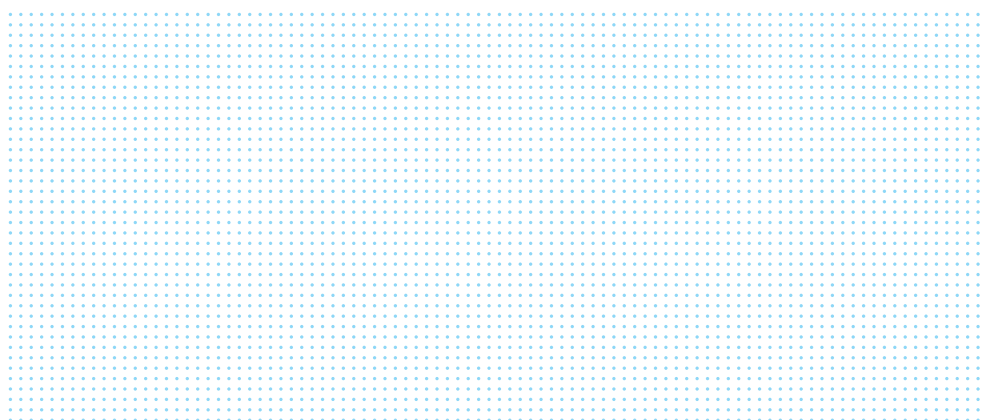# HUNGARIAN **DEMOGRAPHIC** RESEARCH INSTITUTE

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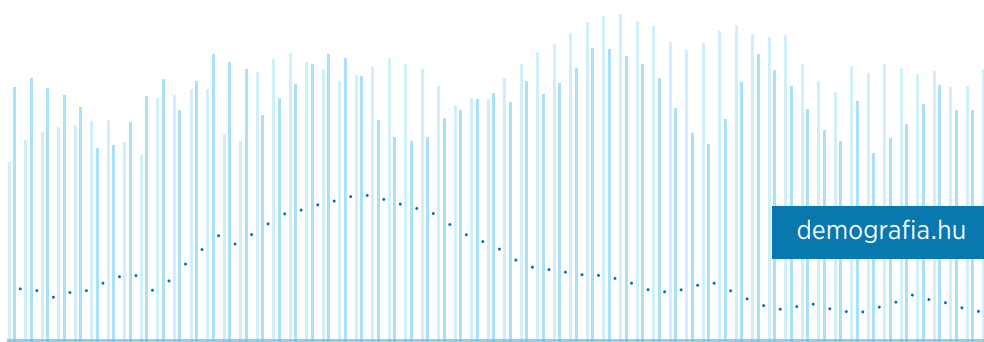
ON POPULATION, FAMILY AND WELFARE

№ 25

SUICIDE IN THE HUNGARIAN KINGDOM

by
Lajos Bálint

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Hungarian Demographic Research Institute
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ABSTRACT

This paper tests the theses of Durkheim's classical work (*Suicide*) and those of other early sociological theories by analysing district-level data of the Hungarian Kingdom at the beginning of the 20th century. So far, there have been few attempts of analysing spatial and historical suicide data for Hungary so far. Previous studies, based on qualitative sources, parish registers or using the literature of the period as a historical source, lacked the opportunities afforded by statistical analysis.

The analysis of the Hungarian Kingdom has proven to be a rewarding exercise and made it possible to raise questions that thus far have received little attention in the scientific community.

Spatial analysis makes it clear that – in contrast to the widespread opinion – not only the Great Plain can be regarded as particularly prone to high suicide rates but some regions in Transylvania were also characterised by a high frequency of suicide. The results of the spatial models generally verified Durkheim's propositions. Both basic types of suicide in the Durkheimian theory, egoist and anomie-type suicides, were found to be crucial in explaining the spatial differences of suicide in the Hungarian Kingdom. All indicators referring to social change (e.g. the share of industrial workers, divorce rate) increased the probability of suicide, whereas variables signalling strong traditional community ties or high levels of integration diminished it.

However, as opposed to Durkheim's theory, spatial and ethnic factors were found to be more important. The concept of the imitative character of suicide or the role of adaptation to (or acceptance of) this kind of behaviour in its spatial spread proved to be important in better understanding the mechanisms of suicide.

The ethno-linguistic variables highlighted the influence of cultural-normative factors among the driving forces of suicide. Durkheim clearly rejected the influence of ethnicity in suicide; whereas this study attributed a shared suicide culture to linguistic groups.

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INTRODUCTION[1]

In the 19th century suicide was viewed as one of the most serious social problems that manifested most appropriately the negative consequences of modernisation, the malaise and collapse of traditional forms of society (Durkheim, 1992, p.177; Giddens, 1971; Lederer, 2013; Lukes, 1972). Even though suicide was relatively rare, it was one of the most widely studied social issues. Suicide research in the 19th century – not surprisingly – accumulated an impressive body of knowledge, primarily by moral statisticians, and contributed to a better understanding of the different aspects of self-destruction (by gender, age, religion, seasonality, marital status, occupation and social status) (Baumann, 2001; Brancaccio et al. 2013; Giddens, 1965; Lederer, 2013).

The scientific community has held a longstanding interest in the historical roots of Hungarian suicide potential (Böszörményi, 1991; Lederer, 2004; Nyíri, 1988; Zonda, 1990; 2004). There is a general agreement in the relevant academic literature that Hungary was not characterised by high levels of self-destruction until the early 1860s. In his work Bernát (1927), referring to one of the most distinguished social statisticians of the era, wrote: "Konek did not even discuss it in his statistics published in 1875 because he considered it so insignificant" (Bernát, 1927, p.20). Enrico Morselli in his famous work *Il Suicidio [Suicide: An Essay on Comparative Moral Statistics]* characterised Hungarians as a nation with low suicide potential (Morselli, 1975, pp.82–83, p.101). Masaryk in the 1870s considered the level of suicide low but that of violent crime high in Hungary (Masaryk, 1970, p.47)

As regards trends over time, Hungary lagged behind European nations with high suicide potential by about 25–50 years (Böszörményi, 1991), however caught up within a relatively short period.[2] After the turn of the century (1901–1905) suicide rate in Hungary already exceeded that in Austria and higher rates were observed only in European countries with traditionally high levels of self-destruction (Halbwachs, 1978, p.72).

The present study examines the ecological characteristics of suicide based on district-level data in the Hungarian Kingdom. To date there has been no quantitative analysis of spatial-historical suicide data in Hungary. Works drawing on historical, cultural and literary sources, as well as parish records lacked the capacity for statistical analysis. The analysis of district-level data provides a unique opportunity to explain the suicidal characteristics of the country characterised by sharp ethnic, religious and economic cleavages, as well as the analysis of different theoretical concepts in the framework of appropriate methods.

This study takes Durkheim's (1951) classical theory as its starting point; the key assertions of which are centred around the level of integration, the stability of regulating norms (regulation), and suicide as a social fact. Most empirical research based on Durkheim's work focus on certain aspects of his theory, however it is rare to find studies that test all of these hypotheses simultaneously. It is a common problem in scientific research that scholars often neglect issues that fall outside their direct interest. The inclusion of relevant control variables is also crucial from a methodological point of view (Breault, 1986), as well as the evaluation of the resulting joint effects. Durkheim emphasised the social determination of suicide and rejected all non-social explanations

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1   This paper was published in Hungarian in *Demográfia* 2014, 57(1), pp.5-43.

2   Földes (1905) reported in his study that the suicide rate doubled between 1860 and the turn of the century. According to the international comparison presented by Szél (1928a) between 1906–1910 the suicide rate per million population exceeded that of Hungary (199) in Germany (214), Switzerland (223) and France (217). After the turn of the century suicide rate was already higher in Hungary than in Austria (182). The sudden increase is also confirmed by Halbwachs' data: in the first half of the 1880s the rate of suicide per million population in Hungary (84) was half or a third of the exceptionally high rates registered in Denmark (248), Switzerland (232), Germany (211) and Austria (162). Nyíri put the increase in the prevalence of suicide at the last third of the century: „Austria and Hungary were among the countries with low suicide rates in the second third of the 19th century, and in the last third of the century they were among those with moderate levels" (Nyíri, 1977, p.632).

including the role of race and ethnicity, as well as the influence of imitation. This study seeks to answer the question whether Durkheim's theory and the ideas of some of his unjustly neglected contemporaries provide a useful theoretical framework to explain the variation of suicide in the Hungarian Kingdom.

The study is structured as follows. First the theoretical background will be discussed including a special section on the spatial aspect of suicide. This will be followed by a section on data and methods. The next part elaborates on the spatial structure of suicide rates in the Hungarian Kingdom and presents the results of spatial autoregressive models. Finally results are confronted with Durkheim's original theory. The paper strongly argues that besides structural components the cultural factor also plays an important role in the explanation of suicide patterns.

THEORETICAL BACKGROUND

In his work Durkheim attempted to bring together previous theories on suicide into a single theoretical framework in order to demonstrate the necessity for the institutionalisation of a distinct discipline to study society (Douglas, 1967, p.15; Lukes, 1972, p.192).

The study of suicide has two important questions. One seeks to answer why the suicide rates of distinct social groups differ from each other, and the other asks why a person kills himself (Gibbs, 1968, p.8). For Durkheim the answer is obvious; he sought to explore the structural causes of social differences in suicide.

From the four social types of suicide, altruism and fatalism that is discussed briefly (only in a footnote) represent the types of the pre-modern era, while anomie and egoistic suicide are the defining types of modernity (Breault, 1986, p.628; Breault, 1994, p.12; Giddens, 1965, p.5).

