

## Inequalities in depressive symptoms between natives and immigrants in Europe: the mediating role of social exclusion

Desigualdades em sintomas depressivos entre a população local e os imigrantes na Europa: o papel mediador da exclusão social

Inequidades en los síntomas depresivos entre nativos e inmigrantes en Europa: el papel de mediación de la exclusión social

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### Abstract

*The aim of this study was to analyze inequalities in depressive symptoms between natives and immigrant groups according to their length of residence in Europe, and to test the mediating role of social exclusion in explaining these differences. The study is based on cross-sectional data from the 7th round of the 2014 European Social Survey (sample of 1,792 immigrants and 22,557 native-born Europeans). Dependent variables: self-reported depressive symptoms. Independent variables: immigrant background and social exclusion factors that were classified into four groups. Socially excluded individuals were those less advantaged in each factor. All analyses were stratified by the length of residence. The independent and overall associations between Social Exclusion and health outcomes were examined using binary logistic regression models (OR; IC95%). Immigrants had a higher prevalence of self-reported depressive symptoms than natives; those residing in Europe for 1-10 years and > 20 years had the highest prevalence. Multidimensional social exclusion factors analyzed together completely explained these differences for immigrants residing in Europe for 1-10 years and partially for immigrants residing for > 20 years. The economic factors also explained these differences completely for 1-10 years and partially for immigrants residing for > 20 years. Policies should offer migrants the possibility to settle in good social and economic condition, promote efforts to eliminate social exclusion and prevent the associated health inequalities.*

*Emigrants and Immigrants; Social Marginalization; Health Status Disparities; Depression*

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## Introduction

Currently, there are over 258 million international migrants in the world <sup>1</sup>, and about one third live in the European Union (EU) <sup>2</sup>. Out of them, 35 million people were born outside of the EU-28 <sup>3</sup>.

The immigrants' lives are shaped by the social determinants of migrant's health along with the migratory phases: in their homelands, during the migration journey, in destination countries, and the return <sup>4</sup>. Immigrants are more vulnerable to social exclusion as they suffer from certain types of discrimination, higher levels of unemployment, precarious jobs, differential access to housing, limitations in the access to public services, and political and social participation; being all of these factors social determinants of migrant's health themselves <sup>5,6</sup>.

Given the complexity of the concept, there is not a single set of indicators to measure social exclusion. This study uses the World Health Organization (WHO) definition of social exclusion, by which social exclusion consists in dynamic, multi-dimensional processes driven by unequal power relationships, that operate along and interact across the cultural, economic, political and social dimensions – and at different levels including individual, household, group, community, country and global <sup>7</sup>. The interaction between multiple exclusionary processes makes explicit the links between social exclusion factors and the social determinants of health <sup>7,8,9</sup>. Besides, social exclusion is considered a significant factor in the causation and maintenance of health inequalities; through material deprivation and psychosocial stress mechanisms <sup>7,9</sup>.

Even though social determinants of health and migration are two related areas of public health, there is still not sufficient dialogue with each other, losing opportunities for research, practice, and policy work <sup>10,11</sup>. Also, the empirical research on multidimensional social exclusion factors and their poor health-related outcomes is still scarce <sup>8,9</sup>. In this context, the study aims to analyze inequalities in depressive symptoms between natives and immigrant groups according to their length of residence in Europe and to test the mediating role of social exclusion in explaining these differences.

## Methods

### Design and information source

A cross-sectional study was performed using data from the 7th round of the 2014 *European Social Survey*. It used representative cross-sectional samples of all persons aged 15 and over regardless of their nationality, citizenship or language – who reside in private households in European countries. Individuals were selected by strict random probability methods at every stage with sampling frames and addresses, households, and individuals used. Data is gathered by face-to-face interviews conducted in the home of the participants. Response rates target 70%, real target lower in some countries <sup>12</sup>.

### Study population

The study included a total sample of 24,349 residents in 20 European countries. Residents born in the country were 22,557, and foreign-born residents were 1,792. Foreign-born residents born in high-income countries, as previous research show they are as well-off as natives <sup>13</sup>. The sample was limited to working-age residents (18-65 years). This age group was selected considering the following aspects: (a) health outcomes might be highly influenced by aging; (b) to avoid the mortality bias among the elderly; (c) as it was used in previous studies regarding health inequalities between natives and immigrants <sup>13,14,15,16</sup>; and (d) there was a small percentage of elderly immigrants (> 65 years).

### Outcome variable: depressive symptoms

Depressive symptomatology was measured through the short version of the *Centre for Epidemiological Studies Depression Scale* (CES-D8). Questions evaluated how often during the past week respondents felt depressed; everything they did as an effort; their sleep was restless; felt unhappy; felt lonely; did not enjoy life, felt sad; and could not go out. All questions included four response categories

(0 = never or almost never to 3 = all or almost all of the time). Items were summed to give a total score that ranged from 0 (the lowest level) to 24 (the highest level), a cut-off point of over eight was established for depression, as in a previous study <sup>14</sup>.

