

## ORIGINAL PAPER

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## Suicide in South Tyrol 1980–1992: influence of affiliation to different language groups

Received: 26 October 1995 / Accepted: 15 April 1996

**Abstract** National suicide rates differ widely throughout Europe. The reasons for this are still unclear. Besides differences in actual suicide figures, different assessment methods and certification strategies have been suggested. This study examines the ethnic influence on suicide rates of South Tyrol, an Italian province bordering on Austria. The region has historically been under the cultural influence of both countries, with its population composed of three ethnic groups: the German-, Italian- and Ladinian-language groups. The study shows a significant correlation between the male suicide rate and the proportion of the German-language group. The ethnic suicide rates of Italian- and German-speaking people in South Tyrol were found to approximate each other, in comparison with the national rates for Italy and Austria, as a possible result of cultural interaction.

**Key words** Suicide rate · Ethnology · Culture · Language group · South Tyrol

### Introduction

The suicide rates of European countries differ strongly, from very low rates in Malta (2.65 per 100 000 in 1988) to a rate of 41.85 per 100 000 in the same year in Hungary (Diekstra 1993). In general, the increase in the rates proceeds from southern Europe to the countries in the northwest, followed by the Nordic countries, Central Europe and eastern Europe. Geographic proximity seems to play a minor role in this phenomenon. The suicide rate in Austria, for example, was 24.95 in 1988 (Diekstra 1993), whereas in Italy it was 6.6 in the same year (Annuario Statistico Bolzano 1990).

Biological (Träskman-Bendz et al. 1993; Engelberg 1992) and genetic factors (Roy et al. 1991) have been sug-

gested as contributors to suicidal behavior and might play a role in explaining the different suicide figures in various ethnic groups. Social (Lester and Abe 1992) and cultural circumstances (Zonda and Lester 1990) may have an influence as well. However, not only actual suicide figures, but also varying assessment strategies (Lester 1992; Etzersdorfer et al. 1992; Farmer 1988), are responsible for differences in national rates. Coroners' attitudes towards suicide (Syer and Wyndowe 1981), inaccuracy of the involved institutions and different classification systems might be responsible for erroneous suicide data, as might also be falsification of data by authoritarian governments (Värnik and Wasserman 1992). The mode of coping with a suicide victim's tendency to disguise his act as an accident might be different from one society to another.

In 1991 Hinterhuber et al. compared the suicide rate of South Tyrol, the most northern Italian province bordering on Austria, with that of Austria and Italy and found it to be between the rates for the latter two countries. Male and female suicide rates for Austria, Italy and South Tyrol are given in Table 1. Since South Tyrol has historically been exposed to the political and ethnic influence of the two countries, the population is still a mixture of the German-language group (GLG), the Italian-language group (ILG) and the Ladinian-language group (LLG; Annuario Statistico Bolzano 1990).

Every resident of South Tyrol must declare his affiliation to a particular ethnic group. The periodic censuses of the population provide the basis for awarding jobs and socialized housing. Anyone who refuses to declare his ethnic affiliation is counted to a language group by the authorities. Thus, every inhabitant of South Tyrol belongs to

**Table 1** Average suicide rates (per 100 000) in Austria, Italy and South Tyrol (1980–1992)

	Men	Women	Total
Austria	38.8	14.5	26.1
South Tyrol	18.0	5.7	11.8
Italy	9.1	3.4	6.2

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one of the following groups: German, Italian, Ladinian, other languages or foreigners. German-speaking inhabitants form the most numerous language group (64%). Ladinians are spread over three Italian provinces, in each of which they constitute a small minority; in the region studied they amount to 4%. The ILG (29%) is concentrated in the larger communities, in some of which it forms the majority. The smaller communities are numerically dominated by either the GLG or LLG. The Ladinians are found mainly in two small valleys; in only eight villages do they amount to more than 50%. German speakers form the vast majority in most of the rural communities throughout the region.