The most important organising principle of this theory is integration, although Durkheim has never defined it (Breault, 1994, p.4; Wray et al., 2011, p.507). Egoistic suicide, associated with a lower degree of integration, is the most extensively discussed and elaborated type, which has also received the most attention in later research based on Durkheim's work (Berk, 2006, p.58; Breault, 1994, pp.12–13; Stack, 1981, p.208). The egoistic theory attributes the vulnerability of individuals in the society to a lack of social cohesion and the weakening of connections between members of the community: "The more weakened the groups to which he belongs, the less he depends on them, the more he consequently depends only on himself […] if we agree to call this state egoism, in which the individual ego asserts itself to excess in the face of the social ego […] we may call egoistic the special type of suicide springing from excessive individualism" (Durkheim, 1951, p.209). According to the general rule: „[…] suicide varies inversely with the degree of integration of the social groups of which the individual forms a part" (Durkheim, 1951, p.209). In Durkheim's discussion egoistic suicide is manifested in the areas of religion, family and politics. Integration occurs through various mechanisms and at different levels (Berk, 2006; Fincham et al., 2011, p.12).

The following will provide a brief overview of religious and family integration that are particularly relevant for our analysis. According to Durkheim the protective influence of religion is solely due to the community integration of the faithful (however, in his later work *The Elementary Forms of the Religious Life* Durkheim (1995) recognised the regulating function of religion as well). Religion is a society maintained by common belief, tradition and practice that are obligatory to the faithful. The individual destroys himself because the religious society it belonged to lost its cohesion. The religious dogmas, the religious perception (condemnation) of suicide, the nature of religious conceptions, religious feelings and commitment are secondary to the development of suicide. The number of suicides is defined solely by the collective states of confessional groups, the

integration of the religious community and the intensity of relationships: "The more numerous and strong these collective states of mind are, the stronger the integration of the religious community, and also the greater its preservative value" (Durkheim, 1951, p.170). Therefore, for Durkheim religion was not the key factor but its effect on social integration. Religious differentials in suicide potential result from differences in the degree of integration. According to Durkheim's famous rule "[...] suicides are found to be in direct proportion to the number of Protestants and in inverse proportion to that of Catholics" (Durkheim, 1951, p.153). Higher suicide among Protestants was explained by the spirit of free inquiry, the independent interpretation of religious dogma, and greater religious individualism. However, Durkheim stressed that free inquiry was not the cause itself, but the effect of another cause, namely the weakening of traditional beliefs: "Reflection develops only if its development becomes imperative, that is, if certain ideas and instinctive sentiments which have hitherto adequately guided conduct are found to have lost their efficacy. Then reflection intervenes to fill the gap that has appeared, but which it has not created" (Durkheim, 1951, p.158). Protestantism allows more freedom for inquiry and individual thought "[...] because it has fewer common beliefs and practices. [...] the greater concessions a confessional group makes to individual judgement, the less it dominates lives, the less its cohesion and vitality" (Durkheim, 1951, p.159).

The association between education and suicide was already known in the first third of the 19th century thanks to the moral statistician A. M. Guerry (Goldney and Schioldann, 2000; Goldney et al., 2008). Morselli linked the spread of education to the weakening of traditional connections, and thus the proliferation of suicide (Morselli, 1975, p.138). Durkheim saw education, the desire for knowledge, and science as the consequence of weakening collective beliefs and the spread of free inquiry. He argued that the extensive primary education (instruction) in Protestant nations, the high rate of enrolment and low levels of illiteracy made the independent interpretation of the Bible possible.

The suicide literature of the 19th century before Durkheim studied the relationship between religion and suicide extensively. Morselli considered religion as the strongest motivating force of human will (Morselli, 1975, p.119). Masaryk highlighted the differences in education and wealth among the different confessional groups, however he considered the effect of religion as distinct as and stronger than everything else (Masaryk, 1970, p.86). For Durkheim – at the analysis of suicide rates of Swiss cantons – religion was not simply one of the key factors but the only truly important one: „Confessional influence is therefore so great as to dominate all others" (Durkheim, 1951, p.154).

Differences in self-destruction by confessional group, particularly higher levels of self-destruction among Protestants than Catholics had already been known well before Durkheim. The German economist Adolf Wagner, an important figure of suicide statistics, noted suicide differentials among denominational groups for the first time in his lengthy monograph published in 1864 (*Die Gesetzmässigkeit in den scheinbar willkührlichen menschlichen Handlungen vom Standpunkte der Statistik*): "The result of this examination is hereby the following: Suicide in Europe is most frequent among Protestants, perhaps even somewhat more frequent among the Reformed than Evangelicals; among Catholics it is very much rarer, perhaps among Greek Christians even more rare; among Jews suicide is usually rarer still than among Catholics and perhaps only somewhat equally frequent or less frequent than among Greeks." (Lederer, 2013, p.691).

Morselli did not simply repeat the idea of denominational differentials in suicide but also put forward a number of ideas that later explicitly appeared in Durkheim's theory. He highlighted the puritanism of Protestants, the discarding of the formalities of religious service, and the practice of free inquiry of religious doctrines. However, Morselli did not attribute self-destruction to integration but to the inner moral struggle of Protestants (Morselli, 1975, p.125). Masaryk, in his work published two years after Morselli's, blamed the spiritual crisis of society and irreligiousness for the increase in the number of

suicides. He argued that strict religious rules have a stronger influence on the moral views of the faithful, therefore he attributed a stronger preservation to Catholicism. In his work he observed substantial variations in the suicide pattern of different Protestant denominational groups (Simpson and Conklin, 1989, p.946). In his analysis he showed that levels of self-destruction were higher in Lutheran countries compared to Calvinist ones (Masaryk, 1970, p.90–91).

The other type of egoistic suicide is related to the degree of integration of families. Durkheim argued that the preservative effect of families can be expressed in terms of their density, which is proportionate to the number of family members (Durkheim, 1951, p.198). He posited that the number of interactions increases with the number of family members, and where interactions are more frequent, integration is stronger and therefore suicide is less common: "[…] the intensity they [collective sentiments] attain therefore depends on the number of consciences which react to them in common. For the same reason, the larger a crowd, the more capable of violence the passions vented by it" (Durkheim, 1951, pp.201–202). Families of small size are inevitably more vulnerable, less resistant and "without duration no society can be stable". By incorporating family size into his theory, Durkheim effectively renounced his earlier position that characterised the integration of families by natural increase, the number of children (Durkheim, 1992). Durkheim first discussed suicide in his work *Suicide and Fertility* (1992) and at the same time he joined the public debate on the future of the population arising from concerns over the decline of fertility in France. He suggested that the high and increasing suicide rate alongside the low and declining birth rate is two sides of the same coin and symptomatic of the pathological state of the society. He argued that a healthy birth rate and immunity to suicide share the same precondition: a family. The weakening of the unity and vitality of families is behind the increase in the suicide rate and the decline of the birth rate, also indicated by the spread of divorce and separation. In his early study on suicide, he linked the protective effect of family to its size, attributing less cohesion to a smaller, less fertile family.[3] He somewhat revised this theory a decade later, and in addition to the number of connections, he also included the intensity as well as the quality of interactions and activity of connections between the members as key factors for integration. Furthermore, he replaced fertility with the average family size as the indicator of integration.

Another key part of Durkheim's theory is regulation, even though some authors regarded anomic suicide as a subordinate, less coherent and incomplete type (e.g. Besnard, 1993), while others not only highlighted its lack of elaborateness but also questioned its distinctiveness (Johnson, 1965; Pope, 1976).

With anomic suicide Durkheim described the effect of inadequate social regulation and the disintegration of social control on self-destruction (Travis, 1990, p.226). He presented the types of anomie through dichotomies (Bernard, 1993, p.173). Ha made a distinction between acute and chronic, as well as economic and conjugal anomie (within the latter he distinguished domestic anomie resulting from widowhood and sexual anomie of the un-married). Acute anomie cannot be analysed using cross-sectional data. Chronic anomie results from an imbalance between social needs and the means needed to fulfil them. Chronic anomie occurs when the gradual erosion of social control cannot prevent needs to surpass means (Pope, 1976, p.28). Chronic anomie was brought about by the unlimited perspectives offered by commerce and industry, and the deregulation of the economy. Seemingly limitless prospects, unrelenting passion for novelties, incessant pursuance of "pleasures and sensations", illusions of future expectations brought about the state of chronic anomie, and "There, the state of crisis and anomy is constant and, so to speak, normal." (Durkheim, 1951, p.256).

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3 On the relationship between suicide and fertility see also Lukes (1972, p.191–195) and for more detail Johnson's (1994) essay (particularly pp.133–149).

In chronic anomie Durkheim saw the pathological state of modern society's values, moral instability and the price of progress (Marra and Orrú, 1991, p.284). However, according to Breult (1993, p.173), Durkheim's argument is too weak to capture the institutionalisation of structural (chronic) anomie.

Another type of anomie is the crisis of widowhood, resulting from the death of spouse. This type of domestic anomie can lead to suicide because the surviving spouse finds it difficult to adapt to the new situation. However, he discussed domestic anomie resulting from divorce in much greater detail (Durkheim, 1951, p.259). He argued that monogamous marriage has a regulatory function and thus, it "closes the horizon" for men (Durkheim, 1951, p. 270). The legalisation of divorce implies the weakening of matrimonial regulation: "One cannot be strongly restrained by a chain which may be broken on one side or the other at any moment. One cannot help looking beyond one's own position when the ground underfoot does not feel secure" (Durkheim, 1951, pp.271–272). According to Durkheim the negative effect of divorce only applies to men.