### **Exposure variable: immigrant status**

Immigrant status was determined by the country of birth. Individuals were considered to be immigrants if they were born abroad. Those born in the country of origin were considered to be natives. Immigrants were further stratified considering the length of residence in Europe 1-10 years; 11-20; and > 20 years similar to previous studies <sup>15,16</sup>. The length of residence information was assessed through the question “What year did you first come to live in this country?”; therefore, it is based on the date of entry into the country.

### **Measures of social exclusion: potential mediators**

Social exclusion is not the converse of social inclusion, and both are dynamic processes that can exist together; existing very few people excluded in all dimensions at once <sup>17</sup>. Thus, excluded individuals in this study were those less advantaged in each social exclusion factor. Also, the indicators were grouped into four dimensions – the economic, social, cultural, and political. The economic dimension of social exclusion.

- **Potential mediators: financial difficulties when growing up**

It was measured through the question “How often did you and your family experience severe financial difficulties when you were growing up?”. The response categories were recoded into 1 = yes (always/often/sometimes) and 0 = no (hardly ever/never).

- **Feeling about household income**

This indicator was obtained through the question “Which of the descriptions on this card comes closest to how you feel about your household income nowadays?”. The response categories were recoded into 0 = living comfortably/coping, and 1 = finding it difficult/very difficult.

- **Activity**

It was measured asking about the respondent’s principal activity the week before filling out the questionnaire. The response categories (were recoded into 0 = employed, 1 = unemployed, and 2 = economically inactive ( student, retired, and engaged in housework activity).

- **Housing problems**

The presence of one or more problems (e.g., mold or rot in windows, doors or floors, overcrowding) was considered as the presence of housing problems = 1 and 0 = absence.

### **Potential mediators: the social dimension of social exclusion**

- **Informal social contacts**

It was assessed through the question “how often do you socially meet with friends, relatives or colleagues? The variable was recoded into a dummy variable 0 = good social contacts (weekly/daily) and 1 = poor social contacts (monthly or less).

- **Thick trust**

Trust in people was measured through three questions: “Would you say that most people can be trusted?”, “Do you think that most people would try to take advantage of you?”, and “Would you say that most of the time people try to be helpful?”. Answers originally ranged on a score from 0 to 10 (where 0 means you cannot be too careful and 10 means that most people can be trusted). A mean for these questions was computed and converted into a 10-point Likert scale variable. Finally, it was dichotomized into a dummy variable: 1 = low (0 to 5 points) and 0 = high (6 to 10 points), as in a previous study <sup>18</sup>.

- **Thin trust**

It was measured by asking participants about how much people trust in the country’s parliament, in the legal system, in the police, in the politicians, and in the political parties. The original answers ranged from 0 to 10 (0 implied “no trust at all”, and 10 implied “complete trust”). The responses for each of these five questions were added to an index that ranges from 0-50. The original 50 alternatives were dichotomized into 1 = low level of trust (0-30) and 0 = high level of (31-50), as in a previous study <sup>18</sup>.

### Potential mediators: the cultural dimension of social exclusion

- **Sense of belonging to the host country**

The sense of belonging was measured asking respondents “How close do you feel to the country?”. The original responses were dichotomized into a new variable called “feeling a sense of belonging” where 0 = high and 1 = low, as in a previous study <sup>19</sup>.

### Potential mediators: the political dimension of social exclusion

- **Political participation**

It was assessed by asking participants whether they had contacted a politician or government official, signed a petition, took part in a lawful public demonstration in the last 12 months (Yes/No). A sum for these three variables was computed, and the variable was dichotomized in Yes = 1 (at least one activity) and No = 0 (None).

### Covariates

The covariates were sex, age, educational level and living with a partner.

### Statistical analysis

First, a descriptive analysis was conducted. Then a mediation analysis followed the three steps of regression models proposed by Baron & Kenny <sup>20</sup>. However, we conducted a binary logistic regression analysis for testing the mediating role of categorical variables on a binary outcome. This paper addresses the question of how to conduct mediation analyses on data in which X, M, and/or Y are categorical. Statistical theory shows that ordinary least squares (OLS) linear regression is better suited for continuous response variables, and logit models are better suited for discrete response variables. This last technique was proposed by Iacobucci as it is closer conceptually to mediation testing practice. Therefore, while a manifest variable may be discrete, the underlying construct is continuous. Besides, the introduction of categorical variables into mediation analyses is recognized as an important issue, although no single solution has been found <sup>21</sup>.

