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ORIGINAL PAPER

Attempted suicide among immigrants in European countries: an international perspective

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Abstract
Purpose This study compares the frequencies of attempted suicide among immigrants and their hosts, between different immigrant groups, and between immigrants and their countries of origin.
Methods The material, 27,048 persons, including 4,160 immigrants, was obtained from the WHO/EURO Multicentre Study on Suicidal Behaviour, the largest available European database, and was collected in a standardised manner from 11 European centres in 1989–2003. Person-based suicide-attempt rates (SARs) were calculated for each group. The larger immigrant groups were studied at each centre and compared across centres. Completed-suicide rates of their countries of origin were compared to the SARs of the immigrant groups using rank correlations.
Results 27 of 56 immigrant groups studied showed significantly higher, and only four groups significantly lower SARs than their hosts. Immigrant groups tended to have similar rates across different centres. Moreover, positive correlation between the immigrant SAR and the

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country-of-origin suicide rate was found. However, Chileans, Iranians, Moroccans, and Turks displayed high SARs as immigrants despite low suicide rates in the home countries.

Conclusions The similarity of most immigrant groups' SARs across centres, and the correlation with suicidality in the countries of origin suggest a strong continuity that can be interpreted in either cultural or genetic terms. However, the generally higher rates among immigrants compared to host populations and the similarity of the rates of foreign-born and those immigrants who retained the citizenship of their country of origin point to difficulties in the acculturation and integration process. The positive correlation found between attempted and completed suicide rates suggests that the two are related, a fact with strong implications for suicide prevention.

Keywords Suicide · Suicide attempt · Culture · Migration · Europe

Introduction

Since the mid-1990s, the number of immigrants to European countries has grown dramatically, reflecting political and economic instabilities in their home countries. According to the UN, the estimated number of international migrants (people born outside of the country they live in) in Europe is in 2010 is almost 70 million, representing approximately 10% of the European population [1]. These figures include people moving for a variety of reasons—travelling for studies, seeking a better socio-economic situation, or fleeing from political and religious persecution.

The process of migration is extremely heterogeneous and not all migrants are likely to face similar experiences before or after migration. Resettling in the new country can rightly be considered as a crisis situation for the individual, which may cause psychological distress and even trigger suicidal behaviour. In their new country, the immigrants may face radical changes in social roles, as well as in their own social status. They may suffer from social marginalization [2], and be exposed to prejudice and discrimination by the host population [3]. Pre-migratory circumstances, such as the reasons for and motivation to migration, and pre-migration trauma such as perilous travel or war experiences may influence the course and the mental health outcomes of the migration process [4, 5]. Studies have also shown that the social and economic disadvantages of immigrants are associated with mental illness, including depression [6] and even suicidal behaviour [7].

To this is added the evidence indicating that suicidal behaviour has a neurobiological and genetic basis at the individual level [8–10]. Hence, it has been suggested that some of the immigrants who exhibit suicidal behaviour in the new country had suicidal tendencies, some degree of depression, or certain maladaptive personality traits in their countries of origin, which may in turn be related to genetic susceptibility manifesting itself at times of severe distress [11].

Against this background, international migration is of paramount interest for suicide research. The relationship between immigration and suicide has also been studied in various societies [12–19]. Comparisons of immigrant suicide rates with those of native populations have produced divergent results. However, aggregated "immigrant" figures can hide large variations between different immigrant groups [20–22].

Generally, it has been reported that immigrants from nations with low suicide rates tend to maintain these in their new country, and vice versa [23, 24]. However, other studies [14, 15, 17] have postulated that immigrants generally show higher suicide rates compared to their countries of origin. Moreover, some studies [13, 16], though not all [12, 25, 26], show that immigrants' suicide rates are lower than or converge over time with [18, 19] those of the host country.

One plausible reason for the differing suicide patterns in different immigrant groups is their varying cultural background, which exerts an important influence on the characteristics of suicidal behaviour [27–29]. There are collective, implicit beliefs about the meaning, permissibility, and adequacy of suicidal behaviour likely to influence the individuals, who draw on these cultural "scripts" in determining their course of action and in giving their suicidal act public significance and legitimacy [30–32].

