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# Scientifically Informed Solidarity: Changing Anti-Immigrant Prejudice about Universal Access to Health

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**Abstract:** Currently, anti-immigrant sentiment has emerged again in European countries, as witnessed, for example, by the rise of xenophobic parties in many member states. This is a prejudice that is not new but that intensifies in certain circumstances, such as the economic crisis. This change in attitudes towards immigration has an impact on the preferences of citizens regarding the universal access to public resources and rights. The results of this article come from the analysis of certain variables of the Transnational European Solidarity Survey (TESS) conducted during 2016 in 13 member countries of the European Union. Specifically, two packages of variables are analysed regarding the degree of solidarity in relation to the access to public health services for immigrants before and after receiving scientific information about the collective benefits of the provision of health for the entire population, including undocumented immigrants. While there is much literature that analyses how scientific literacy in health and education issues improves the situation of vulnerable groups, few studies have analysed how scientific knowledge helps to modify the prejudices and discriminatory attitudes of the general population, thus contributing to the improvement of the health of the entire population.

**Keywords:** anti-immigrant discourse; solidarity; scientific literacy; public health; prejudices; immigrants; Europe



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## 1. Introduction

Anti-immigrant sentiment has emerged again in Europe and Western countries [1–3]. This racist and xenophobic discourse has impacts on citizens' opinions and changes in attitudes regarding immigration, specifically in relation to their positioning in front of the defence of a system of wellbeing and universal access to public health [4].

This study presents the results obtained from the Transnational European Solidarity Survey (TESS), which was implemented during 2016 in 13 EU member countries as part of the EU H2020 funded project *SOLIDUS. Solidarity in European societies: empowerment, social justice and citizenship*. The survey analysed two packages of variables: it analysed the degree of solidarity regarding immigrants' access to public health services by examining the degree of solidarity before and after receiving scientific information about the collective benefits of the provision of health care for the immigrant population. The review of the scientific literature indicates how access to evidence on health issues by the population has a very positive impact on personal improvement. In the present study, a further step was taken, and the study investigated how scientific health literacy also has an impact on the deactivation of prejudice, discrimination and hate speech towards the immigrant population. This also contributes to the overall improvement of society as a whole.

Diverse studies and reports conducted by international and national organisations such as the World Health Organization in the European region, the Italian National In-

stitute for Health, Migration and Poverty and the Lancet Commission on Migration and Health [5,6] report that some of the prejudices on migration that are influencing citizens' opinions the most are that immigrants are carriers of diseases that represent a risk for public health, that they are overloading the health systems and that they have higher fertility rates than host populations.

Although these myths are not based on any evidence and conceal data about the benefits of immigration in national and global economies, they continue to spread not only through the discourses of extreme right political parties but also by some governments in different European countries in order to justify closing borders and restricting access to the public health system [7,8].

These discourses contribute to creating an unsubstantiated civic perception that immigration is overflowing the public health systems in Western countries [9]. For instance, citizens in some European countries estimate that the number of immigrants is three or four times greater than the actual number [6]. Furthermore, the global volume of immigrant and refugee populations has remained at approximately 3% of the world population throughout many decades. Contrary to the perception of many European citizens, 85% of the refugee population is admitted to developing countries and not to Western countries [6]. At a global level, 65% of international immigrants are labour immigrants, and a much lower proportion are refugees or asylum seekers. However, in countries with high-income international migration, which increased from 7.6% in 1990 to 13.4% in 2017, most immigrants were students who paid for their education or workers who contributed with their net incomes to the economy and strengthened welfare states. Furthermore, xenophobic discourses conceal the great consensus on the evidence regarding the economic benefits of immigration. In developed economies, for every 1% increase in the adult immigrant population, the gross domestic product per person increases by 2% [10]. There is no evidence available indicating that immigrants overload the public health system. In contrast, evidence confirms the fact that immigrants contribute to strengthening the health care workforce [5].

Regarding the existing myths stating that immigrants are carriers of infectious diseases and that they can be a risk for public health, no evidence is available to confirm either. The European Centre for Disease Prevention and Control reviewed the available evidence and highlighted that new immigrants and refugees do not present a risk of transmittable infectious diseases for the European population [4]. According to a review of more than 13,000 documents and the follow-up of the evolution of the health of immigrant people in diverse European countries, conducted by the WHO European Region, the main conclusion is that it is more likely that immigrants and refugees are overall in good health. Their probability of getting sick increases during the transition from one country to the other or while having lived in bad conditions in the host countries due to not having access to the health services or due to living in campsites with deficient sanitary services, unprotected from adverse climate conditions, with scarce access to food and water and with the increase of stress entailed by living in that situation of scarcity [6].