Autonomy laws for the province stipulate the use of both the Italian and German languages in all official matters. For example, all communities have an Italian as well as a German (or Ladinian) name. All members of the ethnic groups are subject to the same political administration. Thus, any differences in the suicide rates for the three language groups cannot be caused by different assessment or classification proceedings.

The aim of this study was to determine whether such differences exist and, if so, whether the suicide rates for the ILG and GLG correspond with the national rates for Italy and Austria, respectively.

## Methods

### Acquisition of demographic and suicide data

To differentiate between suicide victims of the GLG and ILG, data on the ethnic composition of each community were acquired. Suicide rates of communities were compared according to their percentage of members of the German-, Italian- and Ladinian-language groups. South Tyrol consists of 116 communities: 102 of them have a GLG majority, 5 are dominated by ethnic Italians and in 8 the LLG forms the majority. In Merano, the second largest city, both the GLG and the ILG show a percentage of approximately 45%. Other data available on the community level and used in this study were: gender distribution, age (< 65 years, > 65 years), distribution of marital status and community size. All community-based data were taken from the Statistical Annual of South Tyrol (*Annuario Statistico* 1990) and date from the year 1990. The suicide data were obtained from the Institute of Statistics of the Province of Bolzano. The data cover all suicide cases reported between 1980 and 1992 and include age, gender and marital status of each suicide victim.

### Statistical methods

Our analysis was split into a purely descriptive first part and an analytical second part. In the first part the communities of the study area were divided into four groups according to their ethnic composition (large German majority, simple German majority, Italian majority, Ladinian majority) and crude suicide rates were calculated by simple averaging. Confidence intervals for the suicide rates were calculated, assuming the counts to be Poisson-distributed. Based on the same distributional assumption, chi-square tests were used to compare suicide rates.

In the second part of the analysis the effect had on suicide rate by affiliation to a language group was assessed using a weighted linear regression analysis, with communities taken as units and community size as weights. This regression on aggregated data is also known as "ecological regression" (Morgenstein 1982). The

regression equation obtained allows estimation of the suicide rates for members of the German-, Italian- and Ladinian-language groups by extrapolation, i.e. one assumes that the regression equation still holds for communities with a purely German- (Italian-, Ladinian-) speaking population. In order to take account of possibly confounding variables, a multiple regression approach with a stepwise backward elimination procedure was applied. Independent variables considered were: GLG (% German vs % non-German), LLG (% Ladinian vs % non-Ladinian), age (% under 65 vs % over 65), marital status (% unmarried or married vs % divorced or widowed) and size of community. (To obtain a more symmetrical distribution the logarithm of the population was taken.)

## Results

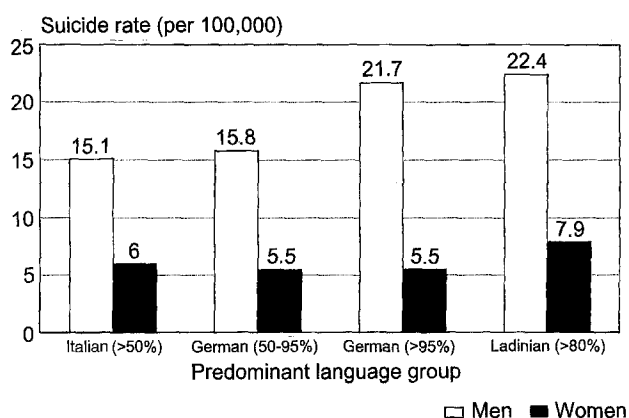
### Descriptive statistics

During the study period (1980–1992) a total of 676 suicides were reported, corresponding to an average suicide rate of 11.8 per 100 000 p.a. Because the suicide rate for men was approximately three times higher than for women (details in Table 2), all results are presented separately for both genders.

