·4% women and 47·5% men). The non-response in EHIS-3 ranged by country, from 12% to 78%. Point prevalence of clinically relevant depressive symptoms was evaluated using a cutoff score of 10 or more for the 8-item version of the Patient Health Questionnaire. Crude prevalence ratios and adjusted prevalence ratios (aPRs) were obtained to assess differences in the prevalence between countries and over time within countries.

Findings The point prevalence of clinically relevant depressive symptoms in Europe in 2018–20 was 6·54% (95% CI 6·34–6·73), ranging across countries from 1·85% (1·53–2·17) in Greece to 10·72% (10·04–11·40) in Sweden. Compared with the other European countries, those with the lowest aPRs were Greece, Serbia, and Cyprus and those with the highest aPRs were Belgium, Slovenia, and Croatia. A small but significant increase in the prevalence between EHIS-2 and EHIS-3 was observed (aPR 1·11 [1·07–1·14]). A wide variability over time in the point prevalence within countries was observed, ranging from an aPR of 0·63 (0·54–0·74) in Hungary to 1·88 (1·53–2·31) in Slovenia.

Interpretation This study, based on large and representative datasets and a valid and reliable screening tool for the assessment of depression, indicates that the point prevalence of clinically relevant depressive symptoms in Europe from 2013 to 2020 remains relatively stable, with wide variability between countries. These findings could be considered a baseline for monitoring the prevalence of clinically relevant depressive symptoms in Europe, and could inform policy for the development of preventive strategies for depression both at a country and European level.

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Introduction

Depression is a major public health problem, and one of the primary causes of disability and poor quality of life, affecting more than 300 million people worldwide.[1,2] Due to its relevance and impact, the implementation of public health policies and preventive measures to reduce the burden of depression could constitute an important step forward to improve the general health status of the population.[3] Precise prevalence estimates are crucial to inform prevention efforts. Moreover, due to the considerable temporal and spatial variability of prevalence estimates, a periodical evaluation of the population distribution of clinically relevant depressive symptoms is required.

To date, several studies have been conducted in Europe assessing the prevalence of clinically relevant depressive symptoms,[4–8] showing that the prevalence of depression might increase over time.[5,9] However, discrepancies in results have been reported, particularly when assessing prevalence differences by country.[4,5,10] This variability could be related to differences in the tools used for the assessment of clinically relevant depressive symptoms and factors contributing to between-country variation—eg, sociodemographic factors such as socioeconomic

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Research in context

Evidence before this study

PubMed and Google Scholar were searched using a combination of key terms including "prevalence", "depress*", "representative", "survey" and "Europe". The search was limited to Jan 1, 2010 to July 1, 2023. Different articles focusing on the prevalence of depression were identified. However, most of the articles identified did not specifically assess the prevalence of depression (or clinically relevant depressive symptoms) and were focused on specific countries or population groups (eg, patients with specific physical health problems). Additionally, the results from the identified studies were difficult to compare due to differences in the measures used to assess depression, the type of variables considered, and the assessed populations. One of the largest studies was based on data from the second wave of the European Health Interview Survey (EHIS-2); it showed that in 2013–15, the point prevalence of clinically relevant depressive symptoms in Europe was 6·38% and varied widely across countries. However, due to the considerable temporal and spatial variability of the point prevalence estimations, a periodical evaluation is required.

Added value of this study

This study, using data from the third wave of the European Health Interview Survey (EHIS-3), is one of the largest and most recent studies worldwide that assesses the point prevalence of clinically relevant depressive symptoms. The results provide updated estimations of the point prevalence of clinically relevant depressive symptoms in Europe, showing a marginal increase with respect to EHIS-2 (6·54%, up from 6·38%), with high variability across countries (from 1·58% in Greece to 10·72% in Sweden), and the variability between countries was minimal between the waves.

Implications of all the available evidence

Due to the within-country representativeness of the data, the suitability and comparability of the questionnaire used for the assessment of clinically relevant depressive symptoms, and the robustness of the results, the prevalence estimations presented could serve as a reference for the monitoring of clinically relevant depressive symptoms in Europe. Additionally, these data could serve as a baseline for further studies on the prevalence of clinically relevant depressive symptoms in Europe, and could inform the development of targeted mental health policies and preventive measures.

status, or health-related factors such as diet.[4,5] One of the largest studies carried out to date in Europe for the assessment of the point prevalence of clinically relevant depressive symptoms (ie, of people with a probable depressive disorder), as well as of differences in their prevalence by country, was based on data from the second wave of the European Health Interview Survey (EHIS-2).[7] This study showed that the overall point prevalence was 6·4%, with a wide variability across countries, ranging from 2·6% in the Czech Republic to 10·3% in Iceland. This study used representative data at the country level,[11] and assessed the point prevalence using the 8-item version of the Patient Health Questionnaire (PHQ-8), a questionnaire with suitable comparability between European countries[12] that has been recommended by the joint initiative by funders and journals to enhance the comparability of results between studies.[13] Thus, obtaining updated results using data from the third wave of the European Health Interview Survey (EHIS-3) will offer valuable information about the cross-country variability of clinically relevant depressive symptoms in Europe, and of the variability of this prevalence within countries over time.