Some current studies rather point to the possible importance of genetic influences on suicidal behaviour even when analysing at aggregate level. In their meta-analysis on studies relating the country-of-birth and immigrant suicide rates, Voracek and Loibl [33] raise the issue of a genetic influence on suicide in immigrant populations. This assumption is in line with the so-called "Finno-Ugrian hypothesis" [34] referring to the early development of ethnic groups who share genes contributing to an elevated susceptibility to suicide [35]. Thus, immigrants might "export" their cultural and genetic propensity to suicidal behaviour from their country of origin.

There is conflicting evidence on whether the spectrum of suicide-related behaviours can be considered as a single continuum, ranging from suicidal ideation through attempted suicide to completed suicide [36]. Individuals displaying non-fatal suicidal behaviour may be very different from those who complete suicide [37]. Nevertheless, suicide attempt is considered to be a strong predictor of completed suicide [38–40].

In contrast to the research so far conducted on immigration and suicide, only a few studies have focused on

attempted suicide among immigrants. Westman and colleagues [7, 22] studied 4.5 million individuals in Sweden between 1993 and 1998. Not only men from Finland and other OECD countries, but also Iranian and Polish men, had higher hazard ratios of attempted suicide than the Swedish-born men, even after controlling for differences in socio-economic status, while Asian and Southern European men had hazard ratios about half of those of the Swedes. Women from Latin America, Asia, and Eastern Europe had hazard ratios twice as high as the Swedish-born women [7].

As far as we know, the only cross-European study on suicide attempts among immigrants was conducted by Devrimci-Özguven and colleagues [41]. It concluded that immigrants in Europe tend to have a higher frequency of suicide attempts than the native-born. However, suicide attempt rates could not be calculated because the data on immigrant population sizes were missing.

In conclusion, previous studies have highlighted the fact that the risk of both attempted and completed suicide among immigrants varies considerably depending on both their ethnic background and other factors. The greatly increased mobility to and within Europe in the last decades and the focus on European-level policy-making in many issues concerning the mental-health of immigrants [42] make the need for knowledge on suicidal behaviour among immigrants at the European level imperative.

Aims

The aim of this study is to investigate the occurrence of suicide attempts among immigrant groups in Europe using cross-national data. The main research questions are (1) Are suicide attempts generally more common among immigrants than among the host populations? (2) Are there differences in this regard between immigrant groups? (3) Are there covariations between different kinds of suicidal behaviours within a specific culture?

Materials and methods

Data

The data on suicide attempts originate from the WHO/EURO Multicentre Study on Suicidal Behaviour, initiated in 1988 and described in detail elsewhere [43]. The master file (the most updated version at the time of the analysis, dated January 2008) contains data collected from 25 centres in 20 countries (Ankara, Turkey; Bern, Switzerland; Bordeaux and Rennes, France; Dobrich, Bulgaria; Emilia and Padua, Italy; Gent, Belgium; Guipuzcoa and Oviedo, Spain; Helsinki, Finland; Holon, Israel; Innsbruck, Austria; Leiden, The Netherlands; Ljubljana, Slovenia; Odense, Denmark; Odessa, Ukraine; Oxford, UK; Pecs and Szeged, Hungary; Sör-Tröndelag, Norway; Stockholm and Umeå, Sweden; Tallinn, Estonia; Wuerzburg, Germany) that have participated in the study. The epidemiological catchment areas of the centres involved together comprise nearly 6,000,000 persons (age 15 and over), having on the average approximately 250,000 inhabitants, and ranging in size from 110,000 in Guipuzcoa to more than a million in Odessa. In the present study, data on suicide attempts from the years 1989–2003 were analyzed ($N = 58{,}622$).

All centres collected data on all suicide attempts that came in contact with any institution in the catchment area health-care system (including hospitals, counselling services, GPs, prisons, crisis centres etc.) Each centre was required to provide standardized information about the individual cases on the basis of a monitoring form that has been translated, back translated, adapted, and pilot-tested at each site [44]. The form includes a whole range of demographic, psychological, and socio-economic variables, detailed information on the method(s) of attempted suicide, its location, and other circumstances. Key persons from each site involved in the project were trained in collecting information according to the monitoring questionnaire. The participating centres use a common definition of attempted suicide, common methods of sampling, and a similar, standardized methodology of interviewing [44].