SPATIAL ASPECT

Durkheim argued that the spatial variation of suicide was determined by changes in the social environment, inadequate degree of regulation, and excessive egoism. For example, he attributed suicide differentials in Germany to differences in the level of integration, the religious division of the country, and the segregation of Protestants and Catholics (Durkheim, 1951, pp.138–139). Out of extra-social factors, he offered an unusually lengthy and sharp criticism on Gabriel Tarde's imitation theory, rejecting any relationship between imitation and suicide. However, the relationship between imitation and suicide had been raised much earlier. William Farr in his work published in 1841 stated the imitative nature of suicide as a fact (Sonneck et al., 1994). Masaryk was also convinced that many cases of suicide could be attributed to imitation (Masaryk, 1970, p.117).

In his foreword to *The Laws of Imitation* Tarde noted that imitation occurs "[...] when a men unconsciously and involuntary reflects the opinion of others, or allows an action of others to be suggested to him, he imitates this idea or act" (Tarde, 1903, p.xiii).

He described imitation as an analogy to waves on the water, highlighting its repetitive nature. Tarde hypothesised that the spatial variation of the suicide rate can be the result of different forms of imitation that are, similarly to innovation, the fundamental driving forces of social interactions.

The sharp debate between Tarde and Durkheim did not start nor end with *The Suicide* (Vargas et al., 2008; Vargas, 2010, p.209). In his theory, Tarde highlighted the fundamentally imitative nature of human behaviour, social relationships, culture, and underestimated the role of collective effects; his sociology was based on the importance of individual relationships and interactions. Tarde emphasised the autonomy of the creative individual, while Durkheim diminished the role of individual factors and stressed the importance of structural conditions that bring about responses in a particular community, without taking into account internal relationships and changes in the composition of the community (for more detail on the debate between them see Clark, 1969, pp.7–18).

Durkheim would have accepted the role of imitation if a number of conditions were met simultaneously. 1) Only if imitation is present with similar intensity in the affected areas. 2) The effect of imitation is distinct, suicide rates of neighbouring areas are not similar due to social causes but parallel dispositions in causes of suicide: "[...] imitative propagation exists only where the fact imitated, and it alone, determines the acts that reproduce it, automatically and without assistance from other factors" (Durkheim, 1951, p.133). 3) Furthermore, unlike other regions, focal points "must have greater aptitude for suicide than all surrounding points; they must show a deeper tinge on the map than neighbouring

regions" (Durkheim 1951, p.133). He also argued that in addition to the physical proximity of the city that serves as the example and the surrounding regions, an active social connection between the two is also necessary. The effect is most pronounced near capitals and large cities, and – other things being equal – it weakens with distance from the focal point.

For the empirical analysis of imitation, Durkheim used district-level suicide data from France. In his understanding of statistics, a relationship between rates is proven, if they form a perfect rank-order (Turner, 1996, p.367). He also applied this rule of so-called "perfect parallelism" to the spatial observations, expecting the focal (city's) rate to exceed that of surrounding regions in all cases. And because this was not the case for all observations, a few exceptions were sufficient for him to reject Tarde's theory referring to some of the "differences" in suicide rates on the crude maps, and to conclude that suicide has an entirely social nature.

A generally accepted view of the era was that large cities were hotbeds of suicide that transmitted the pattern of self-destruction to their surroundings (e.g. Morselli, 1975, pp.42–44). Morselli wrote about large cities noting the "irradiation of their influence in a wider circle of territory", and highlighting at the same time the isotropic nature of the effect (Morselli, 1975, p.173). An even clearer description of the diffusion effect can be found in Masaryk's work: "The morbid tendency to suicide usually spreads like a contagious disease from the city into the provinces, in that it more strongly influences the surrounding countryside than the more distant areas..." (Masaryk, 1970, pp.16–17).

In his understanding the rapid growth of cities, the fluctuating population and the instability of the social environment in themselves had a fertilising effect on the spread of suicide (Masaryk, 1970, p.18). He noted divorce (1970, p.36), extramarital births (1970, pp.37–38), the destructive effect of poverty (1970: 60), the spread of mental illnesses (1970, p.101), the adjustment difficulties of masses of rural migrants (1970, p.171), irreligiousness (1970, p.170) as urban problems.

While Durkheim firmly rejected the possibility of interaction between nearby entities, he did not question the primarily urban nature of suicide. In *The Division of Labour in Society*, published earlier, he viewed civilisation as a phenomenon concentrated in cities and characterised by a high rate of suicide (Durkheim, 2001, p.250; Durkheim, 2013, p.193). Although the relationship between urban lifestyles and suicide was not disputed in *Suicide*, he did not attribute a key role to it either (e.g. Durkheim, 1951, p.353).

Race (ethnicity) is one of the extra-social factors often mentioned in pre-Durkheimian suicidology, which deeply divided the theoreticians of the 19th century. Explanations emphasising the social causes of suicide argued against the importance of race. However, it is important to note that European authors from the 19th century usually referred to race not from a biological but from an ethnic, nationality perspective (Tosti, 1898, p.468). Masaryk argued that the effect of national character was dwarfed by that of civilisation, and ethnicity might have some *"predisposing"* effect but it definitely does not play a *"deterministic"* role (Masaryk, 1970, p.50). Morselli hypothesized that there was a distinct ethnic effect for Germans. In his rule, suicide rate was directly associated with distance from German nations; a relationship that he termed ethnic distance (Morselli, 1975, p.83). He postulated that in ethnically mixed areas, the share of the German population determined the level of suicide. The more Germanic a country is, the stronger its propensity toward suicide is (Morselli, 1975, p.91). However, he glossed over the explanation of the eminent suicide potential of the German population.

Durkheim reduced the explanation of suicide to only social reasons. He firmly rejected the role of race: "If then the terms were strictly used, it would be a question not of race but of nationality. [...] race plays no part" (Durkheim, 1951, p.86).

Durkheim, maintaining the coherence of his theory, associated the notoriously high suicide potential of Germans to their civilisation: "[...] Germans commit suicide more than other peoples not because of their blood but because of the civilization in which they are reared" (Durkheim, 1951, p.89).

STRUCTURE OF PUBLIC ADMINISTRATION AND DATA

The Kingdom of Hungary together with Croatia-Slavonia had 665 territorial units in 1910: 150 cities and 515 districts. From a territorial perspective, the Hungarian administrative system was characterised by multiple levels comprising of counties, districts and villages (Csizmadia et al., 1990). The district was the territorial administrative unit of the county. The allocation of villages into districts was the competence of counties, which resulted in territorial/spatial heterogeneity in terms of size and population (Hajdú, 2001). The next level of the hierarchy were towns directly subordinated to county authorities outside the district system (*rendezett tanácsú városok*, cc. towns with municipality council); essentially, they were formed out of former market towns or royal free towns that lacked adequate economic power to obtain county rights. The legal status of towns with county rights was constituted by the Act XLII of 1870 on the regulation of public authorities, which also awarded this status to 20 towns in addition to existing royal free towns. After Miskolc received town status with county rights in 1907 and with towns in Croatia, there were 31 major settlements among the towns. Here the term *town* is used to refer to both towns with county rights and towns with municipality council without any distinction.

The data used in this study come from different publications of the Hungarian Royal Statistical Office. Suicide data are from *Village-level vital statistics of the Countries of the Hungarian Holy Crown in 1910–11*, Hungarian Statistical Report, Volume 46, published by the Statistical Office in 1913. In the study of violent deaths, the reliability of data is often raised as an issue (Stack, 1983, p.141). Hungarian authors from the period agree that the unreliability of suicide data must be taken into account. "It is often unclear whether the case is an accident or suicide [...] Therefore the number provided by the official statistics is more likely to represent the minimum, namely the cases that are suicide without a doubt" (Földes, 1905, p.2). Observers a few decades later also suggested caution. "Many cases are kept secret" – noted Bernáth (1927, p.20). Melly highlighted three main sources of error in national data, namely the inaccuracy of forensic or medical examinations; the quality of data reporting and other reasons (Melly, 1928). As regards the reliability of data collection, he notes as a potential issue that registration in the period "[...] did not include deaths that happened locally but deaths that were established locally. Thus, the registers of villages and towns located along major rivers also include corpses that are washed up in the water. However, they do not include suicides committed by local people elsewhere" (Melly, 1928, pp.11–12). The distinction between the actual place of residence and the place where the act has been committed, "[...] the quantification of the number of suicides in large cities is also difficult suicides established locally but committed by non-residents are recorded, while suicides committed by local residents elsewhere are not" – notes Melly (1928, p.54). In addition to the occasional difficulty of establishing whether a death is a suicide or accident, Szél expressed concerns over the quality of data reporting: "Sometimes the »death report« is incomplete, and it is impossible to fill it in later" (Szél, 1928, p.716).

Act XIV of 1876 on the *Regulation of Public Health* was of key importance for health administration. Chapter XV of the Act entitled *Procedures around corpses, funerals and cemeteries* provides detail regulation related to deaths. Article 110 of the Act stipulated that "a professional coroner's service to establish death is to be introduced across the country, and nobody should be buried before a written death certificate has been duly issued by an authorised coroner." The Public Health Act made coroner's inquest and the certification of death mandatory (Gáspár, 2007). The legislator's aim was to introduce a single procedure around deaths, coroner's inquest (post-mortem examination) was delegated to authorised officials. Because there were not enough doctors in the country to carry out these statutory duties, individuals with a coroner's exam could also perform these tasks (Tóth, et al., 2011).