Thus, the mediation analysis was conducted as follows. First, the effect of immigrant status (X) on depression (Y) was tested (path c); second, the effects of immigrant status (X) on social exclusion

dimensions (M1 – M4) were tested (paths a1-a4); steps third and four were estimated in the same regression analysis; thus the effect of immigrant status (X) on depression (Y) controlling social exclusion dimensions (M1 – M4) was computed (path c'). This last step was used to determine the partial or complete attenuation of the association between immigrant status (X) and depression (Y). The binary logistic regression models were fitted (odds ratio – OR; 95% confidence interval – 95%CI) as follows. For step one, the immigrant status variable was added in Model 0. For steps third and fourth, sex, age, education level, and living with a partner were added in Model I. Then, each set of social exclusion factors were introduced separately in blocks in Models II to V, and Model VI was adjusted for all social exclusion factors. For the second step, the effects of immigrant status on each social exclusion factors were calculated by several regression models adjusted by covariates. Besides, for immigrant eligible groups for social exclusion mediation, the Sobel test was used to assess if the mediated effect of each individual social exclusion variable was significant (Figure 1).

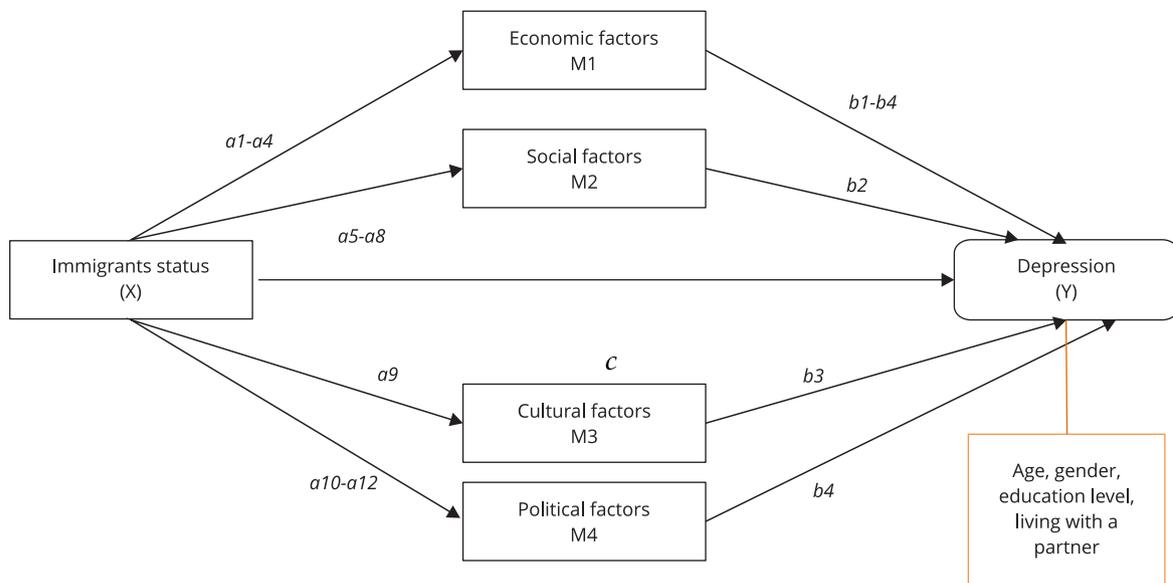
Multicollinearity was tested using binary logistic regression <sup>20</sup> (< 0,6). All analyses (descriptive, OR; 95%CI) were weighted by combining post-stratification and sampling design weights <sup>22</sup>. IBM SPSS Statistics version 24.0 (<https://www.ibm.com/>) was used for statistical analysis.

### **Ethical approval**

This study uses secondary anonymized data. The dataset does not contain direct identifiers and was collected according to ethical standards. Besides, it is freely and publicly available online for research <sup>23</sup>. Thus, there is no specific ethical approval required for this study.

**Figure 1**

Mediation model of social exclusion factors on depressive symptoms.



## Results

A total of 24,374 individuals were included in the study, 7.5% of them were immigrants, and about 40% have resided 20 or more years in Europe. Tables 1 and 2 show the descriptive statistics according to the immigrant status and the length of residence. Immigrants had a higher prevalence of depressive symptoms than natives; those residing in Europe for 1-10 years and > 20 years had the highest prevalence.

**Table 1**

Descriptive statistics of depressive symptoms, sociodemographic characteristics, cultural and political exclusion factors according to immigrant status. The seventh round of the *European Social Survey*, 2014.