In the WHO/EURO Multicentre Study, attempted suicide was defined according to the ICD-10 definition as "an act with non-fatal outcome, in which an individual deliberately initiates a non-habitual behaviour that, without intervention from others, will cause self-harm, or deliberately ingests a substance in excess of the prescribed or generally recognized therapeutic dosage, and which is aimed at realizing changes that the person desires via the actual or expected physical consequences" [45]. This definition leaves open the question of suicidal intent [46].

Persons born outside the country where they had attempted suicide were of interest for this survey. The monitoring form included a direct question about the respondent's country of birth and citizenship, and the collecting centres used one or both of these variables. Thus, when we had to use the citizenship variable, some persons with foreign citizenship were included among "immigrants", although that term may strictly speaking not apply to them (see "Discussion").

In order to calculate suicide attempt rates (SARs), data on each centre's catchment area population (immigrant and native) were collected from regional population databases for the relevant years and groups.

Rates of completed suicide were used in the comparison between the countries of origin and the immigrant groups,

since SARs are generally not available. The suicide rates were taken from the WHO Annual World Statistics database [25] for the relevant years.

Treatment of missing data

In a few of the centres where it was not possible to collect data from all institutions in the health-care system, specific estimation factors were computed annually in relation to the size of the sample of reporting institutions, the catchment area, and the time periods covered during the year [43].

As to immigrant status, six centres with large (>20%) amounts of missing data on *both* the respondents' country of birth and citizenship were excluded from further analysis.

In most centres, population data were available by either country of birth or citizenship. Consequently, our analysis groups could only be based on the available variable. Linear-development estimates of the group sizes were employed when population data were not available for all years.

The annual values of completed suicide were estimated from five-year time points available in the WHO Annual World Statistics database [47]. For the few countries (Curacao, Ex-Yugoslavia, Iraq, Libya, and Morocco) with no WHO data, the rates were taken from other sources (articles and local databases).

Methods

Data formation and modification

The immigrants were studied group-wise at different centres. Thus, centres with few (<20) suicide attempts by immigrants, and those with very heterogeneous immigrant populations, where no immigrant group would account for more than 0.5% of the attempts, were excluded. However, native persons at three centres, whose citizens were found at other centres as immigrants, were included. After ordering the material, 11 centres with 74 studied groups, with 22,888 local and 4,160 immigrant person-cases in altogether 28.6 million person-years, remained in the analysis (Tables 1, 2).

Calculations

Annual person-based suicide attempt rates (SARs; cases per 100,000) were calculated at each centre for both the immigrant groups and host population, based on the catchment area population and the suicide attempters in the database during the relevant period, taking into account the above-mentioned estimation factors. The SARs of the foreign-born and foreign citizens were compared to those of the local-born and local citizens at the single centres, and the differences were tested for significance assuming a Poisson distribution of rates. Possible differences in SARs between groups with the same citizenship versus same country of birth at the same centre were similarly assessed. Further, the differences in SARs of the specific immigrant groups (by citizenship or country of birth) were compared across the centres.

In order to assess the relationship between the completed-suicide rate in the country of origin and the attempted-suicide rate in the immigrant group, a rank-correlation analysis was performed using Kendall's tau-b coefficient.

Results

Suicide attempts among immigrants and host populations

Comparison of the 56 larger, specifically studied immigrant groups with the host groups at the individual centres showed that 27 of them had a significantly higher SAR than the hosts, 25 had a similar one, and four a significantly lower SAR.

Finns, Italians, and Turks were found as hosts at one centre but as immigrants at another. Comparing their SARs in the two positions it transpired that they were of similar magnitude for Finns and Italians. A major exception from this similarity was the Turks, whose immigrant-position rates were far higher than those of their countrymen in Ankara (see Table 3).

Suicide attempts among persons born abroad versus foreign citizens

In Leiden (The Netherlands), Stockholm (Sweden), Tallinn (Estonia), and Umeå (Sweden), the SARs of persons born abroad could be compared to those of the persons who carried the citizenship of the same country, without necessarily having been born there. The rates of these two groups were generally similar (Table 4).

Immigrant groups at different collecting centres

Thirteen immigrant groups were numerous enough in more than one centre to allow comparison. Most of them were found at two centres only, but persons born in Turkey and those with Turkish and Ex-Yugoslavian citizenships could be compared across several locations. Table 5 shows that in six of the thirteen immigrant groups the levels of SARs across different centres were fairly similar.