Table 1

Descriptive statistics of variables in the analysis

Variables	Abbreviation	Minimum	Maximum	Median	Mean	Deviation
Number of suicides per 100,000	SUI100	1.02	77.71	13.79	18.16	13.97
Number of births per 1,000	BIRTHRATE	7.73	89.31	37.57	37.34	6.35
Number of divorces per 1,000	DIVORCE	0.00	10.12	1.28	1.77	1.57
Literacy rate in the population aged 6 years and over, %	ALPHAB6	13.56	94.96	70.87	65.45	19.14
Industrial workforce and their dependents, %	IND	0.93	65.06	12.01	16.07	11.28
Catholics (Roman and Greek), %	KATR	1.42	99.90	64.46	60.83	27.78
Protestants, %	PROTEST	0.00	90.58	12.44	20.06	21.69
Lutherans, %	EVAN	0.00	89.53	1.11	7.50	13.80
Calvinists, %	REFORM	0.00	90.20	2.51	12.13	18.71
Unitarians, %	UNIT0	0.00	38.92	0.01	0.44	2.60
Native Hungarian-speakers, %	HUN	0.00	99.92	28.92	43.38	38.68
Native German-speakers, %	GER	0.00	85.99	2.18	9.84	15.71

The explanatory variables came from the 1910 Population Census data. Volume 42 of Hungarian Statistical Reports entitled *1910 Population Census of the Countries of the Hungarian Holy Crown. Part One. Main population data by villages, larger hamlets and settlements* contains information on the number of population present (civil and army), composition by gender as well as distribution by age, marital status, mother tongue and religion. Population censuses of the period collected information on the distribution of the population by mother tongue, any assumptions on the ethnic composition of the population are based on this (Vol. 42, 5). Data on the occupational composition of the population were published in Volume 48 (*1910 Population Census of the Countries of the Hungarian Holy Crown. Part Two. Occupations and Industrial Enterprises by villages.*). The more than thousand-pages-long volume has very detailed village-level occupational data.

METHODS

The spatial pattern of suicide has been analysed using thematic map and local spatial autocorrelation analysis based on the Local Moran statistics (Anselin, 1995). The main purpose of local indicators is to provide a local measure of similarity between each region's associated value (Waller and Gotway, 2004). The formula of Moran's *I* for observation *i* is given by (Lloyd, 2011, p.87):

$$I_i = z_i \sum\nolimits_{j=1}^{n} w_{ij} z_j, \qquad j \neq i$$

where z_i and z_j are deviations from the mean, $\left(y_i - \overline{y} \right)$ and $\left(y_j - \overline{y} \right)$, w_{ij} is the spatial weights matrix. The expected value of the local Moran is:

$$E\left(I_i\right) = -\sum_{j=1}^{n} w_{ij} / \left(n-1\right)$$

Based on the indicator four types of significant clusters can be distinguished, and as a fifth, non-significant locations. We can identify high-high and low-low clusters; in these cases the location and its neighbouring sets have similarly high or low values. There are also low-high and high-low clusters that indicate large neighbourhood differentials. Because the probability distribution of I_i was poorly represented by normal distribution, as an alternative we used random permutation test to depict significant local clusters. In this paper the spatial weight matrix $\left(w_{ij}\right)$ was based on queen-contiguity and was row-standardized (the sum of rows were zero).

The modelling strategy started with non-spatial linear regression model, and then it was tested whether this benchmark model fulfils the main assumptions or it needs to incorporate spatial components. Because of the spatial nature of the analysis, ordinary least squares residuals were evaluated and all models showed significant spatial autocorrelation, meaning that the error structure did not meet the independence assumption.

This required the use of a spatial model that could address this problem adequately. In the standard linear model spatial dependence can be incorporated in two ways: as an additional regressor in the form of a spatially lagged dependent variable $\left(Wy\right)$, or as spatial dependence in the error term $\left(E\left[\varepsilon_i \varepsilon_j\right] \neq 0\right)$. The former is referred to as spatial lag or spatial autoregressive (SAR) model, the latter is the spatial error (SEM) model (Anselin, 2001). The spatial lag model includes the spatially lagged dependent variable $\left(Wy\right)$ on the right hand side of the regression equation:

$$y = \rho Wy + X\beta + \varepsilon$$

with y as a $n \times 1$ vector of observations, W is a spatial weights matrix that formalizes the interaction structure between observations, Wy is the spatially lagged value of the dependent variable, ρ is the spatial autoregressive parameter, X is an $n \times k$ matrix of observations on exogenous explanatory variables with $k \times 1$ regression coefficient vector, ε is the $n \times k$ vector of the error terms. Anselin (2001) interpreted this approach as substantive spatial dependence, because the response variable observed at each location is jointly determined with those of other locations.

The other method of incorporating spatial autocorrelation into the regression model is the application of spatial error model, often referred to as nuisance dependence. Unlike spatial lag models, spatial error specifications are typically not motivated by a theoretical background, but instead are formulated to deal with data problems (Anselin, 2002). For instance, there could be a mismatch between the spatial scale of the process

under study and the spatial unit of observation. If spatial processes can be described better by the spatial error model, the estimation based on the method of least squares is unbiased but not efficient. The error model can be specified as:

$$y = X\beta + \varepsilon$$

The error vector:

$$\varepsilon = \lambda W \varepsilon + \xi$$

where λ is the spatially lagged autoregressive parameter of error components $\left(W\varepsilon \right)$, ξ is an $n \times 1$ vector of normally distributed random error terms with means 0 and constant (homoskedastic) variances.
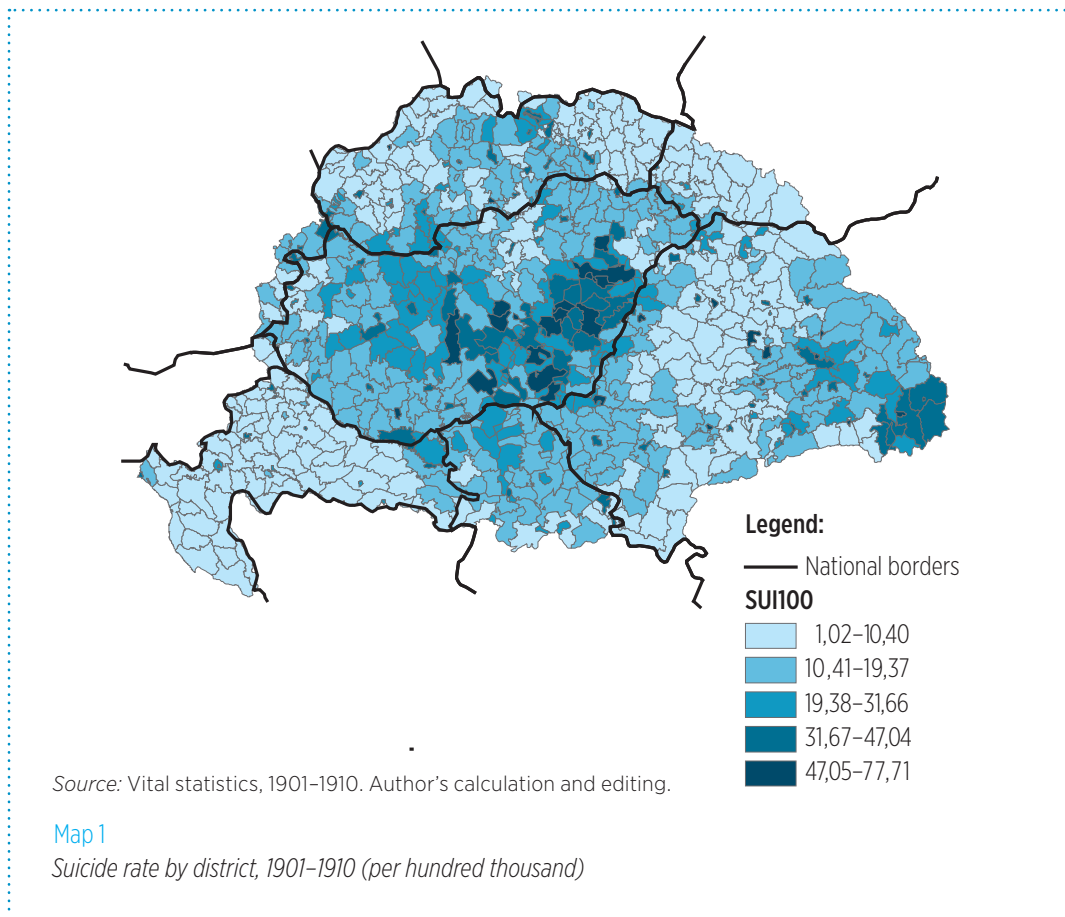
To decide whether to use the spatial error or the spatial lag model, the Lagrange multiplier and the robust Lagrange multiplier were applied that are commonly accepted diagnostic tests in spatial econometrics (Anselin et al., 1996). These tests take into account the relative size of covariances. The first covariance includes the residuals of the model and the spatially lagged values of the dependent variable: $\mathrm{cov}\left[e_i, y_j \right]$; the second includes the residuals of the model and the value of their neighbouring locations $\mathrm{cov}\left[e_i, e_j \right]$. The larger covariance indicates the appropriate model.

The spatial error model is based on the assumptions of homoskedasticity (constant variance). However, heteroskedasticity is detected in the estimated spatial error models, therefore Kelejian–Prucha consistent estimator for heteroskedastic error terms (KP-HET) (Kelejian and Prucha, 2010) was used. Diagnostics and models were estimated with the statistical software R and GeodaSpace (Anselin et al., 2011; 2012).