It should be noted that the prevalence of clinically relevant depressive symptoms is consistently related to different sociodemographic (eg, gender, age, and educational level)[7,14–16] and health-related (eg, diet, physical activity, and smoking status) characteristics. These factors might account for country-level variations in the prevalence of depression and have a wide variability over time and across countries. For example, higher depression rates were found among women, older populations, and those who were underweight or obese.[17–20] Similarly, socioeconomic status might be associated with depression.[21] Thus, it is important to consider the combined effects of multiple risk factors when comparing the prevalence of depression at a specific timepoint or over time.[3]

In this study we aimed to assess cross-country differences in the point prevalence of clinically relevant depressive symptoms in Europe in 2018–20, to evaluate differences in point prevalence between countries, and to describe temporal changes in the point prevalence of clinically relevant depressive symptoms between 2013–15 (EHIS-2) and 2018–20 (EHIS-3).

Methods

Study design and participants

This observational study used pooled data from EHIS-3. EHIS-3 is a cross-sectional country-level representative survey designed as a follow-up survey to EHIS-2 (conducted between 2013 and 2015 using a completely independent sample to EHIS-3). The data collection was carried out between January, 2018 and September, 2020, including all the EU member states (28 in total), and Iceland, Norway, Serbia, the UK, and Turkey.[22,23] Data were collected in the COVID-19 pre-pandemic period (ie, before February, 2020) except the

data from Germany (collected until September, 2020), Spain (until July, 2020), Malta (until April, 2020), and Latvia (until February, 2020).[22] Ethical approval for this study was obtained from the Ethics Committee of the Hospital del Mar (2012/9896) and the University of Leon (ETICA-ULE-032–2021). The study was reported in accordance with the STROBE guidelines.

EHIS-3 gathers cross-sectional information on health-related, socioeconomic-related, habit-related, and lifestyle-related factors. When necessary, different linguistic modifications of specific questions were made to ensure their conceptual comparability (such as phrasing changes to adapt questions to the nuances of the national languages). The variables collected in EHIS-3 are the same as those used in EHIS-2,[23,24] allowing them to be pooled to study differences over time. For this study, data from both surveys were pooled to compare the point prevalence between EHIS-2 and EHIS 3, as participants in the two waves were not the same. This data pool included information from 27 countries included in EHIS-2 (of a potential 31), and from 29 countries included in EHIS-3. All participants with complete data on clinically relevant depressive symptoms assessed using the PHQ-8 were included (a total of 542 580 participants; 258 888 participants from EHIS-2 and 283 692 participants from EHIS-3). Further information about EHIS-2 and EHIS-3 and the selection of participants for this study is in the appendix (p 2). Further information about the characteristics of the sample from EHIS-2 (and the distribution of the prevalence over them) can be found in a previous study.[7]

Procedures

Clinically relevant depressive symptoms were assessed using the PHQ-8,[25] a self-reported questionnaire that consists of eight out of the nine symptom criteria of depression from the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV). DSM-IV has shown high reliability and good validity for assessing clinically relevant depressive symptoms in the general population,[26–29] as well as measurement equivalence across several European countries.[12] The PHQ-8 includes eight self-reported Likert-type items with a response scale from zero (not at all) to three (nearly every day). Each item of the PHQ-8 corresponds to each of the DSM-IV diagnostic criteria for major depressive episode (ie, the symptoms must be present within the last 2 weeks) without the ninth criteria about suicidality, included in the 9-item version (the PHQ-9). Other than this difference, the PHQ-8 and the PHQ-9 are equivalent.[29] The PHQ-8 score ranges from zero to 24 and is calculated by summing the responses to each of the items. For this study, a cutoff score of ten or more for the PHQ-8 score was considered as positive clinically relevant depressive symptoms.[25,29] This cutoff value has shown high sensitivity (more than 85%) and specificity (more than 85%) to detect major depression using semi-structured diagnostic interview as reference standard, and, due to its widespread use, it allows comparisons with other studies.[30] Sensitivity analysis using a cutoff score of 12 or more and the algorithm scoring method of the PHQ-8 were also used to assess the point prevalence of clinically relevant depressive symptoms.[30,31]

The main explanatory factor considered in this study was the country of residence of participants. A comprehensive set of other sociodemographic and health-related variables were also considered. Socio-demographic variables included gender, age, birthplace, degree of urbanisation of the residence area of the participant, net monthly income of the household equivalised for each country, and educational level, and health-related variables included long-term conditions, limitations on general activities, BMI, fruit and vegetable consumption, smoking status, and physical activity (considered as the number of days per week taking part in activities that result in, at least, a little rise in heart rate or breathing for at least 10 minutes non-stop). Furthermore, the data collection mode (interview method) was considered as a covariate in the multivariable models.