Table 1 Centres, population groups, and years used in the final analysis

Centres and years	Groups by country of birth	Groups by citizenship
Ankara (Turkey) 1998–2000	Turkey	Turkey
Bern (Switzerland) 1989–1991	\	Germany
1993-1999		Italy
		Portugal
		Spain
		Sri Lanka
		Switzerland
		Turkey
		Yugoslavia
Ghent (Belgium) 1996–1999	\	Belgium
		Morocco
		Turkey
Helsinki (Finland) 1989–1997	Finland	Finland
Holon (Israel) 1997, 1999, 2002	Egypt	Israel
	Ethiopia	
	Iran	
	Iraq	
	Israel	
	Libya	
	Morocco	
	Poland	
	Russia	
	Romania	
	Turkey	
	Ukraine	
	USA	
Leiden (Netherlands)1989–1992	Curacao	Morocco
	Indonesia	Turkey
	Morocco	
	Netherlands	
	Suriname	
	Turkey	
	UK	
Padua (Italy) 1989–1996	\	Italy
Stockholm (Sweden) 1990–2003	Chile	Chile
	Finland	Finland
	Former Yugoslavia	Former Yugoslavia
	Greece	Greece
	Norway	Norway
	Poland	Poland
	Sweden	Sweden
	Turkey	Turkey
Tallinn (Estonia) 1995–2000	Estonia	Estonia
	Russia	Russia
Umeå (Sweden) 1989–1995	Finland	Finland
	Iran	Iran
	Norway	Norway
	Sweden	Sweden
Wuerzburg (Germany) 1989–2003	\	Former Yugoslavia
		Germany
		Poland
		Russia
		Turkey
		Ukraine
		USA

Other groups displayed larger, but statistically non-significant differences. These included Moroccan-born persons in Leiden (The Netherlands) versus Holon (Israel), and Norwegian-born and Norwegian citizens in Stockholm versus their counterparts in Umeå (both centres in Sweden).

Large and significant discrepancies could be observed between Finns holding a Finnish citizenship in Stockholm and those in Umeå (Sweden), as well as between the Russian-born in Tallinn (Estonia) and those in Holon (Israel). The largest differences within the same group were found between persons with a Moroccan citizenship in Ghent and Leiden and between Iranian-born persons living in Umeå and Holon. Turkish-born persons in Holon had also a much lower SAR than their counterparts in other centres.

Immigrant suicide attempts and suicide in the countries of origin

The rank-order of the SARs of the different immigrant groups—by country of birth and by citizenship—are shown in Tables 6 and 7. These include SARs across all centres and the rates of completed suicide in the immigrants' countries of origin during the relevant years. A positive correlation was found between the SARs of immigrants (by country of birth) to European host countries and the completed-suicide rates in their native countries (Kendall's tau-b = 0.34; $p = 0.045$). When the calculation was performed without the dubious outlier value of Ukraine (see "Discussion"), the correlation became stronger (0.47, $p = 0.007$).

Table 7 shows that in 14 out of 19 cases, higher SARs of immigrants coincided with higher completed-suicide rates in their native countries. Among Chileans, Iranians, Turks, and Ukrainians, opposite patterns were observed.

Table 2 Centres, missing data, and the number of suicide attempters in the final analysis

Centres	Missing data for country of birth (%)	Missing data for citizenship (%)	Suicide attempters, local-born	Suicide attempters, foreign-born	Suicide attempters, local citizens	Suicide attempters, foreign citizens
Ankara (Turkey)	0.0	0.0	299	3	301	1
Bern (Switzerland)	42.1	1.1	–	–	1,138	272
Ghent (Belgium)	3.1	2.8	–	–	1,876	124
Helsinki (Finland)	20.0	0.1	–	–	3,087	9
Holon (Israel)	9.2	6.0	233	73	(418)[a]	(2)[a]
Leiden (Netherlands)	3.2	3.2	557	50	579	28
Padua (Italy)	0.4	1.3	–	–	885	14
Stockholm (Sweden)	15.1	10.9	2,109	627	2,481	391
Tallinn (Estonia)	3.1	2.8	2,354	644	1,538	1,469
Umeå (Sweden)	0.6	0.2	1,064	123	1118	74
Wuerzburg (Germany)	10.5	7.9	–	–	3199	258

– Large amounts of missing data on the variable/was not collected by the centre

[a] Automatic citizenship is given to all Jews; hence, country of birth is used as the indicator of immigration