As for the populist assertion that immigrants have many more children than host populations, the UCL–Lancet Commission on Migration and Health has reviewed data from several long-term studies that demonstrate that the birth rates among immigrants are barely at the level of population replacement (2.1 births per woman) and are often falling. Among these studies, one of them conducted in six European countries found that the fertility rates among immigrant women were, in general, lower than those in host populations [5].

These unfounded myths have an impact on the way in which immigration is treated in host societies, which leads to immigrants experiencing discrimination in different fields of society and finding themselves with restricted access to public health. Besides being a violation of human rights, this puts not only their health but also the health of the whole population at risk [6].

In contrast, data on the occupational health risks for immigrant workers at a global level have been reviewed. Evidence highlights that immigrant workers work for less

pay, for longer hours and in worse conditions than nonimmigrants and are often subject to human rights violations, abuse, human trafficking and violence. Worldwide, immigrant workers have higher rates of adverse occupational exposures and working conditions, which lead to poor health outcomes, workplace injuries and occupational fatalities. The health disparities of immigrant workers are related to environmental and occupational exposures and are a result of language/cultural barriers, access to health care, documentation status and the political climate of the host country [11].

The WHO European Region warns that the way in which the world addresses human mobility will determine public health and social cohesion for decades ahead. The creation of public health systems that include immigrant populations benefits society as a whole. The creation of health systems that integrate immigrant populations and guarantee that immigrants can be productive members of society benefits national economies while strengthening and improving the access to public health for society as a whole [12]. Not doing so can be costlier for national economies, community health assurance and global health [13]. However, only a minority of countries in the EU provide the same access to health care services for all immigrants as for the resident population [14,15]. The international scientific community and international organisations are warning governments around the world of the need to rise to the occasion and adopt policies that guarantee universal health coverage for immigrants and refugees, as well as host populations, in accordance with the UN Sustainable Development Goals [4,16].

Moreover, the access to, and use of, information have been shown to play a key role in attitude change in different topics and therefore is a relevant feature to consider in our analysis of the extent to which providing scientific information can lead to a change of opinion as registered in the context of the TESS survey. For instance, Krupic [17] analysed the effect of different factors on decision making about organ donation, finding a positive relation between having increased information about it and the donation process, highlighting increased information as a predictor of organ donation. Furthermore, the quality of the information we receive and how efficiently we address it have also been identified as predictors of attitudinal change, as highlighted in the study of Loy, Hamn and Reese [18] about informational self-efficacy and its positive effect on improving climate protective behaviours.

Conversely, the spread of misinformation and the factors that facilitate its growth and impact—such as the increase in social interaction triggered by social media—have been largely reported [19]. Besides, the proliferation of fake news is also associated with a context that facilitates the increase of public discourses where populist disinformation becomes a communication style that avoids empirical evidence and expert analysis [19], sowing the seeds of social discontent [20]. Therefore, countering the effects of disinformation to protect democratic values has become a key task to which many efforts are dedicated in the EU and the world. In the case of the access to information about Covid−19, Pulido et al. analyse Twitter communications and show how, despite a lot of false information circulating that distorts reality, the population retweets more scientific information and proven facts [21].

Regarding migration and its acceptance in our societies, a proper access to data and knowledge on the reality of the benefits and/or threats of managing migration, with improved scientific literacy as a goal to be met, is a key element to improve the wellbeing of societies. In fact, scientific literacy is being promoted both in Europe and at a global level by international organisations, institutions and citizenship in order to confront racism and myths about migration [22–25].

Scientific literacy is knowledge and understanding, and it is also the ability to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriately [26]. It helps a society of scientifically literate thinkers to make wise choices and to combat racism, sexism, bigotry and social injustice by allowing the public to distinguish reliable scientific information from unsubstantiated claims and pseudoscience [27]. The European Commission is supporting scientific literacy projects for the most vulnerable groups, propelled by nonprofit associations. An example is the "ScienceLit project: Scien-

tific literacy for all!", in which adult education schools and community centres from Italy, Germany, Greece and Spain are participating [28].