Statistical analysis

Descriptive analyses of the general characteristics of the population of EHIS-3 and of the distribution of the point prevalence of clinically relevant depressive symptoms across populations and by country were conducted using unadjusted and weighted percentages and 95% CIs. The differences in the point prevalence between EHIS-3 and EHIS-2 overall and in the point prevalence by country were also obtained. Differences in the prevalence of clinically relevant depressive symptoms between each country and the rest of the included countries for EHIS-3 (between countries), and within the same countries over waves (within-country EHIS-2 *vs* EHIS-3) were assessed using crude prevalence ratios (PRs), adjusted PRs (aPRs), and 95% CI obtained from Poisson bivariable and multivariable regression models. More detailed information about the modelling process is in the appendix (p 3).[7]

See Online for appendix

Sensitivity analyses were performed to calculate the point prevalence of clinically relevant depressive symptoms stratified by gender and country, and by age group and country. To ensure the validity and robustness of the findings, we conducted sensitivity analyses calculating the overall point prevalence and the point prevalence by country using a cutoff score of 12 or more for the PHQ-8, and the PHQ-8 algorithm scoring method. Furthermore, prevalence ratios, aPRs, and 95% CIs (between country, and EHIS-3 *vs* EHIS-2) were calculated using these scoring methods and the same approach as for the main analyses.

All the covariates included in the study had missing data except sex, age, and country. The percentage of

missing data for the variables included ranged from 0% (sex, age, and country) to 5·3% (household income). As multivariable normality could not be assumed, multiple imputation models using chained equations with five imputations were performed to deal with missing data. The weights derived from the complex sample design for each wave and country were considered for all the analyses (using the Taylor linearisation method for survey data).[32] The statistical analyses software Stata MP version 17 was used to perform all the analyses.

Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

A total of 283 692 individuals were included in the study (a weighted percentage of 52·4% were women [unweighted n=148 654] and 47·5% were men [unweighted n=134 753]; table 1), and the percentage of participants with PHQ-8 scores of 10 or more was higher among women,

	EHIS-3 (n=283 692)		PHQ-8 <10 (n=267 413)		PHQ-8 ≥10 (n=16 279)	
	Unadjusted % (weighted)	95% CI	Unadjusted % (weighted)	95% CI	Unadjusted % (weighted)	95% CI
Gender						
Men	47·58%	47·36–47·91	94·84%	94·57–95·10	5·16%	4·90–5·42
Women	52·42%	52·19–52·74	92·22%	91·94–92·50	7·78%	7·50–8·06
Age, years						
15–29	11·41%	11·28–11·65	94·00%	93·36–94·63	6·00%	5·37–6·64
30–44	24·19%	23·87–24·40	93·86%	93·39–94·32	6·14%	5·68–6·61
45–59	25·43%	25·25–25·70	93·60%	93·21–93·99	6·40%	6·01–6·79
60–74	23·30%	23·16–23·54	93·81%	93·48–94·14	6·19%	5·86–6·52
≥75	15·78%	15·66–16·09	91·74%	91·36–92·13	8·26%	7·87–8·64
Country of birth						
Native born	90·50%	90·37–90·72	93·68%	93·49–93·88	6·32%	6·12–6·51
Another European country	3·45%	3·21–3·50	92·91%	91·67–94·15	7·06%	5·83–8·30
Non-European country	6·21%	5·98–6·34	90·55%	89·53–91·87	9·44%	8·42–10·46
Residence area population						
Dense	39·66%	39·24–39·99	92·29%	91·94–92·64	7·69%	0·73–0·80
Intermediate	35·49%	35·17–35·70	93·73%	93·41–94·06	6·28%	5·96–6·60
Thin	25·05%	24·89–25·32	94·95%	94·67–95·23	5·08%	4·80–5·36
Net monthly income (quintiles)						
1 (lower income)	17·97%	17·60–18·14	88·33%	87·68–88·98	11·70%	11·05–12·34
2	19·48%	19·11–19·75	91·72%	91·23–92·21	8·28%	7·79–8·76
3	19·96%	19·68–20·13	94·01%	93·59–94·42	5·98%	5·57–6·40
4	21·36%	21·09–21·53	95·69%	95·38–96·00	4·28%	3·98–4·58
5 (higher income)	21·63%	21·47–21·89	96·57%	96·30–96·85	3·43%	3·15–3·70
Has long-standing illness						
Yes	44·25%	43·92–44·67	88·16%	87·79–88·53	11·84%	11·46–11·21
No	55·85%	55·43–56·18	97·67%	97·51–97·83	2·33%	2·17–2·49
General activity limitation						
Severely limited	6·34%	6·27–6·50	65·45%	64·11–66·79	34·54%	33·20–35·88
Limited but not severely	20·54%	20·37–20·81	87·61%	87·03–88·20	12·38%	11·80–12·97
Not limited	73·12%	72·83–73·42	97·53%	97·39–97·68	2·47%	2·32–2·61
Educational level						
Primary or lower	7·20%	7·16–7·45	89·64%	89·02–90·25	10·38%	9·76–10·99
Secondary	64·30%	64·09–64·60	93·02%	92·75–93·28	6·98%	6·72–7·25
Tertiary	28·50%	28·21–28·78	95·44%	95·17–95·72	4·56%	4·28–4·83
BMI, kg/m²						
<18·5	2·60%	2·58–2·71	88·27%	86·44–90·11	11·61%	9·81–13·41
18·5–24·9	44·76%	44·43–45·08	94·43%	94·16–94·70	5·57%	5·30–5·84
25·0–29·9	35·54%	35·23–35·85	94·22%	93·92–94·51	5·81%	5·51–6·10
≥30·0	17·21%	16·85–17·56	90·18%	89·61–90·75	9·80%	9·23–10·36