The suicide rates of the South Tyrolean communities according to their percentage of members of the individual language groups is shown in Fig. 1. These are crude rates, i.e. not adjusted for potential confounding factors. The suicide rate for men is markedly increased in communities with a GLG or LLG majority (21.7 and 22.4, respectively) as compared with communities with a higher proportion of ILG members (15.1). For women, only the communities with a Ladinian majority show a somewhat

**Table 2** Suicides in South Tyrol between 1980 and 1992: overview

	Men	Women	Total
No. of suicides	509	167	676
Population (1990 census)	217 425	224 850	442 275
Annual suicide rate (per 100 000)	18.0	5.7	11.8
95% confidence interval for rate	16.5–19.6	4.9–6.6	10.9–12.7



**Fig. 1** Suicide rate in South Tyrol ethnic composition of communities

**Table 3** Dependence of suicide rate on age, marital status and community size

Factor	Categories	Suicide rate		
		Men	Women	Total
Age (years)	< 65	17.3	4.8	11.0
	> 65	22.7*	12.1**	17.3*
Marital status:	Single	16.7	4.6	11.1
	Married	18.4	5.4	11.9
	Widowed/divorced	45.2**	12.5**	18.4**
Community size:	< 10 000 Inhabitants	20.0	5.4	12.6
	> 10 000 Inhabitants	15.2**	6.2	10.7

\* $p < 0.05$ \*\* $p < 0.01$ 

Compared to first category of factor

higher average suicide rate (7.9) than do those with an Italian or German majority (6.0 and 5.5, respectively).

The suicide rate is related to several other factors which may be potential confounders, i.e. which may increase or decrease the true effect of the factor "language group" because of their correlation therewith (Table 3). Numbers displayed are, again, crude rates.

The risk of suicide is markedly increased for people over 65 years of age and for widowed or divorced persons. The suicide rate for single persons in South Tyrol is slightly lower than the rate for married persons. The suicide rate for men in communities with more than 10 000 inhabitants as compared with those in smaller communities is significantly lower. Correlations between the factors listed in Table 3 and language group affiliation, calculated on the community level, are displayed in Table 4. Of the sociodemographic variables, "population size" is most strongly associated with ethnic affiliation: Native German speakers tend to live in the smaller communities, and native Italian speakers in the larger communities. Correlations of "age" and "marital status" with ethnic affiliation, although also high, are induced mainly by the factor "community size", because after adjustment the correlation coefficients drop considerably. On the whole the correlational results underscore the necessity to consider "age", "marital status" and, in particular, "community size" as covariates in the subsequent regression analysis.

## Regression analysis

To estimate the suicide rates of the three ethnic groups and allow for adjustments for possibly confounding variables (age, marital status, community size) regression analyses based on the communities as described in the "Methods" section were performed separately for men and women. In the analysis for men the factor "language group" had a significant effect on suicide rate:  $p = 0.018$  for German vs Italian,  $p = 0.058$  (i.e. marginally significant) for Ladinian vs Italian, and no statistical significance for Ladinian vs German. The factors "age", "marital status" and "community size" did not show a significant effect on suicide rate (in each case  $p > 0.1$ ), indicating that the effect of the language group is not unduly influenced by any of these factors. In the analysis for women the factor "language group" did not attain statistical significance; neither did any of the other factors considered. Estimated suicide rates for the three language groups, derived by extrapolation, are given in Table 5a. Statistical details of the regression analysis are presented in the Appendix.

A graphic illustration of the relation between suicide rate and language group for men and women is given in Figs. 2 and 3. For simplicity the communities with a Ladinian majority (8 of 116) were omitted, so that the remaining population is composed basically of the GLG and the ILG. The figures show that apart from the relation between language group (German, Italian) and suicide rate described above, there is considerable variation in the suicide rate for the GLG-dominated communities.

Omission of the Ladinian communities does not essentially alter the results. Also, omission of the data for the only major city, Bolzano (70.9% Italians of the total 100 595 inhabitants; all other communities have a population below 40 000), does not substantially change the general outcome of the regression analysis as far as statistical significance is concerned. The estimated suicide rate for Italian-speaking males, however, drops considerable (Table 5b).

