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Culture, structure, or both? Explaining spatial inequalities of suicide in Hungary

Abstract

The spatial distribution of suicide in Hungary cannot be adequately explained by socio-economic inequalities. In the seventies and eighties, Hungary was a world leader in suicide, and by the mid-eighties the rate began to decline dramatically. Despite the significant change in suicide rate, the spatial pattern has hardly changed in the last decades. The persistent stability of the spatial suicide pattern suggests that beyond structural factors, cultural factors may play an important role in this phenomenon. Measuring specific deviance culture or equivalently finding an proxy variable for it is especially difficult in an ethnically and linguistically homogenous society, like the Hungarian. Suicide rate from the early twentieth century may be suitable for capturing these enduring, deep-rooted cultural influences. We investigated the effect of different social variables and historical rate as proxy variable of deviance culture on recent suicide mortality ratio. We have used a wide range of spatial econometric models to describe spatial processes as accurately as possible. We concluded that the proxy variable of culture, besides the endogenous, educational and integrational (divorce) effect, has its own explanatory power in the spatial inequalities of suicide. Because this effect is culturally deep-embedded therefore the success of the intervention is more limited.

Theorethical Background: the role of structure – a Durkheiman framework

Suicide is a special cause of death and its patterns are primarily shaped by social factors (Durkheim, [1897] 1951), unlike many deaths, it is not caused directly by degenerative diseases or by older age (Denney et al., 2009).

Modern sociological research on suicide comes from the classic work of Durkheim ([1897] 1951). According to Durkheim, the key to the difference in suicide rates lies in the degree to which individuals are integrated into a social group. He defines egoistic suicide as a consequence of the lack of social cohesion and the breakdown of ties between members of the community. Another major type of suicide in modernity is anomic suicide. This type describes the effect of the inadequate regulatory mechanism of society over the individual, the disintegration of social control. Eventually the result of social disintegration is self-destruction. Durkheim formulated a number of well-testable hypotheses, which play an important role in today's scientific analysis. In his early work, Durkheim ([1888] 1992) emphasized that the decline in family integration, explained by the spread of divorce and separation, increases the suicide rate. Contemporary empirical analyses show a positive significant relationship between divorce and suicide at the macro level (Breault, 1986, Brainerd, 2001, Chuang - Huang 1997, Neumayer 2003, Rodríguez, 2005) and at the micro level as well (Heikkinen et al., 1995, Kposowa, 2000).

Durkheim observed a higher suicide rate among upper social classes, the intellectual professions. He found that poverty makes people immun against suicide, as the subordinate social situation tends to limit desires, makes moderate needs, and moves forward the obedient acceptance of collective discipline. In contrast, wealth creates the illusion of limitlessness, which makes it difficult to accept a change of living conditions.

Contemporary academic literature has come to a conclusion contrary to Durkheim's findings, and the results show that suicide is closely linked to socio-economic factors. Groups with low social status, the less educated, poor groups are more likely to commit suicide than those in a better position (Blakely et al., 2003, Kposowa 2000, Lorant et al., 2005, 2018, Lewis-Slogett,

1998, Qin et al. ., 2003). Among the socio-economic variables, education is one of the strongest factor on suicide. This effect is reported to be gender-specific, more pronounced for men than for women (Li et al., 2011, Maki et al., 2007), and the relationship may not always be present in female population. (Andrés et al., 2011, Lorant et al. 2018, Yamamura 2010, Strand et al. 2010).

According to the classic Durkheimian theory, members of religious groups with greater social cohesion are more protected from suicide. According to classical theory, Catholics and Jews represented these groups against Protestants. Stack (2000) suspected that such religious differences in Christianity had become obsolete. In our study, we examine the relationship between religious affiliation and suicide based on the spatial data of a post-communist country.

Durkheim himself did not develop hypotheses regarding women's participation in the labor market. However, others have tried to apply integration theory to explain the phenomenon. According to the sociological explanation, fulfilling too many social roles is beyond the ability of the individual to properly perform their respective roles, leading to role strain and role conflict. Failures related to such role expectations are assumed to have negative consequences for women and those in their social environment.

From the male point of view, more intense work by women causes role conflicts because it calls into question the primacy of men's family support role (Stack 1978, Rodríguez 2005). Recent empirical findings suggest that increasing the number of female roles is productive, beneficial for mental and physical health, strengthens employee relationships, reduces social isolation, promotes career development, increases employee self-confidence and financial independence (Stack 1998, Neumayer 2003, Rodríguez 2005). Contemporary empirical experience emphasizes the positive effects of female employment, and fulfilling socially meaningful roles outside the household must be negatively related to suicide risk (Chuang - Huang 1997). In the former socialist countries, women's mass employment took place decades earlier, so the assumption of role conflict seems less plausible.