DESCRIPTIVE RESULTS

The dependent variable was the (crude) suicide rate per 100,000 population, the numerator was the number of suicides between 1901 and 1910, while the denominator was the mean of total populations from the 1900 and 1910 censuses, multiplied by 10. In the studied period 5,149,651 deaths were registered, out of these 36,939 (0.7%) as suicide. The map representing the crude rates (Map 1)[4] shows marked spatial differences. Higher suicide rates can be observed in the middle of the country (in the current territory of present-day Hungary), as well as in the Northern part (Upper Hungary, present-day Slovakia) and in the South (Vojvodina, region in present-day Serbia) and in Transylvania (present-day Romania). The map highlights the higher rates of areas populated by ethnic Hungarians. In particular, some areas of Transylvania and the Great Plain appear especially affected. The local Moran map helps to determine the significant clusters (Map 2). One of the high-high clusters is nearly fully located within the current borders of Hungary, and essentially it follows the natural boundaries of the Great Plain; the other is found in Transylvania and in reality it includes two smaller, discontinuous areas in its Eastern corner: Háromszék and Brassó counties. The low clusters include nearly all of Croatia-Slavonia; in the North the North-Western and further East the North-Eastern Carpathians, as well the counties of Transylvania towards the South, with a majority Romanian population.

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4   I would like to thank Norbert Agárdi (Research Centre for Astronomy and Earth Sciences, Hungarian Academy of Sciences) for making the set of vector maps available.

Source: Vital statistics, 1901–1910. Author's calculation and editing.

Map 1
Suicide rate by district, 1901–1910 (per hundred thousand)

The spatial concentration of suicide, the proximity of areas with higher prevalence has been well known since Morselli (Morselli, 1975, pp.40–41). One of his rules was the separation of high and low areas, and he demonstrated this in detail in a number of European countries. He termed areas with high suicide rate "suicidogenic zones" that included North-Eastern France and the Eastern part of Germany (Morselli, 1975, p.49). In Hungary, the first commentary on the spatial structure of suicide can be attributed to Sándor Konek (1867). Konek noted that the distribution of suicides in the Hungarian Kingdom is also uneven: "considering each county, proportionately the most suicides happen in the district on this side of the Danube, and the fewest on the other side of the Danube, although obviously because the capital of the country is located in the former, which has the least favourable rate, in Buda-Pest" (Konek, 1967, p.101). Elsewhere he argued that this was because "[...] the Helvetian confession is highly represented among the common people here [...] the visible difference can be fully explained not by the Helvetian religion but rather Hungarian nationality, which has the key influence. In counties populated by Hungarians the suicide rate is also higher among Hungarians of different confession." (Konek, 1868, p.100). Much later, Böszörményi pointed out the importance of ethnic boundaries instead of the East-West divide: "Thus, the argument that the prevalence of suicide was lowest in Transdanubia hardly or does not hold at all in areas highly or less populated by ethnic minorities [...] The »low rate« of these counties only appears so in comparison with other Hungarian counties" (Böszörményi, 1991, p.85).

The statisticians of the Dualist era did not attribute special importance to the spatial pattern of suicide. Even recent historical works have also ignored the high suicide rate in Transylvania and concentrated only on the Great-Plain phenomenon[5]. According to Nyíri, the area of Great Plain corresponds to "[...] the area delineated by the so-called

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[5]   For a more detailed overview of Hungarian ecological analyses see Moksony (1984, p.34–40), and Zonda et al. (2010).

Vienna Peace, thus the part of the country that was repopulated after its destruction by the Turks mainly in the 18th century. Possibly the historical experiences of the population that remained in the areas occupied by the Turks on the one hand, and the inherent weakness of the internal cohesive forces of a society made up by settlers on the other, might have contributed to the relative emotional poverty and rigidity of the South-East Great Plain subculture [...]" (Nyíri, 1977, p.631). Zonda rejected Nyíri's argument, partly referring to the inaccuracy of the overlap between the suicide areas and the areas that formed part of the Turkish Empire after the Vienna Peace, as well as highlighting changes in the population of the newly repopulated areas after the Turkish Occupation (Zonda, 1991, p.27). The high suicide rate of areas in Transylvania, particularly in Szekler Land fundamentally questions the legitimacy of explanations based on the Turkish occupation as well as the singularity of the Great Plain (the characteristics of settlement structure, backwardness, the lack of perspective in hamlets etc.).

Source: Edited by author.

Map 2
Local Moran's I of suicide rate by districts level, 1901–1910
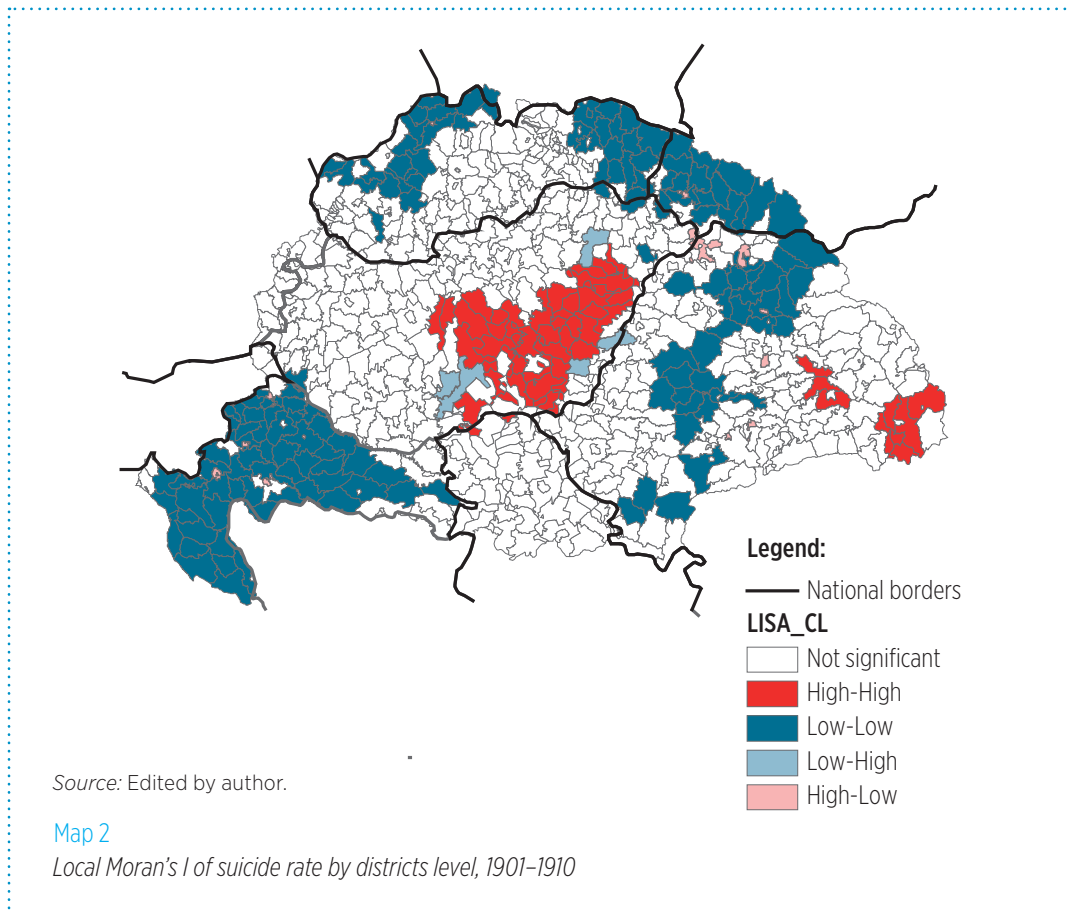
RESULTS OF THE MODELS

First, Durkheim's theory of integration and anomie was tested. As regards the model, it was hypothesised that if integration becomes weaker, suicide will increase, and altruistic suicide as a premodern type caused by strong integration is not present. The two variables of the model – the share of the industrial workforce and the divorce rate – showed the presence of anomie. In the second case, the extended models that included variables on Protestant denominations (Calvinist, Lutheran, Unitarian), ethnic variables (Native Hungarian- and German-speakers), and a town-status (dummy) variable, were tested. The first method of analysis was the method of ordinary least squares, followed by the spatial error and spatial lag models. In each case the spatial error model described the spatial processes adequately. The results of the robust estimation using Kelejian-Prucha's generalised moments estimator (K-P HET) is considered valid because the assumption of constant variance was not met.

Table 2

Results of the Durkheimian-type regression models

Variables	OLS		SAR Lag (ML)		SAR Error (ML)		Spatially Weighted Least Squares GMM (KP-HET)	
	Estimates	St. error	Estimates	St. error	Estimates	St. error	Estimates	St. error
KONSTANS	−0.438	2.993	2.134	2.818	8.404 *	3.565	5.918	4.890
BIRTHRATE	−0.151 *	0.060	−0.230 ***	0.057	−0.311 ***	0.061	−0.277 **	0.095
DIVORCE	3.793 ***	0.284	3.284 ***	0.272	3.224 ***	0.303	3.162 ***	0.512
ALPHAB6	0.104 ***	0.026	0.039	0.024	0.076 *	0.038	0.132 **	0.044
INDUST	0.309 ***	0.039	0.375 ***	0.037	0.398 ***	0.039	0.369 ***	0.059
KATR	0.037 *	0.018	0.038 *	0.017	0.023	0.024	0.016	0.022
PROTEST	0.174 ***	0.023	0.138 ***	0.022	0.178 ***	0.030	0.167 ***	0.037
ρ			0.036 ***					
λ					0.600 ***	0.040	0.675 ***	0.042
Diagnostics								
Moran I	0.30 ***		0.16 ***		−0.01			
Breusch-Pagan (df=6)	157.63 ***		157.54 ***		145.51 ***			
Jarque-Bera chi square (df=2)	197.86 ***		238.38 ***		272.19 ***			
Adjusted/ pseudo R^2	0.63		0.66		0.70		0.63	
AIC	4744.8		4688.2		4604.9			
Lagrange Multiplier (lag)	52.09 ***							
Robust LM (lag)	4.99 *							
Lagrange Multiplier (error)	137.28 ***							
Robust LM (error)	90.18 ***							

Notes: † p < 0.1; * p < 0.05; ** p<0.01; *** p<0.001.