## Discussion

This study yielded two main results: Firstly, there is an influence of the affiliation to language group on suicide

**Table 4** Pearson correlations between sociodemographic characteristics and language group composition of communities (In parentheses: partial correlation controlling for population size). GLG

% Age > 65 years	***				
% Widowed/divorced	0.91 (0.81)	***			
Population size	0.72	0.79	***		
% GLG	-0.58 (-0.12)	-0.69 (-0.25)	-0.76	***	
% LLG	-0.12 (0.00)	-0.19 (-0.09)	-0.14	-0.39 (-0.77)	***
% ILG	0.69 (0.19)	0.85 (0.50)	0.89	-0.84 (-0.61)	-0.17 (-0.05)
	% Age over 65 years	% Widowed/divorced	Population size	% GLG	% LLG

German-language group; LLG Ladinian-language group; ILG Italian-language group

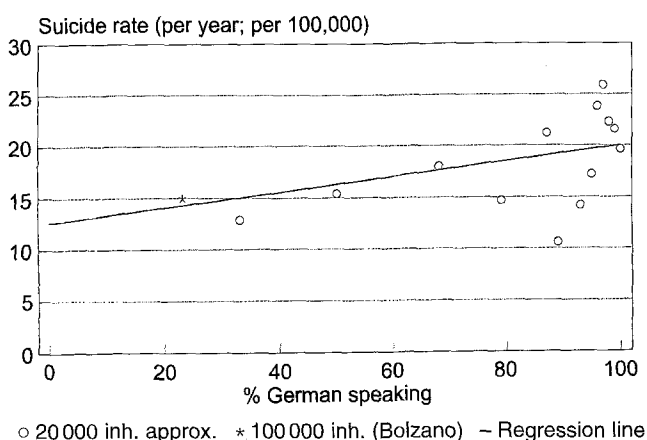
**Table 5a and b**

**a** Estimated suicide rates (per 100 000) derived from regression equation

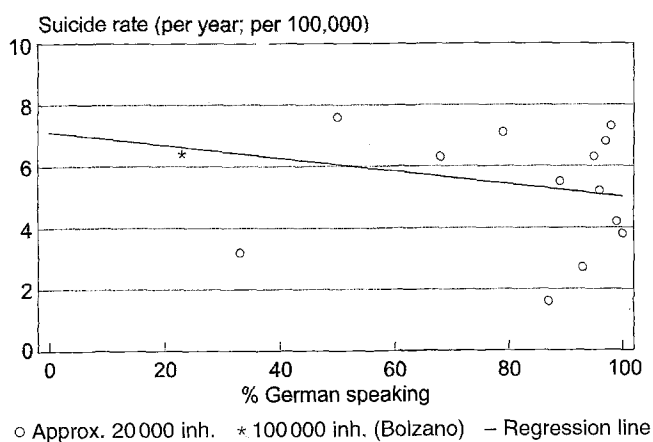
Language group	Estimated suicide rate		
	Men	Women	Total
Italian	12.5	7.1	9.8
German	19.9	5.0	12.4
Ladinian	23.2	7.6	15.4

**b** Estimated suicide rates (extrapolation from regression equation) for South Tyrol excluding Bolzano

Language group	Estimated suicide rate		
	Men	Women	Total
Italian	8.5	7.4	7.9
German	20.3	5.0	12.6
Ladinian	23.3	7.6	15.4



**Fig. 2** Suicide rate by language group: regression analysis men. Slope of regression line statistically significant ( $p = 0.018$ )



**Fig. 3** Suicide rate by language group: regression analysis women. Slope of regression line not significant ( $p > 0.10$ )

rates in men in South Tyrol. The male suicide rate correlates significantly with the proportion of the German-language group in the community. Secondly, the rates esti-

mated with the regression equation show that the Italian- and German-language groups tend to approximate each other in both genders. These rates are not identical with the national suicide rates for Italy and Austria.

Because all inhabitants of South Tyrol are subject to the same legal and administrative conditions (of the Republic of Italy), the difference in suicide rates cannot be due to variations in assessment strategy and suicide certification, which have often been proposed as one of the reasons behind the differences in national suicide rates (O'Carroll 1989; Etzersdorfer et al. 1992). Our results give no insight into the extent to which different attitudes held by ethnic groups towards suicide might have an impact on suicide rates. The trend to disguise a suicide – by the victim him-/herself before the act or his/her family afterwards – might vary in the different language groups.

