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Suicide among Italian police officers from 1995 to 2017

Suicidio nella Polizia di Stato italiana nel periodo 1995-2017

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SUMMARY. Objective. Suicide rate in police officers is higher than in the general population worldwide. This paper assesses and analyzes the trends in suicide rates of Italian police officers from 1995 to 2017 , comparing these with the trends of Italian general population. **Methods.** We reviewed all cases of active Italian police officers who died by suicide from 1995 through 2017 (*N*=271). We calculated age- and gender- specific suicide rates among police officers and the Italian general population. We carried out descriptive chi-squared analyses for categorical variables, and one-way ANOVA for continuous variables, performing a joinpoint regression to analize suicide trends. **Results.** The mean police suicide rate was 11.78 per 100,000 individuals per year (95% CI=11.18-12.06). Joinpoint regression analyses of the period 1995-2017 showed that suicide rates of Italian police officers significantly decreased from 1995 to 2007 (annual percent change [APC]: -5.75%), followed by a period of a non-significant increase (APC: 3.9%). The period as a whole showed a non-significant decrease (APC: -1.7%). During 1995-2014, suicide rates were significantly higher among police officers *vs.* the age-adjusted general population ($p<0.001$), in male police *vs.* Italian male residents younger than 65 ($p<0.001$), and in female police *vs.* the female age-adjusted general population ($p<0.05$). **Conclusions.** Suicide rates among Italian police officers were significantly higher than those of the national resident population younger than 65 years. Annual suicide rate trends among Police showed a significant reduction in the period 1995-2007 followed by a stable trend until 2017. The entire period 1995-2017 showed a non-significant decreasing trend.

KEY WORDS: suicide, suicide rates, suicide trends, Italian State Police, law enforcement.

RIASSUNTO. Obiettivo. Nel mondo, il tasso di suicidio nelle forze di Polizia è più alto rispetto alla popolazione generale. In questo studio è stata valutata e analizzata la tendenza dei tassi di suicidio nelle forze della Polizia di Stato in Italia tra il 1995 e il 2017, in confronto alla popolazione generale italiana. **Metodo.** Sono stati revisionati i casi di decesso per suicidio nel personale della Polizia di Stato in attività dal 1995 fino alla fine del 2017 (*N*=271) e determinati i tassi di suicidio specifici per età e genere del personale di Polizia e della popolazione generale italiana. Abbiamo eseguito le analisi statistiche descrittive attraverso il test del *chi*-quadrato per le variabili categoriali e analisi della varianza a una via per le variabili continue; abbiamo quindi eseguito una regressione *joinpoint* per le analisi dell'andamento dei tassi di suicidio durante il periodo in questione. **Risultati.** Il tasso medio annuo di suicidio nella Polizia di Stato è risultato di 11,78 su 100.000 individui (intervallo di confidenza 95%=11,18-12,06). Le analisi di regressione *joinpoint* per il periodo 1995-2017 hanno evidenziato una significativa riduzione dei tassi di suicidio nel personale della Polizia di Stato tra il 1995 e il 2007 (cambiamento percentuale annuo [CPA]: -5,75%), cui è seguito un periodo di aumento non significativo (CPA: 3,9%). L'intero periodo ha evidenziato un decremento globale non significativo (CPA: -1,7%). Durante il periodo 1995-2014, i tassi di suicidio sono risultati più alti nel personale della Polizia di Stato rispetto alla popolazione generale corretta per età ($p<0,001$), nel personale di Polizia di sesso maschile rispetto alla popolazione generale maschile al di sotto dei 65 anni di età ($p<0,001$), e nel personale di Polizia di sesso femminile rispetto alla popolazione generale di sesso femminile corretta per età ($p<0,05$). **Conclusioni.** I tassi di suicidio nella Polizia di Stato in Italia sono risultati significativamente più alti di quelli della popolazione nazionale residente di età inferiore a 65 anni. L'andamento dei tassi annui di suicidio nella Polizia di Stato è caratterizzato da una significativa riduzione nel periodo 1995-2007, seguita da una tendenza alla stabilità fino al 2017. Il periodo 1995-2017 è caratterizzato da decremento non significativo dei tassi di suicidio.

PAROLE CHIAVE: suicidio, tassi di suicidio, tendenze del suicidio, Polizia di Stato, Forze dell'Ordine.