The first model was based on the reconstruction of Durkheim's (1951) regulation-integration theory, as accurately as possible (*Table 1*). The autoregressive parameter of the spatial lag model was significant, which highlighted the role of endogenous factor in suicide; however the error components of the model still had significant autocorrelation (Moran *I* = 0.16, p< 0.001, the LM test for the autocorrelation of residuals 80.066, p<0.001). Of the spatial models, the error model proved to be the most appropriate choice, which was also demonstrated by its better fit (lower Akaike value and higher pseudo R^2). In the error model the disturbance did not indicate significant autocorrelation. Both indicators measuring the extent of anomie: the divorce rate (DIVORCE) and the share of industrial workforce and their dependents (INDUST) were significant, in the expected direction. All but one egoism variable, depicting the separation of the individual from the community, supported the hypotheses of the theory. The birth rate (BIRTHRATE) used as an

Table 3

Results of the extended regression model

Variables	OLS		SAR Lag (ML)		SAR Error (ML)		Spatially Weighted Least Squares GMM (KP-HET)	
	Estimates	St. error	Estimates	St. error	Estimates	St. error	Estimates	St. error
KONSTANS	5.110	2.642	5.646 *	2.486	8.397 **	3.081	8.341	4.453
BIRTHRATE	−0.145 **	0.053	−0.192 ***	0.049	−0.203 ***	0.055	−0.202 *	0.094
DIVORCE	2.567 ***	0.261	2.149 ***	0.251	2.297 ***	0.275	2.302 ***	0.423
ALPHAB6	0.054 *	0.026	0.021	0.024	0.006	0.035	0.007	0.031
INDUST	0.081 *	0.041	0.115 ***	0.038	0.145 ***	0.041	0.144 *	0.057
KATR	0.001	0.015	0.007	0.014	0.014	0.020	0.014	0.018
EVANG	0.058 *	0.027	0.043 †	0.025	0.093 ***	0.031	0.093 **	0.030
REFORM	0.190 ***	0.024	0.164 ***	0.023	0.253 ***	0.030	0.252 ***	0.042
UNIT	−0.205 †	0.113	−0.183 †	0.106	−0.159	0.112	−0.161	0.128
HUN	0.068 ***	0.011	0.044 ***	0.011	0.063 ***	0.016	0.063 ***	0.017
GER	0.083 ***	0.021	0.057 **	0.020	0.084 **	0.026	0.085 **	0.025
DUMMY	11.426 ***	1.028	12.301 ***	0.974	10.724 ***	0.966	10.730 ***	1.219
ρ			0.31 ***					
λ					0.544 ***		0.614 ***	
Diagnostics								
Moran I	0.25 ***		0.11 ***		−0.001			
Breusch-Pagan (df=6)	328.57 ***		143.64 ***		144.29 ***			
Jarque-Bera chi square (df=2)	190.18 ***		269.37 ***		289.46 ***			
Adjusted/ pseudo R^2	0.73		0.76		0.78			
AIC	4526.9		4471.2		4424.8			
Lagrange Multiplier (lag)	58.09 ***							
Robust LM (lag)	0.22							
Lagrange Multiplier (error)	98.98 ***							
Robust LM (error)	41.10 ***							

Notes: † p < 0.1; * p < 0.05; ** p<0.01; *** p<0.001.

indicator of the strength of family integration and density had a negative relationship to the suicide rate. Durkheim's rule on Catholics (KATR) and Protestants (PROTEST) was only partly corroborated; no significant effect was found for Catholics. The literacy rate (ALPHAB6) yielded the expected result, and higher literacy was positively associated with higher suicide. Compared to the error model, the regression coefficient of literacy was twice as high in the robust model and was already significant at 1%, and the effect of other explanatory variables did not change substantially. The model highlighted the differing roles of anomie and integration, and their distinct effects.

The results of the Lagrange multiplicator test clearly justified the use of the spatial error model. For the spatial lag model, by-and-large the same findings can be repeated; the spatial component is not a negligible factor in the explanation of suicide. One of the aims of the extended model was to consider religious integration in more detail. The variable set enabled us to analyse the effects of Protestant sects separately. The regression showed the inhomogeneity of protestant denominations. Both of the largest denominations, the share of the Calvinists (REFORM) and Lutherans (EVAN) had a positive effect on the rate. The estimated regression parameter for the Calvinists had a stronger effect. The Unitarians from Transylvania (UNIT) were associated with a negative but non-significant effect. The Catholic religion had no effect on suicide in this case either. The findings seem to suggest that denominational differences are less crucial in the spatial distribution of self-destruction, than it would follow from Durkheim's theory.

The other direct indicator of integration, the birth rate showed a relationship in the expected direction, while literacy became non-significant. The indicators expressing the extent of anomie (industrial workforce, divorce rate) were still important. The urban-rural contrast often noted by the historical literature was clearly corroborated in the Hungarian Kingdom, town status had a significant effect on the rate. In addition to the variables on integration and regulation, the variables of ethnic composition also remained significant. This also suggests that alongside the driving forces of suicide related to integration, other socio-cultural factors must also be considered that can be captured with the ethno-linguistic variable. It is plausible that the Hungarian population had a clearly different suicide potential from that of minority groups in the early 20th century; however this was not consistent even in the Hungarian population and its extent was influenced (seemingly in an additive way) by social integration and cohesion.

THEORETICAL DISCUSSION – THE INTERPRETATION OF FINDINGS

Durkheim made a clear distinction between the egoistic and anomic suicide, however he also described their relationship to each other (Travis, 1990, p.226). The multivariate models supported Durkheim's concept, the existence of distinct types of suicide.

The presence of anomic suicide was examined in terms of the prevalence of industrial employment and divorce. Industrialisation indicates the intensification of the division of labour, the evolution of occupational structure, the transition from agricultural to industrial society (Stack, 1997). Stack (1993) directly linked the effect of industrialisation to suicide, alongside "the unleased appetite for profit in industrial capitalism" (p. 138). He saw egoism as the driving force of this mechanism: changes in fertility patterns and the decreasing number of children reduce family density, responsibility and the amount of interaction, and thus it contributes to the increase of suicide risk. The analysis of the relationship between industrialisation and suicide is most often found within the conceptual framework of modernisation theory that also includes other paradigms of sociological interpretation of suicide (e.g. secularisation, urbanisation, civilisation,

education) (Masaryk, 1970, pp.140–220; Morselli, 1975, pp.130–142; Stack, 1983a; 1983b; 1993; 1997; Stack and Danigelis, 1985). This theory links the modernisation of society to the increase in suicide. It assumes that rapid social change erodes the individual's attachment to society, and thus increases suicide (Lester, 1997; Stack, 2000). According to the representatives of this theory, modernisation is the key determinant of macro-level suicide. However, the results of time series are largely dependent upon the country and the period studied. Trends depicting the period prior to post-industrialisation or less developed countries show a positive relationship between industrialisation and suicide (Miley and Micklin, 1972). Whitt and his colleagues (1972) drew on the aggression-frustration theory, popular in the 1950s, to examine the relationship between suicide and industrialisation in predominantly Protestant, Catholic and non-Christian samples of nations. They found a moderate relationship in the Protestant group, and a strong relationship in the non-Christian and particularly in the Catholic group. The positive association between suicide rate and industrialisation was also observed in the combined analysis of all observations. A recent study analysing cross-sectional data from 87 countries found a positive relationship between the share of industrial workers and the suicide rate; however unfortunately the analysis was based on simple correlations (Lenzi et al., 2012).

To explain domestic differences in suicide rates Durkheim used both the theories of anomie and egoism (Danigelis and Pope, 1979, p.1083). Durkheim and his followers considered divorce, discussed in the chapter on anomie, as the most important indicator of family integration (Agerbo et al., 2011; Barstad, 2008; Breault, 1986; Kposowa et al., 1995; Kposowa, 2003; Lukes, 1973, p.530–534; Schmid and Van Arsdol, 1955). This study considered divorce as an indicator of the declining regulatory role of marriage. According to sources from the period, the number of divorces was increasing steadily in Hungary from the late 19th century onwards. As regards the divorce rate per 1,000 marriages, Hungary followed closely the leading countries in Europe: Switzerland and France (Bernáth, 1927). By current standards, divorce was a rare phenomenon in the Hungarian Kingdom; the Population Census in 1910 registered slightly more divorced men and women than the total number of suicides in the previous decade. Although Durkheim linked the anomic effect of suicide exclusively to men, empirical data show that divorce is also a serious risk factor for women as well (Vigderhous and Fishman, 1977). The findings of this study have shown a relationship between divorce and suicide, in line with international experiences.