The affiliation to a language group in South Tyrol is not recorded in the death certificates, nor do these data figure in the suicide statistics. To evaluate the ethnic influence on suicide rates we used an approximation method described in the "Methods" section. Suicide rates of communities were compared according to their ethnic, i.e. language group, composition. The statistical approaches are based on the assumption that the proportion of suicides of the ethnic groups in a community is more or less identical with the community's ethnic composition. The linear regression technique allows estimation of the suicide rates of the individual ethnic groups, although all communities consist of a mixture of these ethnic groups. Moreover, this method permits adjustment for possibly confounding variables.

A significant correlation was found between the proportion of German-speaking inhabitants and the male suicide rate. Communities with an Italian-speaking majority clearly show a lower suicide rate for men than do communities dominated by the GLG (Fig. 2). Ladinian villages have the highest suicide rate for males and females, suggesting an additional suicide risk due to the minority status of the LLG. This result, however, must be seen under the statistical restriction that there are only eight communities dominated by the LLG and only approximately 18 000 Ladinians.

The increasing proportional size of the GLG revealed a significantly higher suicide rate for men only. Suicide rates for women in communities with a low (50%), medium (50–95%) or high (more than 95%) percentage of GLG members were very similar (5.5–6; Fig. 1). Only in the communities with a Ladinian majority was the female suicide rate somewhat higher (7.9). Diekstra (1990) reports a stronger association of changes in economic and employment conditions with depressed mood and (para)suicidal behavior in the Netherlands for men than for women. This suggests a higher susceptibility to psychosocial influences for men. The results of the present study support the assumption of a similar effect of ethnic affiliation, restricted to males.

Besides affiliation to a language group, our study considered the following sociodemographic variables for their potential impact on suicide rates: age (> 65 years), marital

status, community size. The regression analysis shows that within the study area the relationship between language group and suicide rate is affected very little by these variables. This does not imply, however, that these variables have no effect on suicide rates. In concurrence with the literature (Kreitman 1986) we found that high age as well as being widowed or divorced increases the suicide risk quite drastically (Table 3). The reason why both age and marital status do not show up as statistically significant confounders in our regression analysis is probably that their variation from community to community is fairly low.

As for the variable "community size", the study reveals a significantly lower male suicide rate for towns with more than 10 000 inhabitants than for smaller communities. This is contradictory to what is known for many, but not all, countries (Kreitman 1986). In economically and politically disadvantaged regions an inverse rural/urban suicide ratio was found (Shiqing et al. 1994; Värnik and Wasserman 1992). This, however, is not the case with South Tyrol. The economic conditions of its rural areas are comparable to those of western European countries. The high proportion of extended families might produce a social stabilization effect. The significantly higher male suicide rate in small communities confirms the proportional influence of GLG members on the suicide rate.

South Tyrol has historically been a pluricultural society. Since 1880 there has been a decrease in the proportion of the GLG and an increase in the ILG, whereas the percentage of Ladinians has remained relatively stable. Up to World War I the region was part of Austria. In 1921 the percentage of the GLG was 75.9% compared with 10.6% Italians (Annuario Demografico Bolzano 1990). Due to the nationalistic policy of the Mussolini regime, forced settlement of Italians from southern parts of the country led to an increase in the ILG in the 1930s. After World War II changes in population composition were not substantial.

The influx of Italians, mainly of younger age, to promote the economic predominance in South Tyrol could have led to a different age-group pattern of the language groups. Because the settlement of Italians, to the greatest amount, happened during the decades before World War II, this suggestion seems to be unlikely, since possible differences in the age structure between the groups were eliminated until the time of the study.