While there is a considerable amount of literature that analyses how scientific literacy in health issues can reduce health inequalities between immigrants and native-born people and improve the situation of vulnerable groups [29–34], a gap is found regarding the impact of the way in which scientific literacy helps modify prejudices and myths on immigration and public health among the general population. Only some empirical data on the impact of educational level in general on self-reported attitudes towards immigrants have been gathered [35,36]. Data drawn from the European Social Survey and the European Union Labour Force Survey analysed the 12 Western European countries that are most likely to be destination countries for immigrants: Belgium, Denmark, Germany, Finland, France, Greece, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. The findings suggest that education may function as an effective policy instrument to affect natives' reported attitudes towards immigrants and increase social cohesion in societies that are subject to large immigration flows. Education affects attitudes not only by providing natives with more secure positions in society but also by changing their values and understanding of the role of immigrants in host countries [36–38] (p. 217).

The present study provides evidence that contributes to this analysis and fills this gap. The results shed light on the question of whether a change can be registered in self-reported attitudes regarding the access to public health for immigrants after receiving scientific information about the collective benefits of the provision of health for the immigrant population in 13 EU countries.

## 2. Materials and Methods

In this article, we analyse microdata from the Transnational European Solidarity Survey (TESS). TESS is a comparative survey conducted in the summer and autumn of 2016 in 13 European countries using computer-assisted telephone interviews. Respondents in the survey are citizens eligible to vote in national elections in the respective country. The final sample used in our analysis includes a total of 11,029 respondents (after adjusting for missing values). There are approximately 900 respondents per country, including Austria, Germany, Greece, France, Hungary, Ireland, The Netherlands, Poland, Portugal, Slovakia, Spain and Sweden; there are slightly more than 400 respondents for Cyprus due to its smaller population (see Table 1, below). The number of valid observations per country is similar to the regular sample size in standard and special Eurobarometer surveys. The samples are nationally representative of voters in terms of age, gender, employment and occupational status and region (NUTS2). Weighting factors are used to adjust the sample structures as well as possible changes to the population structures known from Eurostat 2016, EU-SILC (Statistics on Income and Living Conditions) and ESISCED 2010–2014.

TESS is part of a joint venture between two research groups: the international research project *SOLIDUS. Solidarity in Europe: Empowerment, Social Justice and Citizenship*, funded by the European Commission through the Horizon2020 research programme, (Grant Agreement no. 649489) and the German DFG Research Unit *Horizontal Europeanization*, funded by the Deutsche Forschungsgemeinschaft (DFG) (FOR 1539). Subteams from the University of Leipzig and the University of Barcelona, both from SOLIDUS and from the Freie Universität Berlin, from the DFG group, were responsible for developing, monitoring and analysing TESS. The commercial opinion company TNS Opinion and Social conducted the fieldwork in all countries under investigation.

TESS had two objectives:

- first, to measure the degree of solidarity across Europe in relation to immigrants and other low-income groups through the provision of health and education services, and
- second, to test the assumption that the factual information on solidarity given to respondents can change policy attitudes.

**Table 1.** Transnational European Solidarity Survey (TESS).

| Country | Sample Size |
|---|---|
| Austria | 923 |
| Cyprus | 421 |
| France | 901 |
| Germany | 909 |
| Greece | 874 |
| Hungary | 875 |
| Ireland | 896 |
| The Netherlands | 893 |
| Poland | 870 |
| Portugal | 865 |
| Slovakia | 784 |
| Spain | 938 |
| Sweden | 880 |
| Total | 11,029 |

Source: Own elaboration using data from the Transnational European Solidarity Survey (TESS).

Our strategy consisted in asking respondents a first set of questions related to their willingness to provide immigrants—including undocumented immigrants—with free access to public health and education systems. Once their answers had been collected, a second set of questions was introduced where facts about the relative advantages of redistributive policies for these groups were first presented to the respondents. The sample size, according to groups of respondents based on sociodemographic characteristics, was as follows (see Table 2, here below).