Table 3 Comparison of suicide attempt rates between the same citizenship or country-of-birth group in host and immigrant positions (per 100,000 Person-years)

Centres	Citizenship Italy	Citizenship Finland	Citizenship Turkey	Country of birth Turkey	Citizenship Germany
Ankara			**31.1**	**31.0**	
Bern	37.1		158.3**		66.0
Ghent			190.0**		
Helsinki		**214.8**			
Holon				34.6	
Leiden			87.3*	126.5**	
Padua	**33.7**				
Stockholm		160.4	130.9**	163.0**	
Umeå		60.2**			
Wuerzburg			157.7**		**80.8**

The host-position rate fat-styled

* Significance of difference to host position $p < 0.05$

** Significance of difference to host position $p < 0.01$

The Chi-square value of the Table is 4.23 ($p = 0.04$), without Ukraine, 5.84 ($p = 0.016$).

The correlation between the SARs of foreign citizens and the completed-suicide rates in their citizenship countries was not significant. The correlation coefficient calculated without the outlier values of Iran, USA, and Ukraine raises this close to significance (Kendall's tau-b = 0.32, $p < 0.09$). 12 of 19 cases follow the positive correlation between immigrant SAR and the completed-suicide rate of the country of their citizenship, while seven show opposite patterns. The Chi-square value was not significant.

Discussion

Data quality and methodology

Few countries in the world have systematic data registration of attempted suicide, which makes it impossible to relate national trends of suicide to national trends of attempted suicide. Hence, in the absence of such data, one is forced to rely on local studies, varying considerably in terms of operational definitions of attempted suicide [48, 49]. Yet, the common definitions and methodology of the

Table 4 Suicide attempt rates (SAR) among immigrants by country of birth and by citizenship (per 100,000 Person-years)

Group	Centre	SAR by country of birth	Person-years	SAR by citizenship	Person-years	
Iran	Umeå	272.2	10,655	296.9	9,095	n.s.
Norway	Umeå	190.8	6,815	196.2	5,097	n.s.
Finland	Umeå	112.4	27,582	60.2	13,289	$p < 0.0005$
Turkey	Stockholm	163.0	80,970	130.9	61,130	n.s.
Chile	Stockholm	158.4	43549	148.9	21,489	n.s.
Finland	Stockholm	153.8	170,302	160.4	119,704	n.s.
Poland	Stockholm	150.9	34,449	153.0	15,035	n.s.
Ex-Yugoslavia	Stockholm	121.5	42,813	117.4	23,844	
Norway	Stockholm	106.1	16,028	92.9	13,995	n.s.
Greece	Stockholm	40.5	22,197	48.5	10,301	$p < 0.0005$
Russia	Tallinn	171.0	371,904	250.8	571,339	n.s.
Turkey	Leiden	126.5	6,324	87.3	9,166	n.s.
Morocco	Leiden	96.4	10,370	58.5	13,672	

WHO/EURO monitoring study give a unique opportunity for a multi-site comparison, overcoming at least the problem of differing definitions of suicide attempt between countries and studies.

The interest of this study lies in its generality that makes comparisons possible. However, considering the coverage and the relatively small number of cases in small groups, single results should not be overemphasised, rather, it is the emerging patterns that should be the focus of attention.

There are important issues of validity and reliability. First of all, the attempted suicides not reaching health-care services are estimated to add 10–50% to the recorded number [7, 50]. For example, the British Survey of Psychiatric Morbidity reports that only 63% of men and 58% of women who reported having attempted suicide said that they had sought help following the last attempt [51]. Other research has shown that in areas where GPs treat suicide attempts independently from general hospitals, a maximum response of about 70% accuracy can be achieved in monitoring research [52]. Yet, the WHO/EURO Multicentre Study was designed to minimize underestimation of medically treated suicide attempts by taking into consideration non-response and missing information in the catchment area of the study (i.e. using an estimation factor).

Another related aspect is that different ethnic groups have different patterns of help-seeking behaviour and health-service utilisation [53]. It is likely that the SARs in some ethnic groups are underestimated. For example, Ethiopian immigrants to Israel show high completed-suicide rates [54], but their SAR here was very low. That may well be related to their low mental health service use both in Israel and elsewhere [55]. Such methodological problems often occur in studies involving suicide attempts.