Culture – Sociological Explanation

Durkheim in his book attempted to explore the structural causes of social differences in suicide. However, there is ample evidence that the social structure does not always provide a satisfactory response to the phenomenon, which is well demonstrated by the fact that countries with similar levels of development exhibit significantly different suicidal behaviors.

According to the explanations, culture itself has a significant influence on the suicide rate (Minois 1999). Family-social mechanisms of cultural inheritance carry suicidal beliefs and practices from one generation to the next. There is often a marked difference in suicide between groups of different ethnic backgrounds and cultures (Utsey et al., 2008, Lester 2008). In some countries there are marked regional differences within the country, to which the socio-economic differences do not respond satisfactorily. The lack of a quantitative control variable that measures suicidal attitudes makes the empirical analysis of spatial suicide inequalities difficult (Neumayer, 2003). Because attitudes that support or restrict suicide are deeply culture-specific, we have a good reason to believe that these attitudes can be quantified by the suicidal behavior from a hundred years ago.
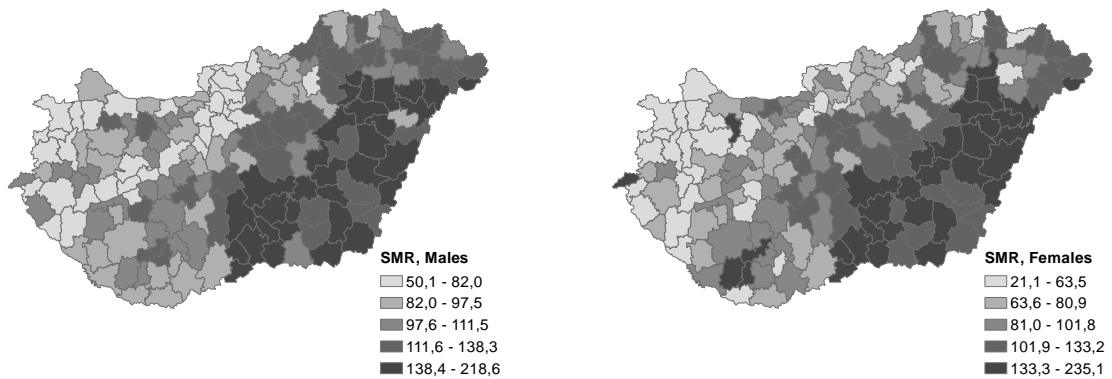
Data

In our analysis, we used divorce rates as a proxy variable for family integration. The indicator was calculated for the population aged 15 years and over by gender and for the total population. Among the indicators of socioeconomic status, income and educational attainment were highly

correlated with each other. The proportion of women in employment is also from the census. The Religion Variable (RELIG) represents the proportion of those who classified themselves in a religious denomination during the 2001 census. Historical suicide rates for cultural attitudes include cases of suicide between 1901 and 1910 (járás ~ LAU1, $N = 168$). Dependent variables are age-standardized suicide mortality rates. Due to low childhood incidence, only population aged 15 years and older were included in the standardization. The explanatory variables of the empirical model are not assumed to be exclusively exogenous.
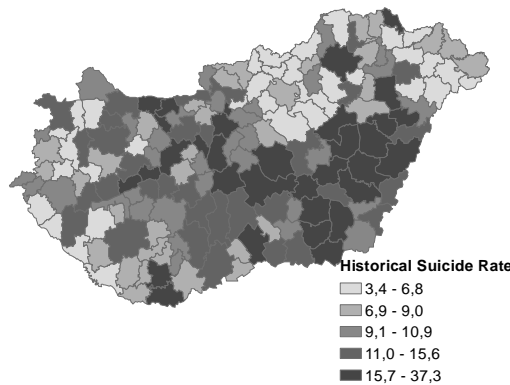
Standardized suicide mortality ratio (SMR) and historical suicide rates (raw rate / 100000) in Hungarian subregions (LAU1)

Males   **Females**

SMR, Males
☐ 50,1 - 82,0
☐ 82,0 - 97,5
☐ 97,6 - 111,5
■ 111,6 - 138,3
■ 138,4 - 218,6

SMR, Females
☐ 21,1 - 63,5
☐ 63,6 - 80,9
☐ 81,0 - 101,8
■ 101,9 - 133,2
■ 133,3 - 235,1

Historical Rates (raw suicide rates / 100000)

Historical Suicide Rate
☐ 3,4 - 6,8
☐ 6,9 - 9,0
☐ 9,1 - 10,9
■ 11,0 - 15,6
■ 15,7 - 37,3

Models

Our modeling strategy focused on exploiting the potential of spatial econometric models (Golgher - Voss, 2016, Elhorst, 2010). We used the suicide rate from a hundred years earlier as a proxy variable for cultural influences, calculated according to the contemporary map for spatial elements identical to current administrative units. Because there is a significant difference in the rates of suicides between men and women, three models were fitted for each model, separately for men, separately for women, and separately for the population as a whole. Significant heteroscedasticity due to skewness of variables in the models was treated by logarithmic transformation of all variables. The models are written according to the logarithmic variables, which makes it easier to interpret the models and to interpret the elasticity of the variables.