**Table 2.** Groups of respondents.

| | | Sample Size | % |
|---|---|---|---|
| All | | 11029 | 100.0% |
| Gender | Female | 6085 | 55.2% |
| | Male | 4944 | 44.8% |
| Place of birth | Migrant | 1536 | 13.9% |
| | Native | 9493 | 86.1% |
| Age | 18–24 | 606 | 5.5% |
| | 25–44 | 2647 | 24.0% |
| | 45–64 | 4492 | 40.7% |
| | older than 65 | 3284 | 29.8% |
| Living as a couple | Yes | 7070 | 64.1% |
| | No | 3959 | 35.9% |
| Children | Yes | 2407 | 21.8% |
| | No | 8622 | 78.2% |
| Education | Primary | 1746 | 15.8% |
| | Secondary | 4015 | 36.4% |
| | Tertiary | 5268 | 47.8% |
| Work status | Employed | 5495 | 49.8% |
| | Unemployed | 748 | 6.8% |
| | Inactive | 4786 | 43.4% |

**Table 2.** *Cont.*

| | | Sample Size | % |
|---|---|---|---|
| Place of residence | Urban | 4632 | 42.0% |
| | Rural | 6397 | 58.0% |
| Contact with immigrants | Yes | 6520 | 59.1% |
| | No | 4509 | 40.9% |
| Lived abroad | Yes | 2895 | 26.2% |
| | No | 8134 | 73.8% |

Source: Own creation based on the TESS data.

In this article, we focus on the results related to immigrants' access to public health services. Particularly, we analyse the readiness to accept that immigrants can access the health system regardless of their immigrant status. We are interested in shedding light on the extent to which respondents' willingness to accept universal coverage changes after being presented with scientific evidence on the benefits of granting all immigrants free access to public health services. In particular, respondents were first asked about their willingness to provide immigrants with free access to the public health system; next, the researcher shared with the respondents the following statement and question:

> *Recent scientific research (the interviewer names the specific study if the respondent counter-queries: European Union Agency for Fundamental Rights (2015): Cost of exclusion from healthcare. The case of migrants in an irregular situation. Luxemburg) shows that it is less expensive to offer preventive health care to immigrants than to pay for their emergency treatments later. Given this information, do you agree that the [NATIONAL] government should guarantee access to health care for all immigrants, even if they are illegal?*
>
> [Excerpt from the TESS Survey]

## 3. Results

Our analysis has provided relevant information concerning respondents' acceptance of immigrants' access to health, with interesting results regarding the differences across countries and the reception among different groups within the same countries. Importantly, a significant change is observed when citizens are asked about guaranteeing access to health care to all immigrants, with a very relevant increase between the share of respondents supporting this action before or after the factual information was provided.

First, respondents were asked about their willingness to provide immigrants with free access to the public health system. Before being provided with the evidence, 50% of the respondents were supportive of guaranteeing access to health care to all immigrants regardless of their status. This share increased up to 65% of the respondents after having shared with them factual information, provided by scientific studies, on the potential benefits of these policies (Figure 1).

We focus on the extent to which respondents, as per country, agree or not to immigrants having access to public healthcare. Table 3 summarises these results and the changes in relative frequencies when the respondents receive information on the potential benefits of policies based on factual information coming from scientific studies for the total sample and for each of the countries considered. A two-tailed paired-samples t-test was used to determine whether the proportion of respondents who supported each of the statements was the same before and after receiving scientific information. The level of statistical significance associated with the rejection of the null hypothesis of equality of both proportions with an alternative of a higher proportion after receiving the information is also indicated in the table.