	Natives (n = 22,557; 92.6%) %	Immigrants 1-10 years (n = 543; 2.2%) %	Immigrants 11-20 years (n = 555; 2.3%) %	Immigrants > 20 years (n = 719; 3.0%) %	Total (N = 24,374; 100.0%) %
<b>Depression</b>					
No	75.2	67.0	71.5	64.3	74.6
Yes	24.8	33.0	28.5	35.7	25.4
Missing	0.0	0.0	0.0	0.0	0.0
<b>Sociodemographic</b>					
Sex					
Men	49.5	49.4	52.1	46.9	49.5
Women	50.5	50.6	47.9	53.1	50.5
Missing	0.0	0.0	0.0	0.0	0.0
Age (years)					
18-33	29.8	57.6	30.6	10.8	29.9
34-49	34.6	36.3	53.5	38.7	35.2
50-65	35.6	6.1	15.9	50.5	35.0
Missing	0.0	0.0	0.0	0.0	0.0
Education level					
Less than secondary	6.7	14.0	14.2	19.2	7.4
Secondary	56.9	45.6	52.6	49.4	56.3
Tertiary	36.4	40.4	33.2	31.4	36.3
Missing	0.0	0.0	0.0	0.0	0.0
Living with a partner					
Yes	65.0	51.5	63.8	73.0	64.9
No	35.0	48.5	36.2	27.0	35.1
Missing	0.0	0.0	0.0	0.0	0.0
<b>Cultural dimension of social exclusion</b>					
Sense of belonging					
Yes	86.8	81.9	82.1	81.0	87.0
No	12.6	16.4	17.2	18.5	12.4
Missing	0.6	1.7	0.7	0.5	0.6
<b>Political dimension of social exclusion</b>					
Political participation					
Yes	48.7	29.5	42.3	46.5	48.0
No	51.3	79.9	57.5	53.5	51.9
Missing	0.0	0.6	0.2	0.0	0.0

Source: prepared by authors based on data from the study.

**Table 2**Descriptive statistics of the economic and social exclusion factors according to immigrant status. The seventh round of the *European Social Survey*, 2014.

	<b>Natives</b> (n = 22,557; 92.6%) %	<b>Immigrants</b> <b>1-10 years</b> (n = 543; 2.2%) %	<b>Immigrants</b> <b>11-20 years</b> (n = 555; 2.3%) %	<b>Immigrants</b> <b>&gt; 20 years</b> (n = 719; 3.0%) %	<b>Total</b> (n = 24.374; 100%) %
<b>Economic dimension of social exclusion</b>					
Financial difficulties while growing up					
No	60.2	45.3	47.6	40.2	59.0
Yes	38.6	53.8	51.7	59.2	39.8
Missing	1.2	0.9	0.7	0.6	1.2
Feeling about household income					
Living comfortably	80.8	62.2	68.3	67.4	79.7
Difficult/Very difficult	18.5	36.9	31.7	32.5	19.7
Missing	0.6	0.9	0.0	0.1	0.6
Housing problems					
No	83.2	71.0	75.5	77.9	82.6
Yes	16.3	27.3	24.1	22.0	16.9
Missing	0.5	1.7	0.4	0.1	0.5
Activity					
Employed	65.0	44.8	58.8	63.3	64.3
Unemployed	7.3	17.7	14.1	8.2	7.7
Economically inactive	27.5	37.5	27.1	28.3	27.8
Missing	0.2	0.0	0.0	0.1	0.2
<b>Social dimension of social exclusion</b>					
Informal social contacts					
Good social contacts	82.5	80.8	80.5	81.5	82.4
Poor social contacts	17.2	18.4	19.5	18.4	17.3
Missing	0.2	0.7	0.0	0.1	0.2
Trust in institutions					
High	35.8	62.4	56.4	50.8	37.3
Low	64.2	36.6	43.4	49.2	62.7
Missing	0.1	0.9	0.2	0.0	0.1
Trust in people					
High	52.7	50.2	54.4	46.0	52.5
Low	47.2	49.8	45.4	53.8	47.4
Missing	0.1	0.0	0.2	0.1	0.1

Source: prepared by authors based on data from the study.

Table 3 shows results for steps one, three and four of the mediation procedure. The first step tested the association between immigrant status and depressive symptoms and is shown in Models 0 and I. In Model 0 (unadjusted) immigrants in Europe for 1-10 years and > 20 years were more likely to have depressive symptoms than natives OR = 1.49; 95%CI: 1.24-1.79 for 1-10 years and OR = 1.69; 95%CI: 1.44-1.97 for > 20 years). This association was non-significant for immigrants in Europe for 11 to 20 years. Adjusting for sociodemographic (Model I), these associations persisted and slightly decreased for both immigrant groups OR = 1.40; 95%CI: 1.16-1.69 for 1-10 years and OR = 1.59; 95%CI: 1.35-1.87 for > 20 years. Therefore; immigrants residing in Europe for 1-10 years and > 20 years were eligible for mediation. Models II, III, IV, and V were adjusted for sociodemographic, and economic, social, cultural, and political social exclusion factors, respectively. In Models II and VI, the associations with depressive symptoms became statistically non-significant for immigrants in Europe

**Table 3**

Steps 1, 3 and 4 of the mediation analysis testing the association between immigrant status and depressive symptoms adjusting for sociodemographic and social exclusion factors (odds ratios – OR). The seventh round of the *European Social Survey*, 2014.