Spatial regression models of age standardized suicid mortality ratio of males

Variables	OLS	SAC (Kelejian-Prucha)
Divorce (DIVMALE)[a]	0.283***	0.106*
	(0.100)	(0.054)
Education (MEDU)[a]	-0.421**	-0.363***
	(0.088)	(0.055)
Religiousity (RELIG)	-0.181	-0.017
	(0.125)	0.073
Historical rate (HISTR)	0.197***	0.063*
	(0.040)	(0.028)
Female employment rate (FEMPL)[a]	-0.697***	-0.043
	(0.133)	(0.087)
Intercept	8.227***	2.083**
	(0.726)	(0.651)
ρ		0.771***
		(0.058)
λ		-0.610***
		(0,169)
Adjusted/Nagelkerke R^2	0.53	0.71
AIC	-34.20	-108.76
Moran I	0.271***	
LMerr	31.924***	
LMlag	70.102***	
RLMerr	0.635	
RLMlag	38.813***	

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, †$p < 0.1$, all variable in logged form, [a] gender-specific variable,

Together with the OLS model, we tested a total of nine models, eight of which included explicit consideration of spatial dependencies (SAR, SEM, SAC, SDM, SDM, SLX, SDEM, MANSKI). The spatial process necessitated the use of a spatially lagged model and a spatial error model (Kelejian-Prucha model) in all cases.

Since no independent variable was found to be significantly correlated with the response variable in women, the presentation of the women model was disregarded. In fact, the model for males was hardly any different from the model for total, so we confine ourselves to presenting and interpreting the former. Because of the spillover effects created by spatial dependencies, each variable can have both direct and indirect effects on the response variable, so the magnitude of the effects cannot be seen directly from the regression coefficients. To ease the interpretation, direct, indirect and total effects are also reported separately.

Impact analysis (SAC Model)

Variables	Direct	Indirect	Total
log(DIVMALE)	0,131*	0,333	0,464
log(MEDU)	-0,448***	-1,140*	-1,588**
log(RELIG)	-0,021	-0,054	-0,075
log(HISTR)	0,077*	0,197†	0,274*
log(FEMPL)	-0,053	-0,134	-0,186

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, †$p < 0.1$

Results:

After OLS estimation, error members showed strong significant spatial autocorrelation (Moran I = 0.27, p <0.001). Therefore, the use of spatial econometric models that explicitly consider the spatiality of data is essential for analysis. Among the dependent variables of the model, Religion and Women's employment did not appear to be significant. Previous empirical results on the possible effects of these variables have not been consistent. Based on our model, we have good reason to believe that these two indicators do not play a role in suicide.

The level of education had the strongest impact. The logarithm of the educ variable shows a strong significant relationship with the response variable for both direct and indirect effects. A total effect of -1.588 means that a 1% increase in the proportion of high school graduates and graduates results in a cca. 1.5 % decrese in male suicide rate.

At the same time, there is a strong significant positive effect of historical data, which is considered a proxy for culture. The direct effect is highly significant, while the indirect effect from the spillover is poorly significant, but the total effect can still be considered significant at 5%. However, the magnitude of the effect is smaller than that of the education, with a 1% increase in the historical rate causing about a 0.25% increase in the suicide rate of men.

The divorce rate among males was slightly significant but had an effect greater than that of culture. A 1% increase in men's divorce rate led to a 0.4% increase in their suicide rate. The strongly significant value of the spatially delayed variable of the dependent variable (ρ) indicates that the suicide rate in the neighboring regions is significantly influenced by the spatial cultural embeddedness of the phenomenon.

Conclusion

We can conclude that the proxy variable of culture, besides the endogenous spatial lag, educational and integrational (divorce) effect, has its own explanatory power in the spatial inequalities of suicide. Through these two variables, health policy measures can have a direct impact on the degree of self-destruction. Unlike other deaths, we need to emphasize the importance of cultural attitudes in suicide, as these effects are culturally deep-rooted and therefore the results of the intervention are more limited.

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