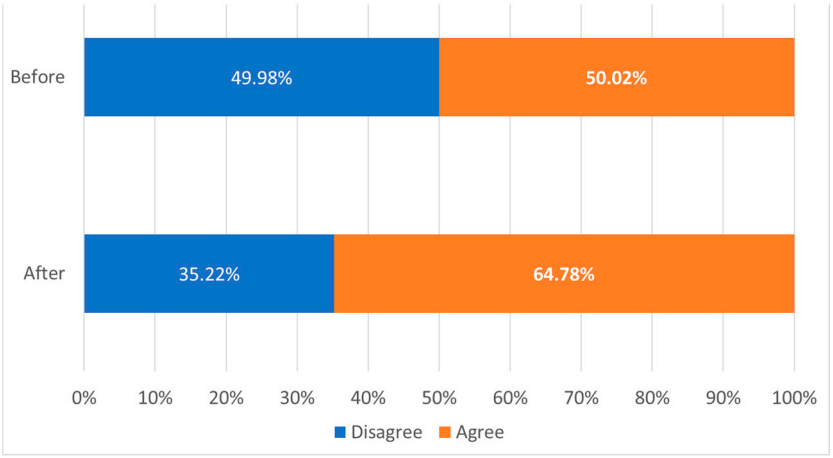


**Figure 1.** Health Care for Immigrants. Source: Own elaboration using data from the TESS survey.

**Table 3.** Health Care for Immigrants.

| Country. | Before | After | Difference |
|---|---|---|---|
| Austria | 41.92% | 57.74% | 15.82 pp *** |
| Cyprus | 39.24% | 54.63% | 15.38 pp *** |
| France | 47.62% | 59.21% | 11.60 pp *** |
| Germany | 48.08% | 65.19% | 17.11 pp *** |
| Greece | 50.35% | 63.71% | 13.36 pp *** |
| Hungary | 30.55% | 47.64% | 17.09 pp *** |
| Ireland | 55.05% | 73.54% | 18.49 pp *** |
| Netherlands | 57.78% | 72.50% | 14.72 pp *** |
| Poland | 39.56% | 56.65% | 17.09 pp *** |
| Portugal | 69.58% | 84.94% | 15.36 pp *** |
| Slovakia | 32.17% | 54.38% | 22.21 pp *** |
| Spain | 70.37% | 77.17% | 6.80 pp *** |
| Sweden | 60.53% | 68.70% | 8.17 pp *** |
| Total | 50.02% | 64.78% | 14.76 pp *** |

Source: Own elaboration using data from the TESS survey. *** Significant differences at the 1% level. Null hypothesis of equality of both proportions vs the alternative of being different. pp: percentage points.

Significant differences across countries were found. If we first focus on the data obtained before the factual information was provided, we can highlight remarkable differences between countries such as Hungary, Slovakia, Cyprus and Poland, with the lowest share of agreement with health access for immigrants (at 30.55%, 32.17%, 39.24% and 39.56%, respectively). Conversely, we find countries such as Spain, Portugal, Sweden and the Netherlands with the highest initial agreement with the proposed statement (with 70.37%, 69.58%, 60.53% and 57.78%, respectively). In the middle of the table, we find Greece, Germany and France (with 50.35%, 48.08%, and 47.62%, respectively).

Following the research hypothesis, our analysis will now focus on the eventual change of opinion facilitated by the provision of scientific information by the researchers, as explained in the previous section. The results are also presented in Table 3.

As introduced, the data collected show a noteworthy change of opinion in all countries. This significant increase in acceptance of immigrants' access to health care merits further reflection and is addressed in the discussion.

The data collected provide us with relevant information concerning how the change of opinion occurs, with some differences among countries, and with presence in the different groups of respondents considered in the survey being statistically significant in all of them. This information is presented next.

The countries that agreed with the statement to the highest extent in the first place show a less remarkable change of opinion when provided with scientific evidence. Here,

we see Spain and Sweden, for example, with 6.80 percentage point (pp) and 8.17 pp increases, respectively, which are the lowest increases in the table. The case of Portugal is somewhat different, as, despite having one of the highest rates of acceptance initially, it also shows an important increase after scientific information is provided, with a difference in opinion of 15.36 pp.

Hungary, Slovakia, Cyprus or Poland, which were the countries with the lowest rates of acceptance before the scientific information was given, were now among the countries with the highest differences, with changes of 17.09 pp, 22.21 pp, 15.38 pp and 1709 pp, respectively. Other countries worth mentioning, which were in the middle of the table before the factual information was given and which have also shown very high rates of increase in acceptance, are Germany and Ireland, with 17.11 pp and 18.49 pp, respectively.

Another relevant finding to be highlighted refers to the analysis performed when focusing on the responses as per group of respondents, as shown in Table 4.