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INTRODUCTION

The rate of suicide in police forces worldwide is higher than that of the general population[1,2]. Research has explored suicidal behavior in police officers with variables such as divorce, age 40+, job dissatisfaction, somatic complaints, anxiety, depression, and burnout[1-4]. Suicide risk in police officers worldwide is related to several factors, including the easy availability of lethal means for suicide (firearms and cars), the presence of suicidal ideation, a diagnosis of major depressive disorder or other mood disorder, post-traumatic stress disorder, alcohol use disorder (particularly in young officers), family conflicts, marital problems, psychological distress, stigma for mental illness, and being suspended from service[3,4].

Other studies have identified several protective factors for suicide among police officers, including camaraderie, perception of a positive sense of professional and life purpose, family and social support, organizational support, adequate officer selection, medical and psychological services provided for officers, and periodic medical and psychological examinations[5]. These kinds of protective factors are in line with current theoretical models of suicide risk which emphasize the importance of being socially integrated[6,7].

For the law enforcement officers in Italy, suicide is considered an occupational hazard. Police officers are believed to manifest higher suicidality than ordinary people, but no studies have systematically investigated this to date. To address this issue, the present paper focuses on police suicide rates during the 23-year period from 1995 to 2017, comparing suicide rates among Italian police with the suicide rates of the general population.

METHODS

The Italian Police Department provided names, dates and locations for the death of all officers who died during the study period, along with the annual numbers of active police officers, stratified by age, gender, and ethnic group. Death certificates from the certifying jurisdictions were reviewed. Only deaths certified as suicide (ICD codes 950-959) were used to calculate suicide rates. The Italian National Institute of Statistics (ISTAT) provided the annual numbers of general population residents who committed suicide, stratified demographically (*http://www.istat.it/it/archivio/suicidi*). Annual crude rates of suicide were calculated as the annual number of residents who died by suicide, divided by the national resident population per 100,000 persons-per year. we calculated the annual suicide rates for the national resident population corrected by age (<65 years old).

Statistical analysis

We used the SPSS Statistics V24.0 software (IBM Corporation, Armonk, New York, 2016) for descriptive analyses and analysis of variance. The annual suicide rate for police officers was calculated as the number of suicides per year, divided by the number of active police officers as of July 1 each year per 100,000 persons per year. Suicide rate among national residents was adjusted to the demographic characteristics of the sample. We calculate 95% confidence intervals (95% CIs) for each rate. Differences by age and for other continuous variables between men and women, and between police and the general population were analyzed through one-way analysis of variance (one-way ANOVA). We used the *chi*-squared test to analyze differences for the categorical variable "gender".

We analyzed temporal trends in suicide rate using log-linear joinpoint segmented regression models, which identify points corresponding to statistically significant changes over time in the linear slope of the occurring trend[8]. We used annual suicide rates as the independent variable, assuming constant variance (homoscedasticity) and without log transformation. We applied a grid search method to fit regression functions with unknown joinpoints assuming a Poisson distribution and uncorrelated errors. We set the minimum/maximum joinpoint number from 0 to 4, and used a permutation test with overall significance level set at $p<0.05$ and the number of randomly permuted data sets of 4,499 to select the best fit. In the final model, each joinpoint indicates a significant change in trend. We reported estimated annual percent change (APC) for the segmented analysis. To summarize and analyze trends, we calculated the estimated average annual percent change (AAPC) for the entire period (1995-2017), and for the periods 1995-2007 and 2007-2017. AAPC is a summary measure that is computed, over a fixed interval, as a weighted average of the slope coefficients of the joinpoint regression with the weights equal to the length of each detected segment over the interval[9,10]. Joinpoint analyses were performed using the Joinpoint Regression Program, version 3.5, from the US National Cancer Institute (*https://surveillance.cancer.gov/joinpoint/*).

RESULTS

Descriptive statistics

Among the deaths of police officers from 1995 to 2017, 271 were certified as suicide. The mean age of the suicides was 38.97 years (SD=8.77, range=20-55). The annual number of suicides ranged from 3 in 2007 to 19 in 1999 (mean=11.78, CI=11.35-12.21). The mean police suicide rate in the period 1995-2017 was 11.78 per 100,000 individuals per year (95% CI=11.18-12.06). The mean male police suicide rate between 1995 and 2014 was 12.67 per 100,000 individuals per year (95% CI=12.14-13.2), and the mean female police suicide rate for the same period was 5.61 per 100,000 individuals per year (95% CI=1.87-9.35).

Suicide was committed using a police duty weapon (81.92%), a private weapon (5.54%), hanging (7.01%), drowning (0.37%), jumping (2.21%), cutting (0.74%), throwing oneself under a truck (1.11%), and poisoning with drugs (0.74%). Overall, firearms were used in 237 of these (87.45%). Suicide motives, reported by the Police Departments of those who died by suicide, consisted mainly of emotional issues (39.11%) (resulting from personal and family problems, mourning, and divorce), economic difficulties (6.27%), psychiatric disorders (11.81%), honor-related issues (5.17%), physical illness (2.21%), occupational problems (1.48%), and unknown reasons (33.95%).