Another issue that may contribute to inaccuracies in some groups' SARs is erroneous categorization of immigrants. This is likely in the case of Ukrainians, whose extremely low rates are difficult to explain otherwise since they differ from both the high rates in Ukraine [47] and the local patterns in Holon (Israel) and Wurzburg (Germany).

Definitions of host and immigrant populations are not always clear-cut and may change over time as illustrated by the situation in Tallinn. Russians in Estonia lived for decades as a "domestic" minority under the Soviet regime. Being Soviet citizens, they were not categorised as immigrants until Estonian independence [56].

It should be noted that the catchment areas cannot be considered to be representative of the countries involved, and the immigrants living within them may not be representative of the immigrants to those countries. However, since this study has been made using the largest European data material at hand it could suggest possible areas of future investigation.

The data on completed suicide in the countries of origin vary in quality and reliability. Data from developed countries (Europe, North America, and a few countries in the Western Pacific region) are collected and updated on regular basis on the WHO website. Most developing countries (in Latin America, Asia and the Eastern Mediterranean region) report on a less regular basis, and very few African countries report mortality regularly to the WHO. At present, many less developed countries do not keep registration systems due to lack of means to collect the data on mortality in the population [48]. When available, figures on suicide are underestimated and may not always be reliable due to underreporting, resulting from inefficient civil registration systems. There are also

Table 5 Comparisons of suicide attempt rates (SAR) within the same citizenship or country-of-birth group across different centres (per 100,000 Person-years)

Group	Centre	SAR
Ex-Yugoslavia (citizenship)	Stockholm	117.4
	Wuerzburg	98.2
	Bern	60.2**
Finland (country of birth)	Stockholm	153.8
	Umeå	112.4
Finland (citizenship)	Stockholm	160.4
	Umeå	60.2**
Iran (country of birth)	Umeå	272.2
	Holon	38.2**
Morocco (citizenship)	Ghent	228.8
	Leiden	58.5
Morocco (country of birth)	Leiden	96.4
	Holon	61.5
Norway (citizenship)	Umeå	196.2
	Stockholm	92.9
Norway (country of birth)	Umeå	190.8
	Stockholm	106.1
Poland (citizenship)	Stockholm	153.0
	Wuerzburg	134.5
Russia (citizenship)	Tallinn	250.8
	Wuerzburg	225.7
Russia (country of birth)	Tallinn	171.0
	Holon	76.3**
Turkey (citizenship)	Ghent	190.0
	Bern	158.3
	Wuerzburg	157.7
	Stockholm	130.9
	Leiden	87.3
Turkey (country of birth)	Stockholm	163.0
	Leiden	126.5
	Holon	34.6**

The significances indicate the p of the difference to the centre with the highest rate only

* Significance of difference to the highest rate $p < 0.05$

** Significance of difference to the highest rate $p < 0.01$

variations in coroners', doctors', and hospital practices when issuing death certificates [57].

Having the limitations mentioned above in mind, we now turn to the conclusions of the study.

The results of the study

Suicide attempts among immigrants and host populations

The studied immigrant groups often had significantly higher SARs than their hosts, which points to the possibility of a general tendency towards more suicide attempts at least among the larger immigrant groups, supporting previous studies that consider immigration in itself a risk factor for suicidality [7, 58, 59].

Suicide attempts among immigrants born abroad versus foreign citizens

In most cases where foreign-born immigrants and those who held a citizenship from the same country could be compared at the same centre the differences in SARs were small. Earlier hypotheses of naturalisation as a positive factor in acculturation and integration [26] possibly leading to a convergence in suicidal behaviour could not be supported since such an effect would have created a difference between those who had changed their citizenship and those who had not. This underlines the importance of shared cultural background.

Immigrant groups at different collecting centres

Thirteen immigrant groups could be found at more than one collecting centre. Comparing the SARs of those groups across the centres we found few significant differences. Those that existed were mostly found in Holon (Israel), where the all immigrants have the Jewish religion—and low SARs—in common [60]. The similarity across centres shows that the cultural background of the immigrants seems to be more important than the location into which they settle for their propensity to attempt suicide.

Immigrant suicide attempts and suicide in the countries of origin

A positive correlation was found between the completed-suicide rates of the immigrants' countries of origin and the SARs of the corresponding immigrant groups. As expected, this correlation was stronger for the immigrant groups born in their country of origin than for the citizens, for whom the positive relationship was not significant. In the debate on whether suicide attempts and completed suicides are parts of a single continuum or separate phenomena, our results support the continuum hypothesis, showing that there may exist a connection between the tendency to attempt and complete suicide at the most general level [39].