(Table 1 continues on next page)

	EHIS-3 (n=283 692)		PHQ<10 (n=267 413)		PHQ≥10 (n=16 279)	
	Unadjusted % (weighted)	95% CI	Unadjusted % (weighted)	95% CI	Unadjusted % (weighted)	95% CI
(Continued from previous page)						
Diet (fruit and vegetables)						
Daily	68·21%	67·91–68·51	94·07%	93·85–94·29	5·93%	5·71–6·15
4–6 times per week	19·59%	19·23–19·74	93·66%	93·24–94·08	6·34%	5·92–6·76
1–3 times per week	10·60%	10·40–10·81	90·68%	89·94–91,42	9·31%	8·57–10·05
<1 time per week	1·70%	1·61–1·88	84·32%	82·33–86·32	15·74%	13·73–17·74
Smoking status						
Daily smoking	18·16%	17·99–18·43	89·81%	89·15–90·47	10·20%	9·54–10·86
Occasional smoking	4·80%	4·76–4·95	93·76%	92·95–94·56	6·22%	5·41–7·02
No smoking	77·04%	76·75–77·33	94·31%	94·12–94·49	5·69%	5·51–5·88
Days per week doing sports						
0	52·87%	52·44–53·10	91·98%	91·70–92·25	8·00%	7·73–8·28
1	8·03%	7·84–8·23	94·62%	93·98–95·26	5·37%	4·72–6·01
2	11·55%	11·33–11·79	95·34%	94·83–95·85	4·67%	4·16–5·18
3	10·74%	10·52–10·96	95·49%	94·95–96·03	4·51%	3·97–5·05
4	5·10%	4·94–5·26	95·93%	95·16–96·70	4·04%	3·26–4·82
5	4·32%	4·21–4·47	95·59%	94·80–96·37	4·44%	3·63–5·24
6	1·88%	1·78–1·88	95·31%	94·02–96·59	4·74%	3·44–6·04
7	5·98%	5·80–6·15	93·49%	92·54–94·43	6·50%	5·55–7·45
Interview method						
Self-administered, postal non-electronic version	2·33%	2·27–2·38	91·54%	90·86–92·22	8·46%	7·77–9·14
Self-administered, web questionnaire	6·45%	6·35–6·56	91·00%	90·52–91·47	9·00%	8·53–9·48
Face-to-face interview, non-electronic version	40·47%	40·16–40·78	95·67%	95·54–95·81	4·33%	4·19–4·46
Telephone interview, non-electronic version	39·85%	39·46–40·25	91·55%	91·11–92·00	8·45%	8·00–8·89
Web personal interview	1·20%	1·16–1·24	90·78%	89·80–91·76	9·22%	8·24–10·20
Mixed mode collection	9·70%	9·57–9·82	94·54%	94·25–94·83	5·46%	5·17–5·75

EHIS-3=third wave of the European Health Interview Survey. PHQ-8=Patient Health Questionnaire 8 items. Further information about the quality of EHIS-3 data can be found at Eurostat.[23]

Table 1: **Distribution of general characteristics of the study population and unadjusted and weighted pecentage of participants with positive and negative clinically relevant depressive symptoms (PHQ-8) from EHIS-3 (2018–20)**

participants older than 74 years, those born in a non-European country, those residing in densely populated areas, those with lower net income, those with long-standing illnesses, those who are severely limited in their general activities, and those with primary or lower educational level. Additionally, the percentage of participants with PHQ-8 scores of 10 or more was also higher in participants with a BMI lower than 18·5 kg/m², and among those who consumed fruit and vegetables less than once per week, daily smokers, those who took part in physical activity less frequently, and those for whom the data collection method was a self-administered web questionnaire.

The overall point prevalence observed in EHIS-3 was 6·54% (95% CI 6·34–6·73; table 2), with Greece (1·85% [1·53–2·17]), Serbia (2·07% [1·80–2·34]), and Cyprus (2·09% [1·73–2·44]) having the lowest, and Sweden (10·72% [10·04–11·40]), Estonia (9·45% [8·57–10·33]), and Luxembourg (9·37% [8·45–10·29]) having the highest. The distribution stratified by gender and across the countries of the point prevalence (crude) shows that the point prevalence of clinically relevant depressive symptoms was higher among women (7·78%, [7·50–8·06]) than men (5·16% [4·90–5·43]) for all the countries together and for each of the countries included in this study (appendix p 4). Besides, the distribution of the point prevalence (crude) stratified by age groups indicates that the highest prevalence was found in the oldest population group (older than 75 years: 8·26% [7·87–8·64]; appendix p 5). Results of the sensitivity analyses show lower point prevalence using the cutoff score of 12 (overall point prevalence: 4·46% [4·29–4·63]) and higher using the algorithm (overall point prevalence: 6·82% [6·62–7·01]), and show a similar distribution of the point prevalence of clinically relevant depressive symptoms by country to that found in the main analyses (appendix p 6).