Immigrant status	Model 0 OR (95%CI)	Model I OR (95%CI)	Model II OR (95%CI)	Model III OR (95%CI)	Model IV OR (95%CI)	Model V OR (95%CI)	Model VI OR (95%CI)
Natives	Reference						
Immigrants 1-10 years of residence	<b>1.49 (1.24-1.79)</b>	<b>1.40 (1.16-1.69)</b>	1.09 (0.89-1.32)	<b>1.51 (1.25-1.83)</b>	<b>1.41 (1.17-1.71)</b>	<b>1.40 (1.16-1.69)</b>	1.26 (1.00-1.53)
Immigrants 11-20 years of residence	1.21 (1.0-1.46)	1.16 (0.96-1.41)	1.01 (0.83-1.23)	1.26 (1.03-1.53)	1.21 (1.01-1.47)	1.17 (0.96-1.41)	1.02 (0.89-1.16)
Immigrants > 20 years of residence	<b>1.69 (1.44-1.97)</b>	<b>1.59 (1.35-1.87)</b>	<b>1.42 (1.20-1.67)</b>	<b>1.68 (1.43-1.98)</b>	<b>1.62 (1.38-1.90)</b>	<b>1.59 (1.35-1.87)</b>	<b>1.54 (1.30-1.82)</b>

95%CI: 95% confidence interval.

Note: Model 0: unadjusted; Model I: adjusted for age, sex, level of education, and living with a partner; Model II – V (Models I-V adjusted separately by economic factors, social factors, cultural, and political factors respectively); Model VI (Model II + all social exclusion factors). Significant associations are in bold.

for 1-10 years and were attenuated for immigrants in Europe for > 20 years. In Models III, IV, and V – djusted for sociodemographic and social capital factors, the cultural, and political factors, respectively – the association remained significant with a very slight attenuation for both immigrant groups.

Table 4 shows the results for the second step of mediation analysis, the association between immigrant status and social exclusion factors. After adjustment for sociodemographic, all the associations between immigrant status and social exclusion variables were statistically significant for eligible groups; except for immigrants in Europe for 1-10 years with household income unsatisfaction, low sense of belonging and poor interpersonal trust; and for immigrants for > 20 years with poor social contacts and poor political participation. The Sobel tests showed significant mediation effects for all the variables and groups (except for social contacts in immigrants > 20).

## Discussion

This study investigated inequalities in depressive symptoms between natives and immigrant groups according to their length of residence in Europe and examined if social exclusion could explain these differences. The results show that immigrants experience higher levels of depressive symptoms than natives which variate according to the length of residence in Europe, increasing for immigrants residing for 1-10 years and immigrants residing for > 20 years. Also, the findings show that different dimensions of social exclusion – the economic, social, and cultural – together explain thoroughly these differences between natives and immigrants residing for 1-10 years, and very slightly for immigrants residing for > 20 years. Besides, the economic factors in isolation explain these differences between natives and immigrants residing for 1-10 years in Europe.

All immigrant groups showed higher prevalences of depressive symptoms than natives. Immigrants residing in Europe for 1-10 years and > 20 years had the highest prevalence. The regression analysis showed that both these groups of immigrants were more likely to have depressive symptoms than natives. The mental health deterioration in immigrants residing in Europe for > 20 years, could be explained by the cumulative exposure to socioeconomic disadvantage, separation from relatives and friends, poor integration, cultural differences and discrimination, which accumulate throughout the migration trajectory and the life course affecting immigrants' health negatively<sup>24,25</sup>. Besides,

**Table 4**

Step 2 of the mediation analysis. Association between immigrant status and social exclusion factors (OR and 95%CI). All results are adjusted for gender, age, education level and living with a partner. The seventh round of the *European Social Survey*, 2014.