Until the mid-20th century the difference between Protestants and Catholics was considered as "One Law" of sociology (Pope and Danigelis, 1981). Authors from the first half of the 20th century supported Durkheim's assertion on the higher rate of suicide among Protestants (Cavan, 1965, pp.37-45; Dublin, 1963, pp.76–77; Stack, 1980b, p.66). According to Gargas (1932) the suicide rate of Catholics was less than half of that of Protestants in Holland between 1900 and 1910. Halbwachs provided the most comprehensive empirical analysis of the Protestant-Catholic difference in the period, accepting the higher suicide potential of Protestants (Halbwachs, 1978, p.158, p.187), however the crucial element of his contribution was questioning exclusivity of religion. Using Prussia as the example, he emphasised the importance of taking into account occupational and denominational difference. Notably, the fact that the Poles tend to be in agricultural occupations and they are Catholics, while the Germans fill the leading commercial and administrative occupations, and the majority of them live in towns. He argued that it is not possible to separate religious practices from the structures of the wider community (Halbwachs, 1978, p.175). He attributed the protection of Catholics – in contrast to Durkheim – not to their religion but their social structure defined by their traditions and institutions, the organisation of their community, and their traditional cohesion (Halbwachs, 1978, p.190).

Durkheim postulated the suicide differential of Catholics and Protestants in the context of rapidly industrialising nation states. Later studies have limited indicative power because they reflected on the conditions of entirely different historical periods, when religion had already lost its cultural hegemony (Pescosolido and Georgiana, 1989, p.33). Attitudinal differences between Protestant and Catholic denominations decreased substantially (Stack, 1980b; 1981; 1983b), the Catholic Church became more tolerant toward suicide (Stark et al., 1983b). In his critique Pope (1976) questioned the empirical evidence of Durkheim's assumption on differences between Catholics and Protestants, and the validity of conclusions derived from the data. After the inclusion of modernisation variables (urbanisation, length of railway lines, labour market structure) the strength of the relationship changed, and in some cases its direction was reversed (Pope, 1976, pp.63–72). Pope és Danigelis (1981) examined time series of industrialised nations, however after taking into account economic development and time dimension, there was no evidence for the higher rate of suicide among Protestants compared to Catholics. Van Poppel and Day (1996) looked at the suicide differential of Dutch Protestants and Catholics. The validity of their study is increased by the fact that they determined the standardised rates for denominational groups based on individual records, without ecological bias. General mortality was higher among Catholics, however suicide was less than half of that observed among Protestants. However, because causes of death suggestive of potential cover-up (i.e. sudden death, poorly defined or undefined causes of death) are significantly more common among Catholics, they demonstrated that differences are only due to the way information is recorded, the cover-up of suicide among Catholics. Simpson (1998) rejected van Poppel and Day's argument on the composite indicator of suicide and reminded that such causes of death are more common among low-status Catholics.

With the appearance of multi-variate analysis methods, the argument that differences in the suicide rates of Protestants and Catholics at the end of the 19th century were primarily due to their socio-economic differences, rather than the distinct effect of religion (Simpson and Conklin, 1989, p.946) gained ground. Critiques highlighting Durkheim's methodological limitations argued that the lack of control variables could potentially lead to false conclusions (Bainbridge, 1989, p.288; Cutright and Fernquist, 2004, p.272; Pope and Danigelis 1981, p.498). Stack after the inclusion of economic variables, found no association between religion (religious books sold) and suicide (Stack, 1983a). In another study he found no relationship between suicide and Catholicism by controlling for divorce, which he explained by the convergence of Catholic and Protestant normative structures (Stack, 1980b).

When assessing the role of religious integration, Durkheim returned to the well-known theory of denominational affiliation, and as regards the differences among Protestant denominations he only highlighted the strong integration of the Anglican Church (Durkheim 1951, pp.160–161). Differences in suicide behaviour among Protestant denominations were later noted by Gibbs (1971), as well as Pescosolido and Georgiana (1989).

The composition of the suicide rate by religious denomination in historical Hungary was examined by Tivadar Szél (1928b). Szél's (1928, p.849) data from the period 1901–1908 practically coincide with the period examined by this study. The crude rate per one million population aged over six years was highest for Calvinists (443) and Unitarians (426), followed with a considerable lag by Lutherans (314), Jews (208), Catholics (199), Greek Christians (115), and Greek Catholics (102). Despite the lack of standardisation, the rates published by Szél could have reflected the magnitude of differences accurately. At least, our findings coincide with these. Durkheim's idea of religious integration, with a few modifications, seems valid for the Hungarian data. Denominational attachment was a significant factor for the two largest Protestant

denominations. The share of Calvinists and Lutherans within a geographical area was positively associated with self-destruction. On the other hand, the proportion of Unitarian and Catholic population had no effect on the suicide rate after controlling for other explanatory variables.

Durkheim regarded education and religion as mediating variables. Based on the analysis of French historical time series (1852–1914) Gillis (1994) argued that the creation of state education brought to life a new structure of socialisation alongside the family, as well as the private and public control of violent behaviour. Literacy and civilisation helped the acquisition of the language necessary for symbolic confrontation, the management and repression of expressions of passion. As a result, passionate homicide (murder) was replaced by suicide. Our findings suggest that civilisation (literacy) had an effect on the suicide rate, independent from Protestantism.

Durkheim was adamant as to the role of extra-social factors. He was particularly dismissive of the role of imitation. As noted by Selvin in his critique, due to his inadequate methods Durkheim rejected a number of statistically significant correlations. There is a large body of literature in the social sciences that contest Durkheim's assertions, and a wide range of examples demonstrate the contagion model of social behaviour in space (Tolnay et al., 1996). Baller and Richardson (2002) refuted the exclusivity of social factors in the explanation of suicide based on the analysis of French department-level data from 1873–1876. In their spatial econometric model they demonstrated the independence of the spatial effect while controlling for integration variables. They found that the magnitude of the suicide rate was influenced not only by the explanatory variables, but also the spatially lagged value of suicide (endogenous variable). In areas where the prevalence of suicide was higher, its risk was also higher in neighbouring areas. They hypothesised that the development of self-destruction might also be influenced by imitation mechanisms. The district-level data series from the Hungarian Kingdom is more detailed than that of French departments. Therefore, it is not unexpected that the error model was better in estimating the spatial process than the lag model, which was clearly more promising from the perspective of interpretation.

There is a broad consensus around linking the urban environment to suicide; most observers agree that cities were the hotbed of self-destruction (Anderson, 1980, p.150; Baudelot and Establet, 2008, p.37; Durkheim, 1951, p.353; Durkheim, 2013, p.193; Giddens, 1970, p.xxxi; Halbwachs, 1978, pp.109–127; Johnson, 1994, p.126; Masaryk, 1970, p.18; Morselli, 1975, pp.169–170; Porterfield, 1952). It was believed that cities attract the most vulnerable social groups and their distinctive social composition causes the higher suicide rate (Morselli, 1975, p.254). A rare exception is Holland, where the self-destruction of rural areas exceeded that of cities in the early 20th century (Gargas, 1932). Thanks to the characteristics of the spatial structure in the period, the role of cities could be examined directly. In line with international experiences, Hungarian commentators from the first half of the 20th century also agreed on the urban nature of suicide (Kovács, 1943; Szél, 1928). Melly published a monograph on the suicide of Budapest and other European cities. He concluded that suicide had been lower in Vienna than in Budapest already before the First World War (Melly, 1928, p.24). In his monograph Sebestyén (1997) analysed the suicide cases in and outside settlements in Csongrád county between 1911–1920 on the basis of parish records. He found that suicide was two and a half times higher in settlements than in hamlets, outside settlements. This highlighted the urban nature of the phenomenon and refuting arguments highlighting the isolation of hamlets in the Great Plain.

The ethno-specific character of suicide is relatively well-known (Kushner, 1985). Socio-cultural norms can encourage or hinder suicide and suicidal behaviour. Therefore the knowledge of cultural norms and differences is crucial for understanding differentials in the self-destructive behaviour of different ethnic groups (Range et al., 1999). Racial

and ethnic studies are uncommon in contemporary social sciences, and they tend to explore discrimination and adaptation difficulties (Johansson et al., 1997; Stack, 2000) as well as the different patterns of socialisation/externalisation of aggression in majority and minority ethnic groups (Henry and Short, 1954; Stack, 1982; 2000). In their studies, Cutright and Fernquist (2000; 2001; 2005) regarded the culturally defined nature of suicide, as well as the permissive or restrictive normative order of societies toward suicide, as key factors in suicidology.

One of the most common empirical evidence for cultural factors is the influence of the mother country on the suicide behaviour of immigrant groups. A number of studies were published in the United States in the early 20th century that highlighted the vast difference between the suicide rates of immigrant and US-born communities. These studies demonstrated that self-destruction was more common in immigrant groups that had higher rates of suicide in their mother country as well (Cavan, 1928; Dublin and Bunzel, 1931; Kushner, 1985; Miner, 1922; Mühl, 1927). It is relatively rare to find information on the suicide behaviour of Ethnic Hungarians in US studies, mainly because Hungarian data were traditionally reported under the category of Austro-Hungary. According the Lane's data from 1890, the crude rate of Hungarians in Philadelphia was one of the highest among the immigrant groups (Lane, 1979; cited in Kushner 1985, p.80). However, Frenay's data from New York between (cited in Dublin, 1967, p.32) show that the suicide rate of those originating from Austro-Hungary was well below those of German and French immigrants, and hardly differed from the rate of immigrants from Russia.[6] A table reported by Ruth Cavan (1928) in her classic work on suicide, the suicide rate of Hungarians in Chicago in 1919–1921 was identical to the highest German and Austrian values.

The ethnic characteristics of suicide in historical Hungary were summarised by Szél (1928, p.853). He reported the higher suicide potential of the Hungarian population compared to any other ethnic groups as a well-established fact. He presented three reasons for the increased vulnerability of Hungarians: higher education, urban population and the typically Hungarian ethnic background of Protestant congregations, the Calvinists and Unitarians. Hungarians topped the ethnic ranking on suicide in the first decade of the 20th century, followed by Germans, Serbs, Slovaks, Croats, and lastly Ruthenians.