There was a wide variation in the PRs according to the country, with a significant difference when compared with the rest of the European countries, except for

	n	%	95% CI
Overall	283 692	6·54%	6·34–6·73
Austria	15 253	5·38%	4·92–5·84
Belgium	7493	8·67%	7·80–9·53
Bulgaria	7045	4·06%	3·63–4·50
Croatia	5176	8·36%	7·44–9·28
Cyprus	5906	2·09%	1·73–2·44
Czech Republic	7882	2·95%	2·57–3·34
Denmark	6169	9·25%	8·45–10·05
Estonia	4836	9·45%	8·57–10·33
Finland	5564	6·71%	5·91–7·52
Germany	22 550	8·22%	7·58–8·86
Greece	7783	1·85%	1·53–2·17
Hungary	5458	4·90%	4·31–5·49
Iceland	3723	9·52%	8·31–10·73
Ireland	7509	4·58%	4·00–5·15
Italy	39 077	4·29%	4·06–4·52
Latvia	5808	4·85%	4·25–5·44
Lithuania	4539	5·05%	4·41–5·69
Luxembourg	4109	9·37%	8·45–10·29
Malta	4344	3·66%	3·06–4·27
Netherlands	8144	8·93%	8·26–9·60
Norway	7826	5·64%	5·03–6·24
Poland	16 557	4·23%	3·87–4·59
Portugal	14 124	7·51%	6·82–8·20
Romania	15 377	3·92%	3·59–4·25
Serbia	12 406	2·07%	1·80–2·34
Slovakia	5520	2·90%	2·46–3·33
Slovenia	9460	7·71%	7·13–8·29
Sweden	9124	10·72%	10·04–11·40
UK	14 930	9·26%	8·55–9·96

EHIS-3=third wave of the European Health Interview Survey. PHQ-8=Patient Health Questionnaire 8 items. Further information about the quality of EHIS-3 data can be found at Eurostat.[23]

Table 2: **Prevalence (%) of clinically relevant depressive symptoms (PHQ-8 ≥10) by country from EHIS-3 (2018–20)**

Finland (figure). After adjustment for covariates, the differences for Bulgaria, Lithuania, and Iceland were no longer significant (appendix p 7). Besides, sensitivity analyses using a higher cutoff value for the PHQ-8 (12 or more), and the algorithm scoring method for the PHQ-8 (appendix p 8), show consistent results on inter-country difference with those of the main analysis.

The overall point prevalence was 0·16% higher in EHIS-3 than in EHIS-2 (PR: 1·02 [95% CI 0·99–1·06; aPR: 1·11 [1·07–1·14]; table 3). Additionally, a wide variability in the point prevalence by countries over waves was found, even after adjustments (appendix p 9), with a wide variability in the aPR by country, ranging from 0·63 (0·54–0·74) in Hungary to 1·88 (1·53–2·31) in Slovenia. Besides, sensitivity analyses using different PHQ-8 scoring methods (appendix p 10) show consistent differences in the point prevalence between waves by country as found in the main analyses.

Discussion

To our knowledge, this is one of the largest and most up-to-date studies worldwide aimed to assess the point prevalence of clinically relevant depressive symptoms. This study shows that the point prevalence of clinically relevant depressive symptoms in Europe showed a marginal increase between EHIS waves (2018–20: 6·54% *vs* 2013–15: 6·38%), with high variability between countries (from 1·58% in Greece to 10·72% in Sweden), and slight within-country temporal variations between 2013 and 2020. Due to the robustness of the results, the use of a suitable measure of clinically relevant depressive symptoms comparable across countries (the PHQ-8), and the country-level representativeness of the samples, these results could be used to monitor clinically relevant depressive symptoms in Europe. Cross-national differences were consistently observed, potentially serving as a baseline for further studies of the prevalence of clinically relevant depressive symptoms in Europe.