Immigrant status	Economic dimension of social exclusion			Cultural dimension of social exclusion	
	Financial difficulties while growing up OR (95%CI)	Low satisfaction with income household OR (95%CI)	Housing problems OR (95%CI)	Not economically active OR (95%CI)	Low sense of belonging OR (95%CI)
Natives	Reference	Reference	Reference	Reference	Reference
Immigrants 1-10 years of residence	<b>2.12 (1.77-2.53)</b>	<b>2.69 (2.22-3.25)</b>	<b>1.64 (1.35-2.00)</b>	<b>2.25 (1.87-2.72)</b>	1.06 (0.87-1.29)
Immigrants 11-20 years of residence	<b>1.66 (1.39-1.97)</b>	<b>1.79 (1.48-2.17)</b>	<b>1.44 (1.18-1.76)</b>	<b>1.43 (1.18-1.72)</b>	<b>0.49 (0.35-0.67)</b>
Immigrants > 20 years of residence	<b>1.98(1.69-2.31)</b>	<b>1.80 (1.52-2.13)</b>	<b>1.49 (1.24-1.79)</b>	<b>1.12 (1.17-1.40)</b>	<b>0.72 (0.55-0.90)</b>

Immigrant status	Social dimension of social exclusion			Political dimension of social exclusion
	Poor social contacts OR (95%CI)	Poor institutional trust OR (95%CI)	Poor interpersonal trust OR (95%CI)	Poor political participation OR (95%CI)
Natives	Reference	Reference	Reference	Reference
Immigrants 1-10 years of residence	<b>1.51 (1.20-1.90)</b>	<b>0.32 (0.27-0.38)</b>	1.04 (0.88-1.24)	<b>1.25 (1.86-2.73)</b>
Immigrants 11-20 years of residence	1.18 (0.95-1.47)	<b>0.39 (0.33-0.47)</b>	<b>0.85 (0.72-0.92)</b>	<b>1.21 (1.01-1.44)</b>
Immigrants > 20 years of residence	0.88 (0.72-1.07)	<b>0.47 (0.40-0.55)</b>	<b>1.25 (1.07-1.46)</b>	1.00 (0.86-1.18)

95%CI: 95% confidence interval; OR: odds ratio.

Note: significant associations are in bold.

failure to achieve the socio-economic expectations and perceived downward social mobility might correlate with poor health among immigrants and contribute to inequalities<sup>24,26</sup>.

Contrary to the results of this study, other research showed that recent immigrants residing for < 10 years had better mental health than natives in Europe<sup>16,27</sup> and elsewhere<sup>28,29,30</sup>. An explanation for the high prevalence of depressive symptoms in recent immigrants (1-10 years), could be their arrival at the onset of the financial crisis in Europe in 2008. The impact of the financial crisis on the social determinants of health and social inequalities in health has been described<sup>31</sup>, with the most significant effect seen among vulnerable populations such as youth, immigrants and ethnic minorities<sup>5,31</sup>. Also, evidence shows that financial crisis had an impact on mental health<sup>32</sup> and increased social inequalities in health, being identified as a major risk factor for poor mental health in immigrants, especially for those undocumented and who lacked social security<sup>27,32,33,34</sup>.

Thus, the previous explanations might reflect that migration is not a risk per se, but depends on the context in which the migration occurs. Also, where and in what circumstances people migrate (e.g., asylum seekers or refugees) could affect their mental health. For instance, a recent study conducted in Sweden by Johnson et al.<sup>15</sup> found that recent male immigrants – both refugees and non-refugees- showed higher prevalence of depressive symptoms among immigrants and in all groups according to the length of residence (1-10 years; 11-19, and > 20 years). Also, male immigrants and refugee women with more than 20 years of residence in Sweden had a significantly higher risk of psychological distress than natives when controlling this association for sociodemographic (occupa-

tional class, disposable family income, education, type of employment, and family constellation) and social support variables.

Immigrants showed higher frequencies in all social exclusion factors than their native counterparts. This is consistent with previous research that shows that immigrants have higher unemployment rates<sup>34,35</sup>, and higher levels of economic stress in childhood<sup>36,37</sup> than natives. In addition, immigrants have a shorter network size and lower social support than natives also, social capital increases with longer duration of residence<sup>27,38,39,40</sup>. Besides, immigrants and refugees were also found to have lower levels of trust in public institutions, and interpersonal trust than natives<sup>15</sup>.

In the mediation regression analysis, immigrants residing in Europe for 1-10 years and > 20 years were eligible for mediation because of their significant associations (OR = 1,40; 95%CI: 1,16-1,69 for 1-10 years and OR = 1,59; 95%CI: 1,35-1,87 for > 20 years). When controlling for economic factors accounted completely for health inequalities in depressive symptoms (HIDS) for immigrants in Europe for 1-10 years, and partially for HIDS for immigrants in Europe for > 20 years. Previous studies found that unemployment and financial difficulties accounted for health inequalities in poor mental health between natives and immigrants<sup>41,42</sup>. Besides, previous research shows existing health inequalities between individuals with poor housing conditions – among the immigrants – and the general population in Spain<sup>43,44</sup>. A previous study showed that economic factors explained completely the health inequalities in depressive symptoms for male and female non-refugee immigrants residing for 1 to 9 years in Sweden<sup>15</sup>.