**Table 4.** Health Care for Immigrants, per group of respondents.

| . | | Sample | Before | After | Difference | Sign. |
|---|---|---|---|---|---|---|
| All | | 11029 | 50.02% | 64.78% | 14.76 pp | *** |
| Gender | Female | 6085 | 51.82% | 67.20% | 15.38 pp | *** |
| | Male | 4944 | 48.13% | 62.22% | 14.10 pp | *** |
| Place of birth | Migrant | 1536 | 56.40% | 67.56% | 11.16 pp | *** |
| | Native | 9493 | 48.97% | 64.32% | 15.35 pp | *** |
| Age | 18–24 | 606 | 55.02% | 68.44% | 13.43 pp | *** |
| | 25–44 | 2647 | 49.69% | 65.91% | 16.22 pp | *** |
| | 45–64 | 4492 | 48.65% | 63.73% | 15.08 pp | *** |
| | older than 65 | 3284 | 49.94% | 62.78% | 12.84 pp | *** |
| Living in couple | Yes | 7070 | 48.90% | 64.41% | 15.51 pp | *** |
| | No | 3959 | 51.98% | 65.42% | 13.44 pp | *** |
| Children | Yes | 2407 | 50.52% | 65.22% | 14.70 pp | *** |
| | No | 8622 | 49.84% | 64.62% | 14.78 pp | *** |
| Education | Primary | 1746 | 51.67% | 65.38% | 13.71 pp | *** |
| | Secondary | 4015 | 45.88% | 61.43% | 15.55 pp | *** |
| | Tertiary | 5268 | 57.71% | 71.64% | 13.94 pp | *** |
| Work status | Employed | 5495 | 48.80% | 65.06% | 16.26 pp | *** |
| | Unemployed | 748 | 52.64% | 63.30% | 10.67 pp | *** |
| | Inactive | 4786 | 51.22% | 64.71% | 13.49 pp | *** |
| Place of residence | Urban | 4632 | 53.29% | 66.25% | 12.96 pp | *** |
| | Rural | 6397 | 48.03% | 63.88% | 15.85 pp | *** |
| Contact with immigrants | Yes | 6520 | 54.89% | 68.94% | 14.05 pp | *** |
| | No | 4509 | 43.69% | 59.37% | 15.68 pp | *** |
| Lived abroad | Yes | 2895 | 53.69% | 67.61% | 13.92 pp | *** |
| | No | 8134 | 48.95% | 63.95% | 15.00 pp | *** |

Source: Own elaboration using data from the TESS survey. *** Significant differences at the 1% level. Null hypothesis of equality of both proportions vs the alternative of being different. pp: percentage points.

The data in Table 4 show how the change of opinion occurs overall with all selected groups. The overall change of opinion is 14.76 pp, and some remarkable differences are seen among the groups. The profiles with the most remarkable initial higher agreement rates are women (with 51.82% versus 48.13% of men), immigrants (with 56.40% versus 48.97% of natives), younger respondents, with 18–24 years of age (with 55.08%), people not living as a couple (with 51.98% versus 48.90%), people with tertiary education (57.71% versus 45.88% with a secondary education and 51.67% with a primary education), unemployed (with 52.64% versus 48.80%), people living in urban settings (with 53.29% versus 48.03% of those living in rural setting), people with contact with immigrants (54.89% versus

43.69% with no contact), and people who have lived abroad (53.69% versus 48.95% who have not).

These initial differences provide us with important information on the existing differences regarding the opinion that different social groups have concerning the access to health care by immigrants. These data already suggest the need for further research that could investigate these differences, possibly with a more in-depth qualitative analysis examining the nature of the factors involved.

Furthermore, and returning to the hypothesis in our study, we focus now on the extent to which providing scientific information triggers a relevant change of opinion concerning the acceptance of immigrants' access to healthcare. The highest differences before and after sharing factual information about the benefits of the policies with respondents have occurred among the women, with a 15.38 pp difference, the native population, with a 15.35 pp difference, among the 25–44 age range, with a difference of 16.22 pp, people living in couple, with a difference of 15.51 pp, people with secondary studies, with a 15.55 pp difference, employed people, with a 16.26 pp difference, rural people, with a 15.85 pp difference, people having had no contact with immigrants, with a 15.68 pp difference, and people not having lived abroad, with a difference of 15.00 pp.