Point prevalence estimates presented in this study are similar to those reported using EHIS-2 data,[7] with a marginal increase (significant after adjusting for the sociodemographic-related and health-related factors) in the overall point prevalence of clinically relevant depressive symptoms between EHIS-2 and EHIS-3, from 6·4% (95% CI 6·2–6·5) to 6·5% (6·3–6·7). Additionally, sensitivity analyses performed using different PHQ-8 scoring methods showed that the point prevalence patterns by country remain similar to patterns observed using EHIS-2, with a wide variability between them and over time in the rates reported and according to different specific factors (eg, a relatively higher prevalence was found in women than men, and in those with the lowest BMI [<18·5 kg/m²]). These results are in line with those reported by a recent systematic review indicating that the rates of depression in Europe did not experience a major shift from the early stages of the COVID-19 pandemic to the end of June, 2020, but showing a high variation between countries in these rates.[33] Thus, the results provide new and robust evidence about the relatively stable (with a very slight increase of clinically relevant depressive symptoms) rates in Europe during the past years, as the COVID-19 pandemic could not be a key factor related to the variation over time in depression rates. It should be also noted that in line with the EHIS-2 findings,[7] higher prevalence rates (ie, inter-country differences) were found in some of the countries with highest socio-economic development (eg, Sweden and Luxembourg) using EHIS-3 data. Additionally, the highest intra-country increases in prevalence (ie, increases over time) were found in Slovenia, Croatia, Denmark, and Lithuania (all of them with aPR >1·5). Despite the small overall difference in point prevalence of clinically relevant depressive symptoms, our results suggest that there is between-country heterogeneity and that differences between countries could contribute to the international

variation, suggesting a possible reduction of international differences, as the largest increases in the point prevalence over time were found in some of the countries with the lowest point prevalence in EHIS-2.

It should be noted that the study used a screening questionnaire to determine the point prevalence of clinically relevant depressive symptoms. A previous study also using data from EHIS-2 (with different methods) highlighted a possible overestimation of the point prevalence of major depressive disorder (MDD) derived from the use of the PHQ-8.[34] However, the PHQ-8 is a screening tool, not a tool to assess the prevalence of MDD, and the methods used in our study are more effective and efficient in detecting differences between countries. Therefore, the results found are a valid and reliable representation of the distribution of the point prevalence of clinically relevant depressive symptoms, not just of MDD, at the country level in Europe. Besides, previous studies using clinical interviews, such as the Composite International Diagnostic Interview, found higher prevalence of MDD both before and during the COVID-19 pandemic than presented in our study using the PHQ-8.[5,8] Despite the possible overestimation of the point prevalence of MDD derived from the use of a cutoff score of 10 or more, this scoring method has been found to be a valid, reliable, and a more feasible alternative to clinical interviews for the assessment of clinically relevant depressive symptoms in large population-wide studies.[25,35,36] Although the direct use of a ten or more cutoff score for the PHQ-8 could lead to an overestimation of the point prevalence of MDD (not of the point prevalence of clinically relevant depressive symptoms),[34] it allows the comparison of the results presented with those from many other studies worldwide.[5,10] Additionally, a higher prevalence of depression among older populations and women was reported in previous studies in different contexts using the PHQ-8.[7,17] Despite these differences, the PHQ-8 has shown to be invariant across countries in Europe,[12] and by age and sex,[37,38] and the robustness of the results presented has been corroborated by the sensitivity analyses using a higher cutoff point and the algorithm scoring method for the PHQ-8.[31]

Several limitations of this study should be discussed. First, the use of the term clinically relevant depressive symptoms instead of the term current depressive disorder used in our previous study based on EHIS-2 should be noted.[7] After carefully consideration, due to the use of a screening tool for its assessment and the necessity of a clinical interview for diagnosing a disorder, the term clinically relevant depressive symptoms has been used to avoid any misunderstanding, and to be as accurate and clear as possible when reporting prevalence estimation—ie, to avoid any misinterpretation of the results, the inappropriate use of the concept disorder, and to make it clear that we are not referring to a specific depressive disorder.[39] Second, the representativeness of