After controlling for social capital factors, the associations remained significant though they were very slightly attenuated. Thus, this may signify that immigrants have higher social capital than natives, as shown in step 2 of mediation analysis, immigrants in both groups are less likely to have poor social contacts, low institutional trust, and almost the same likelihood to have low interpersonal trust than natives. These results are contrary to the findings of a previous study conducted in Sweden in which social capital factors together explained HIDS for various groups of immigrants – non-refugees and refugees – according to the length of residence<sup>15</sup>. Also, other research found that social capital might explain mental health inequalities between natives and immigrants<sup>45,46</sup>.

When controlling for the level of sense of belonging (Model IV), and the level of political participation (Model V), the associations remained significant with a very slightly attenuation in values. Previous studies found that low sense of belonging is a risk factor for suicidal ideation among immigrants in Spain<sup>47</sup>; high sense of belonging was associated with positive mental health among immigrants in Canada<sup>48</sup>. The slight mediation effect that these factors have in isolation may be explained considering that only immigrants residing for 1-10 years were more likely to report low levels of sense of belonging and political participation; immigrants residing for > 20 years had higher levels than natives (step 2 of mediation).

When controlling for all social exclusion factors, these completely explained HIDS for immigrants in Europe for 1-10 years and partially for immigrants residing > 20 years. Previous research analyzed two or more dimensions of social exclusion at the same time, finding their contribution to health inequalities in mental health between immigrants and natives<sup>15,27,49</sup>. Gostens et al.<sup>27</sup> analyzed health inequalities between immigrants born in the middle- or low-income countries and natives before and after the financial crisis in Spain. They found that social support and employment status contribute to inequalities in poor mental health. Levecque & Van Rossem<sup>49</sup> found that first-generation migrants show higher levels of depression, with those born outside of Europe to be the worst off. This higher risk for depression was mainly due to experienced barriers to socioeconomic integration and discrimination and was not attributable to ethnic minority status. Johnson et al.<sup>15</sup> found that social capital explained inequalities in depressive symptoms between immigrants – refugees and non-refugees residing in Sweden for 1-10; 11-19; and > 20 years – and natives, together with socioeconomic factors such as occupational class, disposable family income, education, type of employment, and family constellation; except for non-refugees in Sweden (3-9 years) and for refugee women in Sweden 10 years or more.

## **Limitations and strengths**

This study addresses a knowledge gap in the analysis of social exclusion through multidimensional indicators, as well as its mediating role on immigrant' depressive symptoms. Another contribution of this study is the classification of immigrant groups according to their length of residence in Europe. However, it has several limitations. The largest limitations are the small sample size of immigrants compared to natives; however, the data in each group was adequate for conducting the analysis<sup>50</sup>. This condition prevented the mediation analysis of social exclusion factors in explaining health inequalities segregating the data by sex, into wider ranges of the length of residence, by country of residence or origin. It was not possible to study second-generation immigrants either; however, previous studies have not found differences in social exclusion factors and health outcomes between second-generation immigrants and natives<sup>14,49</sup>.

As a second limitation of the study, its cross-sectional design does not allow to make causal inferences about the associations between social exclusion factors and depressive symptoms; but rather it allows to conceptually model and statistically evaluates the potential mediators in this association. Third, this study uses a self-report depression inventory for which there have been valid cut-off points established<sup>14</sup> but does not allow us to assess clinical depression. However, the use of dimensional models is more reliable and sensitive to the nature and the degree of symptoms, and it is more suitable for regression analyses<sup>49</sup>. Besides, this study used a widely validated scale for depression<sup>14,49</sup>. Finally, interaction can arise even if the mediators do not affect each other; thus, it is not always possible to identify if there is a mediator-outcome confounder that is also affected by the exposure. Thus, as VanderWeele<sup>51</sup> noticed, if the sum of the proportion mediated exceeds 100%, then one of the following must be true: (a) There are other mediators with a negative proportion mediated; (b) the mediators affect one another; or (c) there are interactions between the mediators. Some strategies are described in the literature to address this issue, from bootstrapping recommended in the estimation of standard errors to a regression-based approach for multiple mediators with a binary outcome. However, all of these procedures described are applied when there are continuous mediators, which is not the case of this study.

## **Conclusions**

Immigrants had a higher prevalence of depressive symptoms than natives; those residing in Europe for 1-10 years and > 20 years had the highest prevalence. Immigrants in both groups were more likely to have depressive symptoms than natives. This association was non-significant for immigrants in Europe for 11-20 years. Multidimensional social exclusion factors analyzed together, and the economic exclusion factors in isolation completely explained health inequalities in depressive symptoms for immigrants residing in Europe for 1-10 years and partially for immigrants residing for > 20 years.