Joinpoint regression analyses for the period 1995-2017 showed that suicide rate for Italian police officers significantly decreased from 1995 to 2007 with an APC of -5.75% (95% CI=-10.1, -1.2; t=-2.6; $p<0.05$), followed by a period without a statistically significant change with an APC of 3.9% (95% CI=-2.4, +10.6; t=1.3; n.s.) (Table 1). The whole

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period 1995-2017 showed a non-significant decrease, with APC of -1.7 (95% CI=-4.2, +0.9; *t*=-1.3; n.s.). The AAPC for the whole study period was not significant (AAPC=-1.5; 95% CI=-4.9, +2.1; *t*=-0.8; *p*=0.4), and was significant only for the period 1995-2007 ($p<0.05$), but not for the period 2007-2017 (*p*=0.2) (Table 1).

In summary, two periods can be identified: the first between 1995 and 2007 during which the suicide rate among Italian police decreased, and another from 2007 to 2017 which showed a stable trend (with no statistically significant change) (Figures 1 and 2).

Comparison with general population rates (1995-2014)

Comparing the general population suicide rates for the period 1995-2014 with the police suicide rates for the same period, the overall suicide rate among police officers was 11.62 per 100,000 per-year (95% CI=11.18-12.06), compared with the adjusted suicide rate (age<65) for the Italian population during the same period of 4.67 (95% CI=4.667-4.673).

For the period 1995-2014, the suicide rate for male police officers was 12.67 (95% CI=12.13-13.19) which was higher than that of men of comparable age in the national population (7.44, 95% CI=7.43-7.45). The suicide rate for female police officers was 5.61 (95% CI=1.87-9.35) which was higher than that of females of comparable age in the national population (3.27, 95% CI=3.26-3.28).

One-way ANOVA indicated significant differences in annual suicide rates during 1995-2014 between police officers and the general population, corrected for age (*F*=65.36; $p<0.001$): male police officers and male general population corrected for age (*F*=32.87; $p<0.001$), and female police officers and female general population corrected for age (*F*=5.96; *p*=0.019).

Comparing police suicide rates with the crude suicide rates of the general population, not corrected for age, one-way ANOVA showed significant differences in the annual rates of suicide for the period 1995-2014 in both genders conjointly (F=26.78; $p<0.001$), but not individually (Policemen vs. male general population (F=2.23; p=0.143) and Policewomen vs. female general population (F=2.62; p=0.114).

DISCUSSION

Although most studies report that police officer suicide rates are higher than those of the general population[11-14], other studies have not documented this difference[15-21], possibly a result of the fact that many police officer suicides are labelled as "undetermined"[22,23], thereby causing the actual suicide rate to be underestimated. Since police recruits in most countries undergo psychological screening for job fitness, it might be argued that police suicide rates should be lower than they are since potentially suicidal police officer applicants should be rejected during the screening process[11,24]. For the period 1995-2014, suicide among Italian police officers was influenced by gender, with a mean male/female ratio of 2.26. In the same period the mean age-corrected male/female ratio in the general population was roughly the same (-2.28).

We found that the suicide rate among Italian male police officers was about 1.7-times greater than the age-adjusted suicide rate of the national male population. For Italian female police officers, the suicide rate was 2.7-times higher than the suicide rate of females under 65 years old in the general population. The overall suicide rate of police officers did not rise significantly during the period of observation. For the period 1995 and 2007 the suicide rate among Italian Police decreased, while from 2007 to 2017 there was a stable rate.

There are probably multiple determinants of suicide in police. Job-related stress may often relate to the officer's exposure to trauma and death at the hands of others. In some countries, such as the USA, irregular work shifts and assignments, as well as public stigma resulting from mistrust among the general population and lack of institutional support, may also contribute to the suicide risk[21,26]. The majority of the police suicides in Italy were committed with firearms, in particular with duty weapons, and the easy access to and familiarity of officers with handguns may contribute to their suicide rate[21,27]. Marital problems, alcoholism, and job suspensions were the most noteworthy individual characteristics associated with police suicides[28]. Age, ethnicity, years of service, and rank have not been found to be associated with this risk[3,29].

Italian Police suicide rates in our sample were lower than those in other European countries, the USA, and Africa, but they were higher than those in Asian and Caribbean countries[3]. The reasons for these variations are not be readily apparent, but differences in police officer selection and public attitudes toward the police may play a role.