The effects had by immigration to a new country on suicide rates of ethnic groups have been discussed in various

studies (Chandrasena et al. 1991; Soni Raleigh and Balaraman 1992). In the new environment immigrant groups show suicide rates proportional to the national rates of their countries of origin (Sainsbury and Barraclough 1968; Lester 1989). But the suicide rate of a minority cultural group within a country is also influenced by the group's proportion of the total population (Lester 1986) and by factors in the new country (Anonymous 1992). The composition of South Tyrol's population, however, is not the consequence of distinct immigration movements, but the result of complex interactions between ethnic groups over centuries. Although members of the ILG form a minority in the study region, they are part of the ethnic majority of the entire country. The German-speaking people of South Tyrol, in contrast, still are the majority in this province being at the same time a minority in Italy. This distinguishes the ethnic situation in South Tyrol from the result of immigration movements of a cultural and lingual minority group to a country with a clearly defined ethnic majority. Moreover, it represents a model of the long-time coexistence of various ethnic groups and their mutual interference.

The estimated suicide rates for the ILG and GLG in South Tyrol for both genders tend towards the national suicide rates for Italy and Austria, respectively, but are not identical with them. The suicide rate of the ILG is higher than for Italy, and that of the GLG is lower than for Austria. This indicates an effect of approximation between the two ethnic groups in South Tyrol. Although differences in the national suicide rates of Italy and Austria may to some extent be due to differences in assessment proceedings, this cannot be the case in South Tyrol. There might be an effect of "genetic exchanges" in intercultural families founded by members of different ethnic groups. The most probable explanation, however, is an effect of cultural and social approximation of the ethnic groups in South Tyrol, resulting in an assimilation of the suicide risk.

In conclusion, the results of this study lead to the suggestion that the suicide rates of South Tyrol are influenced by the traditional suicide rates of the different ethnic subgroups. Male members of the GLG seem to be at higher risk for suicide than their Italian co-inhabitants. Suicide rates of language groups for both genders, however, differ from those of the corresponding countries; it can be assumed that there is an approximative effect resulting from cultural and social interaction and coexistence. Further research should focus on the mechanisms of influence between ethnic groups living together in a defined area.

## Appendix: Results of weighted linear regression

1. Regression models used for estimation of suicide rates in the individual language groups

Gender	Communities considered	Coefficients (SEM)			Significance (p-value)		
		GLG <sup>a</sup> $\beta_1$	LLG <sup>a</sup> $\beta_2$	Const. $\beta_0$	$\beta_1$	$\beta_2$	Model (F-test)
Male	All	7.4 (3.1)	10.7 (5.6)	12.5 (2.4)	0.018	0.058	0.036
	Bolzano excluded	11.8 (5.1)	14.8 (6.6)	8.5 (4.4)	0.023	0.028	0.049
Female	All	-2.0 (1.6)	0.7 (3.0)	7.1 (1.3)	n.s. <sup>b</sup>	n.s. <sup>b</sup>	n.s. <sup>b</sup>
	Bolzano excluded	-2.4 (2.7)	0.2 (3.5)	7.4 (2.3)	n.s. <sup>b</sup>	n.s. <sup>b</sup>	n.s. <sup>b</sup>

<sup>a</sup>Proportion of total population formed by language group stated

<sup>b</sup>Always  $p > 0.20$

2. Summary of backward stepwise elimination procedure  
Variables considered: % GLG, % LLG, % age > 65 years, %divorced/widowed, ln (population size)

(a) Men, all communities

Step	Variable dropped	Adjusted R <sup>2</sup>	Significance of model (F-test)	Significance of change (F-test)
0		0.020	0.221	
1	% Divorced/widowed	0.027	0.143	0.708
2	% Age > 65 years	0.036	0.080	0.717
3	ln (population size)	0.044	0.036	0.716

(b) Men, all communities except for Bolzano

Step	Variable dropped	Adjusted R <sup>2</sup>	Significance of model (F-test)	Significance of change (F-test)
0		0.012	0.275	
1	ln (population size)	0.021	0.174	0.984
2	% Divorced/widowed	0.028	0.104	0.629
3	% Age > 65 years	0.035	0.049	0.691

For women (all communities as well as all communities except Bolzano) backward elimination procedure led to exclusion of all variables

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