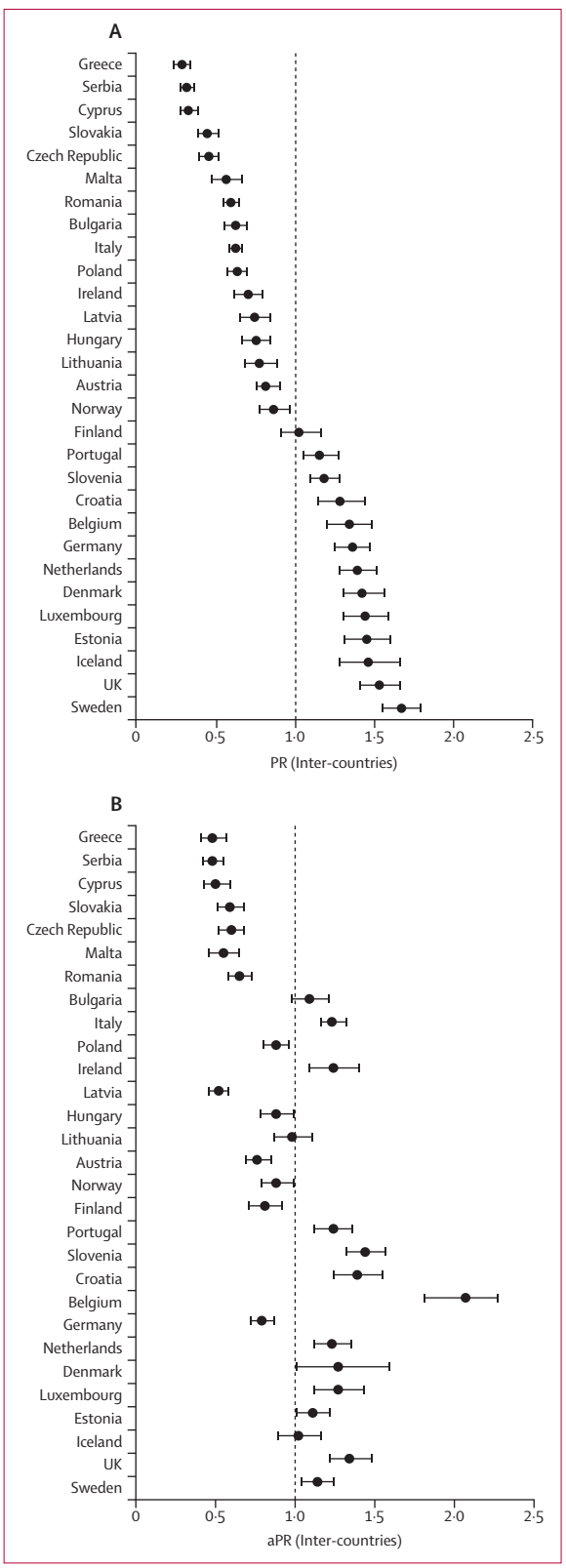

Figure: **Crude (A) and adjusted (B) prevalence ratios for clinically relevant depressive symptoms (country *vs* rest of European countries) from EHIS-3**
PR=1 indicates that crude prevalence in the country is the same as the pooled average in the rest of the countries. EHIS-3=third wave of the European Health Interview Survey. PR=prevalence ratio. aPR=prevalence ratio adjusted for gender, age, country of birth, residence area, net monthly income of the household (equivalised for the different countries), long-standing illness, general activity limitation, educational level, BMI, diet (fruit and vegetable consumption), smoking status, days per week doing sport, and interview method.

	N	n (EHIS-2)	n (EHIS-3)	% EHIS-3 – EHIS-2	Crude models		Full adjusted models	
					PR	95% CI	aPR	95% CI
Overall	542 580	258 888	283 692	0·16%	1·02	0·99–1·06	1·11	1·07–1·14
Austria	30 954	15 701	15 253	1·09%	1·25	1·09–1·44	1·17	1·00–1·37
Belgium	7493	..	7493	..	NA	NA	NA	NA
Bulgaria	12 303	5258	7045	–2·47%	0·62	0·54–0·72	0·73	0·63–0·84
Croatia	10 192	5016	5176	5·12%	2·58	2·14–3·11	1·84	1·50–2·27
Cyprus	10 601	4695	5906	–1·22%	0·63	0·50–0·79	0·79	0·63–1·00
Czechia	14 489	6607	7882	0·37%	1·15	0·92–1·42	1·24	0·99–1·55
Denmark	11 618	5449	6169	2·08%	1·29	1·13–1·47	1·67	1·45–1·93
Estonia	10 275	5439	4836	2·81%	1·42	1·24–1·64	1·28	1·09–1·51
Finland	10 710	5146	5564	1·48%	1·28	1·08–1·52	1·13	0·88–1·45
France	14 191	14 191	..	..	NA	NA	NA	NA
Germany	46 954	24 404	22 550	–1·02%	0·89	0·81–0·97	0·81	0·74–0·89
Greece	15 617	7834	7783	–1·54%	0·55	0·44–0·68	0·86	0·68–1·08
Hungary	11 235	5777	5458	–3·08%	0·61	0·53–0·71	0·63	0·54–0·74
Iceland	7535	3812	3723	–0·81%	0·92	0·79–1·08	1·05	0·88–1·27
Ireland	16 555	9046	7509	–3·09%	0·60	0·51–0·70	0·71	0·60–0·83
Italy	61 011	21 934	39 077	0·48%	1·13	1·03–1·23	1·14	1·05–1·24
Latvia	12 415	6607	5808	0·24	1·05	0·89–1·25	1·01	0·84–1·21
Lithuania	9521	4982	4539	2·04%	1·68	1·38–2·04	1·61	1·27–2·05
Luxembourg	7738	3629	4109	–0·37	0·96	0·84–1·11	1·23	0·95–1·57
Malta	8318	3974	4344	0·39%	1·12	0·88–1·42	1·20	0·94–1·52
Netherlands	8144	..	8144	..	NA	NA	NA	NA
Norway	15 895	8069	7826	0·43%	1·08	0·93–1·23	1·22	1·05–1·41
Poland	38 633	22 076	16 557	–0·08%	0·98	0·88–1·09	0·87	0·78–0·97
Portugal	32 098	17 974	14 124	–1·64%	0·82	0·73–0·92	0·77	0·66–0·89
Romania	31 799	16 422	15 377	–0·46%	0·89	0·80–1·00	0·74	0·67–0·82
Serbia	12 406	..	12 406	..	NA	NA	NA	NA
Slovakia	11 009	5489	5520	0·34%	1·13	0·91–1·41	1·22	0·99–1·51
Slovenia	15 374	5914	9460	2·21%	1·40	1·22–1·60	1·88	1·53–2·31
Sweden	14 861	5737	9124	1·97%	1·23	1·10–1·37	1·05	0·92–1·19
UK	32 636	17 706	14 930	1·86%	1·25	1·13–1·38	1·47	1·33–1·63