The significant positive effect of the German(-speaking) population is also supported by Zonda's (2004, p.105)'s findings, who explained the spread of suicide in the late 19th century with the mediating effect of Austrian (German) culture, and the adoption of patterns in social groups directly exposed to German culture. This explanation is plausible, even though according to the cartographic pattern the suicide rate increases rather than decreases the further we go from Austria, and the highest values are observed in the Great Plain and some Transylvanian counties. Obviously, the strength of interactions can be influenced by factors other than physical distance, there can be an intensive link between more distant areas as well. István Márkus in his work "The Great Plain way" and its obstruction [*Az „alföldi út" és elakadása*] emphasised the strong link between the Great Plain and Western Europe: "the society of the Hungarian Great Plain in the 17th century had two main links to Western Europe - bypassing the Habsburg Empire and the Kingdom of Hungary. One of them was long-distance trade, and Protestantism the other" (Márkus, 1991, pp.312–313).

The role of ethnicity lost its reason for Hungarian suicidology after the Trianon peace, and only a few comparative studies exploring the suicide of ethnic Hungarians abroad addressed this issue (Bradatan, 2007; Hódi, 1997; Voracek et al. 2007; Zonda, 2004).

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6   For the contemporary literature see Cutright – Fernquist (2000).

Bradatan (2007) briefly discussed the suicide culture of the Hungarian population in Romania and found its causes largely unexplored. Sándor Hódi (1997) attributed the high suicide rate of Hungarians in Vojvodina to conflict- and tension-management models shaped by the ethnic culture. Hódi argued that acquisition of this model was the result of socialisation (Hódi, 1997, p.127). Voracek et *al.* (2007) attempted to explain the high suicide of ethnic Hungarians in Romania based on genetic disposition proposed by the Finno-Ugrian hypothesis. The dependent variable in their study was the suicide rate of counties (N = 42) that they sought to explain with indicators of demography, ethnicity, income and health care. They argued that the suicide rate was explained by the proportion of ethnic Hungarians and they also found a small, negative relationship between suicide and life expectancy at birth. The authors suggested that the reason behind aggression, depression and impulsivity was genetic predisposition, which together with unfavourable environmental conditions were responsible for mental illness and suicide. The theory changed a few times over the years and its detailed discussion goes beyond the scope of this study. However, it is important to note here that it is inadequate to explain changes in long-term time series and spatial patterns. The often-cited J-shaped suicide zone stretching from Hungary to Scandinavia (Voracek et al. 2007) includes countries that saw very different trends in suicide over the last 50 years, and the dynamics of change were shaped much more by political and socio-economic factors (Mogyorósi, 1995).

One of the most often cited representative of cultural explanations is Herbert Hendin (1965; 1978). Hendin spent longer periods of time in Scandinavian countries trying to explain the high Swedish and Danish suicide rate in contrast to the low Norwegian rate despite similar levels of development and context. He characterised the suicide motivations of Swedes by their rigid and competitive personality, ambitious objectives, the fear of failure of their strictly defined expectations, and low ability for emotional self-control. In a psycho-analytical framework, he attributed the variations in the suicide potential of different Scandinavian ethnic groups to different approaches to child-rearing. For example, he portrayed Swedish mothers as competitive, obsessively ambitious personalities, and blamed their anxieties on early emotional separation. He reached his conclusions on the basis of a small number of interviews with people who attempted suicide and completely disregarded the historical perspective. There were various attitude studies in Hungary over the past decades that highlighted the socio-cultural embeddedness of suicide in the population of the Great Plain and the importance of the normative system and socialisation (for a comprehensive overview see Paksi and Zonda 2000; Zonda et al., 2010). The current study highlighted the higher suicide potential of the Hungarian population, taking into account all other variables.

LIMITATIONS

The dependent variable of this analysis has been the number of suicides per 100,000 population. By its nature, the crude rate disregards the effect of age composition. The association between the suicide rate and age is well-known. According experiences from the period, the age-specific rate had a bimodal distribution in Hungary (Melly, 1928, p.728). The highest values were observed among young adults aged 20 to 29 years, and even higher values among those aged over 70 years. This age-specific pattern was also confirmed by Mozolovszky (1940, p.7), and Kovács (1943) found it common for both sexes. In the light of this, the use of the crude rate would be justified, if the age composition of spatial observations was also identical. However, in the absence of district-level age data from 1900, it was not possible to use a standardised indicator that could have addressed this issue.

Alongside the dependent variable, the limitations of the explanatory variables were partly discussed in the presentation of data sources. Because the independent variables were derived from the 1910 Population Census, this implicitly assumed that distribution of ethnic, religious and other groups was constant throughout the decade. However, it is well-known that the emigration flows of the period had a strong ethnic aspect, and thus affected minorities much more (Puskás, 1982; Hungarian Statistical Reports [Magyar Statisztikai Közlemények] 1918, Vol. 67). In the light of this, the proportion of the Hungarian population might be over-estimated in some ethnically mixed districts.

The reliability of data is a hotly debated issue in the sociological literature on suicide, the underestimation of data and the reliability of official statistics are often criticised (Atkinson, 1978; Dublin, 1963). There is also a strong tradition of arguments on the social construction of data (Douglas, 1967). Pescosolido and Mendelsohn (1986) examined potential errors of official rates, and argued that systematic misreporting error represents a real risk of bias. In this case misreporting varies consistently with social construction factors. Ignoring this error can lead to incorrect conclusions. Pescosolido and Mendelsohn (1986) noted two main sources of systematic misreporting error: 1) error from the concealment by social groups that varies with the condemnation and stigmatisation of suicide, and 2) "misclassification by coroners and medical examiners who vary in their attitude towards a suicide verdict, in their qualifications to judge a cause of death, and in the resources available to conduct their investigations" (p. 82). According to Anderson (1980, p.162) the key determinant of the reliability of data is the efficiency of the health and judicial administration systems. Based on his information on Victorian England, the number of unclassified deaths was smaller in urban than in rural areas. It is pointless to accept or reject official statistical data until their reliability has been examined based on this theory. Pescosolido and Mendelsohn (1986) proposed various methods to assess the effect of error. The simplest of these is the direct inclusion of the social construction variables of suicide in the regression analysis, and then comparing the estimations with and without the control variables using the appropriate statistical test. This only estimates joint effects, however the significant effect of the construction variable indicates whether bias is present in the model.

The forensic medicine of the period was described as highly developed and a lasting creation by Vilmos Földes (Földes, 1964). Nevertheless, the proportion of deaths established by a medical examiner ranged from 1% to 100%, which meant that the law was not fully implemented (Tóth, el al., 2011). If the percentage of deaths established by a medical examiner is included in the equation, the variation inflation factor (vif) of the variable is over 4, which indicates strong multicollinearity; therefore this model was not reported here. The estimated parameter of the variable was positive and significant, so even though there was a positive association between the percentage of deaths established by a medical examiner and the suicide rate, the estimated value of the model's variables did not change. Overall, bias – from whatever source – had no effect on the conclusions of the model.

CONCLUSION

There are few theories in the sociological tradition that attracted as constant creative attention since their publication as Durkheim's. More than 100 years after its publication, it still serves as a compass for sociological research on suicide (Stack, 1982; 1993). Durkheim's work has been disputed by many (Poppel and Day, 1996), criticising its reductionism, the rejection of biological and psychological dispositions (Giddens, 1965; Graeff and Mehlkop, 2007; Travis, 1990), the disregard for theological differences (Stark, et al., 1983), methodological shortcomings (Pope, 1976; Selvin, 1958), and the

indistinguishability of etiological types (Johnson, 1965; Pope, 1975; 1976). A common claim against Durkheim is that he used and adopted much of the knowledge and methods of his predecessors without the explicit acknowledgement of their merits (Berrios and Mohanna, 1990; Turner, 1995). However, the originality of his work is not in the novelty of his empirical observations or the formulation of previously unknown relationships – such as the social causes of suicide – but in systematic interpretation (Giddens, 1965; Habwachs, 1978; Pope and Danigelis, 1981, p.497; Porter, 1995, p.15–16).

This study has examined some assertions of Durkheim's theory using data from a similar period. Neither Durkheim nor his followers decades later had the capacity to make adequate statistical conclusions, particularly on determining the individual role of factors considered important by them. It might be interesting to "contest" the theory using multivariate methods. Furthermore, to date there have been few attempts at providing a historical-empirical analysis of data covering the whole of Hungary.

It has been argued that both elements of Durkheim's concept of egoism and anomie appear to be crucial in explaining the spatial differences of suicide in the Hungarian Kingdom. Indicators related to the transformation of society (industrial employment, divorce) had a positive, while indicators expressing the strength of integration (such as fertility and literacy) had an inverse relationship with self-destruction.

The model based on Durkheim's theory, even in itself, has adequately described the spatial differences of suicide. However, differences among Protestant denominations, the lack of effect of Catholics, and in particular the extra-social factors have addressed the correction of the theory. The concept of the imitative character of suicide or the role of adaptation (acceptance of) in the spatial expansion of this behaviour proved to be acceptable, although the spatial error model provided more effective estimations than the spatial lag model, which more closely corresponds to the mechanism of imitation. The conclusions were formulated accordingly.

The importance of ethnic variables could prove that cultural and normative factors also played an important role in suicide already at turn of the 20th century. Finally, the regional study of suicide in Hungary over the past 50 years was primarily limited to the explanation of the high frequency of self-destruction in the Great Plain. The spatial pattern for historical Hungary appears to be much more complex than this.

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