However, and in order to get a better picture of the characteristics of the individuals who have changed their views after receiving scientific information, taking also into account their specific country context, we have estimated a multilevel probit model. The advantage of using this model is that it is possible to combine individual covariates with country-level determinants to explain the level of agreement of individuals after having received scientific information. The model is estimated using information from the sample of individuals who did not agree to provide immigrants with free access to the public health system before receiving scientific information. The results of estimating the model are shown in Table 5. The first column of this table presents the results when only individual characteristics are included as covariates. Being a female, education, living in a rural area and having had contact with immigrants have a positive effect on the probability of having changed opinion after having received scientific information. However, being older (up to 58 years old) and being unemployed reduces the probability of changing views. The variance of the country random effects is statistically significant, indicating the relevance of this dimension. The second column of this table shows the results estimating the model after having included country-level variables that have been highlighted by the literature as potential determinants of anti-immigration views: GDP per capita, unemployment rate, the shares of individuals with primary and secondary education, the share of immigrants in the overall population and the number of recorded offences by one thousand inhabitants. All data have been obtained from the Eurostat website. The results for individual variables do not substantially vary from what was found in model 1. Regarding control level variables, GDP per capita and the share of individuals with primary education have a positive influence on changing views, while the presence of immigrants and a high criminal activity have a negative impact. The unemployment rate and the share of individuals with secondary education are not found to be statistically relevant.

**Table 5.** Health Care for Immigrants, multilevel probit estimates.

| . | **Model 1** | **Model 2** |
|---|---|---|
| Female | 0.1680 *** | 0.1660 *** |
| | (0.0464) | (0.0464) |
| Migrant | −0.0388 | −0.0346 |
| | (0.0539) | (0.0541) |
| Age | −0.0115 * | −0.0117 * |
| | (0.0070) | (0.0070) |

**Table 5.** *Cont.*

| . | Model 1 | Model 2 |
|---|---|---|
| Age squared | 0.0001 *<br>(0.0001) | 0.0001 *<br>(0.0001) |
| Living in couple | −0.0138<br>(0.0342) | −0.0163<br>(0.0342) |
| Children | 0.0016<br>(0.0239) | 0.0008<br>(0.0237) |
| Secondary education | 0.0848 **<br>(0.0376) | 0.0916 **<br>(0.0375) |
| Tertiary education | 0.1160 **<br>(0.0516) | 0.1210 **<br>(0.0507) |
| Unemployed | −0.2870 ***<br>(0.0918) | −0.2900 ***<br>(0.0904) |
| Inactive | −0.0748<br>(0.0551) | −0.0780<br>(0.0551) |
| Rural | 0.0501 *<br>(0.0281) | 0.0440<br>(0.0283) |
| Contact with immigrants | 0.0611 **<br>(0.0281) | 0.0593 **<br>(0.0272) |
| Lived abroad | −0.0081<br>(0.0319) | −0.0001<br>(0.0325) |
| Country GDP per capita | | 0.0002 ***<br>(0.0001) |
| Country unemployment rate | | 0.0029<br>(0.0084) |
| Country % Primary education | | 0.0154 **<br>(0.0075) |
| Country % Secondary education | | 0.0013<br>(0.0059) |
| Country % Immigrants | | −0.0171 ***<br>(0.0058) |
| Country % Crime per thousand inhabitants | | −0.0067 ***<br>(0.0015) |
| Variance (Country) | 0.0405 *<br>(0.0237) | 0.0064<br>(0.0052) |
| *Observations* | 5270 | 5270 |

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

## 4. Discussion

The data collected through the TESS survey opens up different lines for future research regarding how scientific evidence can counter the negative effects of disinformation in our societies. The findings also confirm the relevance of scientific literacy to be widespread and a core element for the progress of democracy in our societies [35].

As introduced above, the results have shown how respondents are sensitive to the information based on scientific evidence they receive. Particularly relevant is the fact that almost 15% (14–78%) of respondents increased their agreement with granting immigrants' access to healthcare after receiving factual information on the issue. These results confirm the importance of improving the scientific literacy of the population, especially in matters of direct concern [19]. As indicated in the literature, citizens make informed decisions on the basis of the information they can access [15,16], so it is of key relevance that the information available to them be rigorous and relevant to their own lives and concerns.

The proliferation of fake news, which has seen a boost resulting from the use of social media by citizens of every ages and walks of life [15,35,36], has indeed posed a challenge in the form of populist discourses and narratives based on the spread of falsehoods [18], with very important consequences for the increase of racism and discrimination in our societies [19].

Therefore, the findings of our study contribute an important message: facilitating access to scientific evidence in relevant societal issues is a means to counter disinformation and therefore change citizens' opinion in matters of concern.