n (EHIS-2) shows the number of individuals from the total sample belonging to EHIS-2 without weighting. n (EHIS-3) shows the number of individuals from the total sample belonging to EHIS-3 without weighting. % EHIS-3 – EHIS-2 shows the difference in the prevalence of clinically relevant depressive symptoms betweeen EHIS-2 and EHIS-3 (weighted). All models were significant in relation to their respective null model (p<0·001). EHIS-2=second wave of the European Health Interview Survey. EHIS-3=third wave of the European Health Interview Survey. PR=prevalence ratio. aPR=prevalence ratio adjusted for gender, age, country of birth, residence area, net monthly income of the household (equivalised for the different countries), long-standing illness, general activity limitation, educational level, BMI, diet (fruit and vegetable consumption), smoking status, days per week doing sport, and interview method.

Table 3: **Differences in prevalence of clinically relevant depressive symptoms intra-countries from EHIS-2 and EHIS-3**

the data used for the study should be considered. Country non-response rate varied considerably across countries both in the EHIS-2 and EHIS-3 waves.[11,22] It should be noted that the non-response variability over waves could be a factor potentially influencing differences over time in the prevalence of clinically relevant depressive symptoms for the specific countries. Besides, only participants with complete PHQ-8 data were included. These aspects could have implications for the representativeness of the results derived from the use of the data. However, non-response was lower than 40% in 17 countries in EHIS-2 and 15 countries in EHIS-3.[11,22] Additionally, compensation methods were used to reduce non-response rates.[23,24] This non-response rate suggests that, to a certain extent, the representativeness of the data could be guaranteed (at least at the country level), as shown in the quality reports of both waves of the survey.[11,22] The exclusion of participants with incomplete data on depression (PHQ-8) could affect the generalisability of the findings. However, participants with missing data on the PHQ-8 represent 6·8% of the total sample (more than 500 000 participants [combined EHIS-2 and EHIS-3 samples]). Thus, it could be reasonable to assume that the findings presented could be generalised to the population and are a robust representation of the real distribution of clinically relevant depressive symptoms in the included countries. Another limitation is that the EHIS-2 and EHIS 3 did not

have variables intrinsic to each country or geographical region that might be influencing the prevalence of clinically relevant depressive symptoms (eg, the specific date or season in which the data were collected for each participant; different environmental factors; diet, ethnicity, religious group, coping styles, or stigma; and discrimination-related factors).[40–43] Despite the absence of these variables, a wide and comprehensive set of relevant sociodemographic and health-related covariates included in different health surveys worldwide were considered in this study (eg, gender, age, and BMI). It is thus reasonable to assume the reliability and validity of the results from the adjusted models. Additionally, the results of this study could serve as a baseline for further research to determine the potentially relevant geographical patterns in the prevalence of clinically relevant depressive symptoms, and of the association of these factors with the prevalence. Finally, it should be mentioned that for all the countries included in the analyses (except Germany, Malta, and Latvia), data were collected before the start of the COVID-19 pandemic. Additionally, there is a wide variability in the overlap between the data collection period and the COVID-19 pandemic (1–6 months), and in the prevalence in these three countries, making it difficult to determine the possible effect of the pandemic. Future studies using data from subsequent waves of the EHIS or from other representative population health surveys worldwide—particularly from low-income and middle-income countries—will be helpful to determine the relevance and possible effect of the pandemic on the prevalence of clinically relevant depressive symptoms in Europe and worldwide using primary data. These studies could also be helpful in determining the evolution of such prevalence estimates during and after the COVID-19 pandemic.

These findings, based on large and representative datasets and on a valid and reliable tool for the assessment of depression, indicate that the point prevalence of clinically relevant depressive symptoms in Europe remained relatively stable (approximately 6·5%) between 2013 and 2020, with wide variability between countries. Additionally, relevant differences between and within countries were identified, corroborating the previous finding (EHIS-2) that the highest rates of clinically relevant depressive symptoms were observed in countries with greater economic growth, such as Sweden or Belgium. These results could be used as a reference point for the monitoring of clinically relevant depressive symptoms in Europe, to identify potentially relevant trajectories in symptoms, and to focus mental health policies and prevention strategies to tackle the burden of clinically relevant depressive symptoms.

Contributors

JA-dlT and JA verified and accessed the underlying data used in the study. All authors were involved in the design of the study. JA-dlT carried out the data analysis. All authors interpreted the information. JA-dlT, JA, GV, and AR drafted the manuscript. All authors critically reviewed and edited all the versions of the manuscript and decided to submit its final version. JA-dlT and JA had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Declaration of interests

We declare no competing interests.

Data sharing

The data used for the present study can be requested from Eurostat and the UK Data Service following their respective protocols for requesting them.

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