Policies should offer migrants the possibility to settle in good social and economic condition, promote efforts to eliminate social exclusion and prevent the associated health inequalities. Also, one particularly important area for policymakers is to reframe policies understanding the interactions between economic and social integration and dynamic exclusion processes, as well as between different dimensions of social exclusion.

As the research on multidimensional social exclusion and immigrants' health is still limited, further research is necessary including the social determinants of health approach. It is also necessary to segregate data analysis by sex and to differentiate specific groups of immigrants such as refugees from non-refugees, or by country of origin. Besides, data on the socioeconomic and living conditions gathered before migration, and during the migration process are needed for a more detailed analysis.

## Contributors

A. M. Arias-Uriona was responsible for the study concept and design, interpreting the results, and wrote the first draft of the manuscript, she critically reviewed and approved the final version of the article. N. Guillén contributed to the interpretation of the results, and she critically reviewed and approved the final version of the paper.

## Additional informations

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## Resumo

O estudo teve como objetivos, analisar as desigualdades na prevalência de sintomas depressivos entre a população local e os imigrantes na Europa de acordo com o tempo de residência naquele continente, e testar o papel mediador da exclusão social na explicação dessas diferenças. O estudo teve como base os dados transversais da sétima rodada do Inquérito Social Europeu de 2014 (uma amostra de 1.792 imigrantes e 22.557 nascidos na Europa). As variáveis dependentes eram os sintomas depressivos autorrelatados. As variáveis independentes eram a história de imigração e fatores de exclusão social, classificados em quatro grupos. Os indivíduos socialmente excluídos mostraram desvantagem em relação a cada fator. As análises foram estratificadas pelo tempo de residência na Europa. As associações independentes e globais entre a exclusão social e os desfechos de saúde foram examinadas com o uso de modelos de regressão logística binária (OR; IC95%). Os imigrantes tiveram maior prevalência de sintomas depressivos, comparados aos indivíduos nascidos na Europa; as maiores prevalências de sintomas depressivos foram observadas nos imigrantes com 1-10 anos de tempo de residência e com mais de 20 anos de residência na Europa. Os fatores de exclusão social multidimensionais, quando analisados conjuntamente, explicavam inteiramente essas diferenças nos imigrantes que haviam residido na Europa entre 1-10 anos, e parcialmente nos imigrantes que residiam há mais de 20 anos. Fatores econômicos também explicavam essas diferenças completamente para os imigrantes com 1-10 anos na Europa e parcialmente para aqueles com mais de 20 anos. As políticas públicas devem oferecer aos imigrantes a possibilidade de viverem com boas condições sociais e econômicas, com esforços para eliminar a exclusão social e prevenir as desigualdades sociais.

*Emigrantes e Imigrantes; Exclusão Social; Disparidades nos Níveis de Saúde; Depressão*

## Resumen

El objetivo de este estudio fue analizar las inequidades en los síntomas depresivos entre nativos y grupos de inmigrantes, según su periodo de residencia en Europa, con el fin de probar el papel de mediación de la exclusión social explicando estas diferencias. Este estudio está basado en datos transversales procedentes de la séptima ronda de la Encuesta Social Europea de 2014 (muestra de 1.792 inmigrantes y 22.557 europeos nativos). Las variables dependientes son los síntomas depresivos autoinformados. Las variables independientes son: origen inmigrante y factores de exclusión social que fueron clasificados en cuatro grupos. Entre las personas socialmente excluidas estaban quienes se encontraban con menos puntuación en cada factor. Todos los análisis fueron estratificados por la duración de su residencia. Las asociaciones independientes y generales entre la exclusión social y los resultados de salud fueron examinados usando modelos de regresión logística binaria (OR; IC95%). Los inmigrantes tenían una prevalencia más alta de síntomas depresivos autoinformados que los nativos; quienes residían en Europa entre 1-10 años y > 20 años contaban con la prevalencia más alta. Los factores de exclusión social multidimensionales analizados conjuntamente explicaron completamente estas diferencias en el caso de los inmigrantes que residían en Europa de 1-10 años y parcialmente para los inmigrantes residiendo durante > 20 años. Los factores económicos también explicaron estas diferencias completamente en el caso de los 1-10 años y, parcialmente, en el caso de los inmigrantes residiendo > 20 años. Las estrategias políticas deberían ofrecer a los inmigrantes la posibilidad de establecerse en buenas condiciones sociales y económicas, así como promover esfuerzos para erradicar la exclusión social y prevenir las inequidades de salud asociadas.

*Emigrantes y Inmigrantes; Exclusión Social; Disparidades en el Estado de Salud; Depresión*

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