Possible causes of these patterns may be understood within two main theoretical frameworks described in "Introduction"—genetic make-up (i.e. genetic risk factors for suicidal behaviour) and cultural continuity (i.e. enduring influences of cultural origin). Both may influence patterns of suicidality in immigrants. The design of this study does not permit a conclusion in the matter.

Table 6 The rank orders of immigrants' suicide attempt rates (SAR) and the completed-suicide rates of their countries of origin by immigrant group (according to country of birth) across the collecting centres (per 100,000 Person-years)

Country	Immigrants' SAR	Country of origin completed-suicide rate
Chile	158.4	7.8
Russia	154.3	37.5
Finland	148.0	26.8
Turkey	136.7	3.0
Norway	131.3	13.4
Ex-Yugoslavia	121.5	16.2
Poland	121.2	14.4
USA	108.3	11.5
Iran	105.8	0.0
Curacao	85.0	4.0
Suriname	73.1	7.7
Morocco	73.0	1.0
Romania	44.0	12.5
Greece	40.5	3.5
Iraq	35.7	0.0
Egypt	31.9	0.0
Libya	14.9	0.0
Ukraine	5.0	28.3
UK	0.0	8.0

Kendall's tau-b = 0.34; $p = 0.045$, without Ukraine: Kendall's tau-b = 0.47; $p = 0.007$

Four important immigrant groups

Four major immigrant groups displayed high SARs as immigrants, despite low suicide rates in their countries of origin: Chileans, Iranians, Moroccans, and Turks. This tendency was most consistently documented among the Turks, and since Ankara was participating in the study, their immigrant SARs could be directly compared to the rates there, which were much lower.

It can be assumed that the immigration process in itself and the difficulties in acculturation—intergenerational conflicts, for example—explain the high suicide-attempt rates in these groups. Earlier national studies have also shown high suicide-attempt rates among them [7, 61], although mainly in females. The specific conditions, including the influence of the composition of these immigrant groups, need further inquiry.

Conclusions

The similarity of the groups' rates across centres and that between the countries of origin and the immigrant groups suggest strong continuity between the homeland and immigrant populations in terms of suicidal behaviour. We prefer to interpret this continuity in cultural terms, but genetic interpretations are a possibility. However, these presuppose that genetic differences follow cultural divisions, *and* allow exceptional discontinuities such as the above-mentioned four larger immigrant groups in this study.

Table 7 The levels of the suicide rates in the countries of origin and the immigrants' (by country of birth) suicide attempt rates (SAR)

	Lower SAR (100 or less per 100,000)	Higher SAR (over 100 per 100,000)
Lower suicide rate (8 or less per 100,000)	Curacao Egypt Greece Iraq Libya Morocco Suriname UK	Chile Iran Turkey
Higher suicide rate (over 8 per 100,000)	Romania Ukraine	Ex-Yugoslavia Finland Norway Poland Russia USA

$\chi^2 = 4.23$, $p = 0.04$; without Ukraine: $\chi^2 = 5.84$, $p = 0.016$

Immigrant suicidality is not entirely a question of cultural background, however. The larger immigrant groups studied here did show generally higher rates of suicide attempts than the host populations, and four of them did so in a striking contrast to the low suicide rates (and suicide attempt rates) in their countries of origin. The similarity between the suicide attempt rates of those actually born in the country of origin and those who had retained that country's citizenship also indicates that naturalisation, in itself an indicator of a degree of cultural closeness, did generally not have much effect towards convergence of suicidal behaviour. We would expect that those who changed their citizenship would have consistently lower rates, which is not the case. Thus, the *absence* of a cultural effect indicates that there are counterforces, probably pertaining to the quality of the immigrants' acculturation in the new country or to their generally disadvantaged socio-economic situation, that keep their suicidal behaviour at higher levels.

Additional inquiry is needed into the various patterns of suicidal behaviour in specific immigrant groups arriving to European countries, which may be very different from

those seen among their hosts. Ignorance of the particular characteristics of suicidal behaviour among immigrants impedes the development of targeted, culturally sensitive preventive initiatives and treatment interventions after attempted suicide.

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Conflict of interest The authors declare that they have no conflict of interest.

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