Let us now focus on some of the features of this opinion change as registered in the TESS survey. Our results show that before the intervention—when factual information was shared with respondents—only 30.55% of the respondents in Hungary, 32.17% of the respondents in Slovakia and 39.56% of respondents in Poland expressed their agreement with granting access to health care to the immigrant population regardless of their immigrant status, as opposed to 70.37% in Spain or 69.58% in Portugal.

A second relevant result of our analysis concerns the fact that these countries, that had scored lower in the agreement *before* being given the scientific information, are among the ones with the most remarkable change in opinion *after* being given the information. The results show that the differences range from 17.09 pp for Poland and Hungary to 22.21 pp for Slovakia.

These results indicate that readiness to accept immigrants' access to healthcare cannot be explained in terms of cultural factors either: this would not explain the similar results in countries as culturally different as Portugal or the Netherlands. Another aspect to be considered is that the countries' welfare state models do not seem to be able to explain these differences, as, again, significant model differences exist in countries like Spain and Sweden, which have scored similarly in our findings.

Interestingly, one research question that results from our analysis is the extent to which these results could be associated with the presence and impact of xenophobic discourses promoted by extreme-right parties in these countries, that have adopted a populist discourse. The fact that populist anti-immigrant discourses are highly present in countries that have adopted such discourse and less so in those that have not arises as a factor that might explain these significant differences, as indicated by the literature on the association of both phenomena [20]. We suggest that further in-depth research exploring the possible links between these findings, as well as the potential of scientific literacy actions in countering them, is urgent to inform public policies tackling racism and xenophobia in the EU. Finally, another avenue which wold merit further analysis focuses on the similarities collected among the social groups concerning the change of opinion. Our findings confirm that the change occurs in similar proportions throughout all selected groups, which contradicts some popular assumptions regarding certain groups being more prone to assuming racist discourses. However, while in all the social groups and in all the different countries a change of opinion can be observed when scientifically contrasted information is offered, the data also show a major probability of change according to particular characteristics of individuals. Accordingly, being a female, having a higher level of education, being younger or having had contact with immigrants increases the probability of changing the opinion related to immigrants' rights when contrasted with scientific information, while being of advanced age or being unemployed affects negatively the probability of change.

It is interesting to highlight that women are one of the groups that show greater agreement as to granting access to healthcare to migrants; and, still, once scientific information is provided, they are also the most likely to change their opinion positively. This opens up future lines of research exploring the role of women as a motor for dialogue and consequent change in our societies. Moreover, it is worth noticing that older people (over 58) and the unemployed, who are often the targets of populist and xenophobic political discourses, are the ones less likely to change their opinion in relation to immigrants' right to health. The availability of scientific information to wider populations is therefore crucial to counter

disinformed audiences in vulnerable situations. New lines of investigation can provide guidelines for policy makers, social activists and citizens at large, to design actions towards inclusion and tolerance that can reduce the impact of hate discourses.

Again, this is relevant information to be considered for the potential development of public policies to promote scientific literacy and open access policies in science as a means to prevent discrimination. One of the challenges currently facing public policy is finding effective practices that limit the flow of false information, as pointed out by Pulido et al. [21] and Rodriguez et al. [39].

Overall, the results have shown that the provision of scientific information has the power to change the opinions of respondents on issues as important to our societies as the access to healthcare for all immigrants regardless of their status. Furthermore, the differences identified both among the countries studied and among the groups analysed suggest the importance of studying the factors that could explain these differences in more depth. The findings of such analysis could inform relevant policies in the European Union and abroad.

In summary, this article fills the gap regarding the lack of an exhaustive study, at the European level, on the change in the perceptions of natives towards immigration, how anti-migrant sentiments and prejudices can be transformed using scientific knowledge and how this can contribute to the improvement of the health of the whole population. The sample size, the diversity of the European countries considered and the wide range of topics and personal characteristics covered are the main technical strengths of the study. The current article was based on a research question concerning the impact that knowledge based on scientific evidence has on the deactivation or reduction of prejudice, and that the article has been able to show. The current article therefore identifies an important line of research on how the access to truthful information can combat fake news and hate speech, one of the purposes of Goal 10 of the Sustainable Development Goals; hence, it contributes to a better social coexistence.

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