We found a decrease in police officer suicide rates during the years 1995-2007 followed by a plateau. Whether this represents a result of better selection and improved educational programs that reached a peak in 2007 is unclear, but such programs do indeed reduce suicide rates among police officers in other countries[30]. Data on effects of educational programs aimed at reducing suicide in the police are few, but there is evidence that police officers do increase their knowledge about suicide in other people when participating in such programs, with improvements in terms of stigmatizing attitudes, knowledge and confidence[31].

Police departments, with their tight organizational structures, offer both opportunities and challenges for suicide-prevention programs. The Italian police have sponsored counseling programs for officers, but, barriers for police officers seeking psychiatric care remain formidable, since officers often worry that a psychiatric evaluation can result in job sanctions, reassignment, restriction of firearm privileges, missed promotions, and stigmatization. Stigma in the military has been related to several elements, including feeling embarrassed, relationship problems within their own group, and fear of being discriminated against by superiors. Military personnel often experience difficulty in gaining access to help and treatment, as well as assurance of confidentiality[32]. Interventions may be effective if started early during training and delivered regularly throughout an officer's career in order to keep the rate of suicide among police officers as low as possible. We recently reported that Italian police officers were aware of suicidality-related issues afflicting their organization after having received training on the well-being of the staff[33]. Considering that suicide is an infrequent event and can be unpredictable[34], there is evidence that effective prevention strategies can be implemented successfully[35-37].

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Table 1. Model estimates (upper panel [A]) and trends (lower panel [B]) of suicide rates in Italian State Police.

A. MODEL STATISTICS

Cohort	Number of Joinpoints	Number of observations	Number of parameters	Degrees of Freedom	Sum of Squared Errors	Mean Squared Error	Autocorrelation parameter
All – 1 Joinpoint	1	23	4	19	2.70057	0.14214	Uncorrelated

Estimated Joinpoints

Cohort	Joinpoint	Estimate	Lower C.I.	Upper C.I.
All – 1 Joinpoint	1	2007	1997	2015

Estimation Regression Coefficients (Beta)

Standard parameterization

Cohort	Joinpoint	Parameter Estimate	Standard Error	Test Statistic (*t*)	Prob. > |*t*|
All – 1 Joinpoint	Intercept 1	120.854340	45.207564	2.673321	0.015505
All – 1 Joinpoint	Slope 1	-0.059172	0.022598	-2.618452	0.017410
All – 1 Joinpoint	Slope 2 – Slope 1	0.097731	0.037361	2.615847	0.017506

General Parameterization

Cohort	Parameter	Parameter Estimate	Standard Error	Test Statistic (*t*)	Prob. > |*t*|
All – 1 Joinpoint	Intercept 1	120.854330	45.207464	2.673321	0.015505
All – 1 Joinpoint	Intercept 2	-75.290950	59.875518	-1.257458	0.224658
All – 1 Joinpoint	Slope 1	0.059172	0.022598	-2.618452	0.017410
All – 1 Joinpoint	Slope 2	0.038559	0.029752	1.296008	0.211345

B. ESTIMATED JOINPOINTS

Cohort	Joinpoint	Estimate	Lower C.I.	Upper C.I.
All – 1 Joinpoint	1	2007	1997	2015

Annual Percent Change (APC)

Cohort	Segment	Lower Endpoint	Upper Endpoint	APC	Lower C.I.	Upper C.I.	Test Statistic (*t*)	Prob. > |*t*|
All – 1 Joinpoint	1	1995	2007	-5.7^	-10.1	-1.2	-2.6	0.0
All – 1 Joinpoint	2	2007	2017	3.9	-2.4	10.6	1.3	0.2

^ Indicates that the APC is significantly different from 0 at the $\alpha = 0.05$ level.

Average Annual Percent Change (AAPC)

Cohort	Range	Lower Endpoint	Upper Endpoint	AAPC	Lower C.I.	Upper C.I.	Test Statistic*	*p*-value*
All – 1 Joinpoint	Full Range	1995	2017	-1.5	-4.9	2.1	-0.8	0.4
All – 1 Joinpoint	1995-2007	1995	2007	-5.7^	-10.1	-1.2	-2.6	0.0
All – 1 Joinpoint	2007-2017	2007	2017	3.9	-2.4	10.6	1.3	0.2

^ Indicates that the AAPC is significantly different from 0 at the $\alpha = 0.05$ level. Parametric method used to calculate confidence intervals (CIs).
* If the AAPC is within one segment, the *t*-distribution is used. Otherwise, the normal (z) distribution is used.

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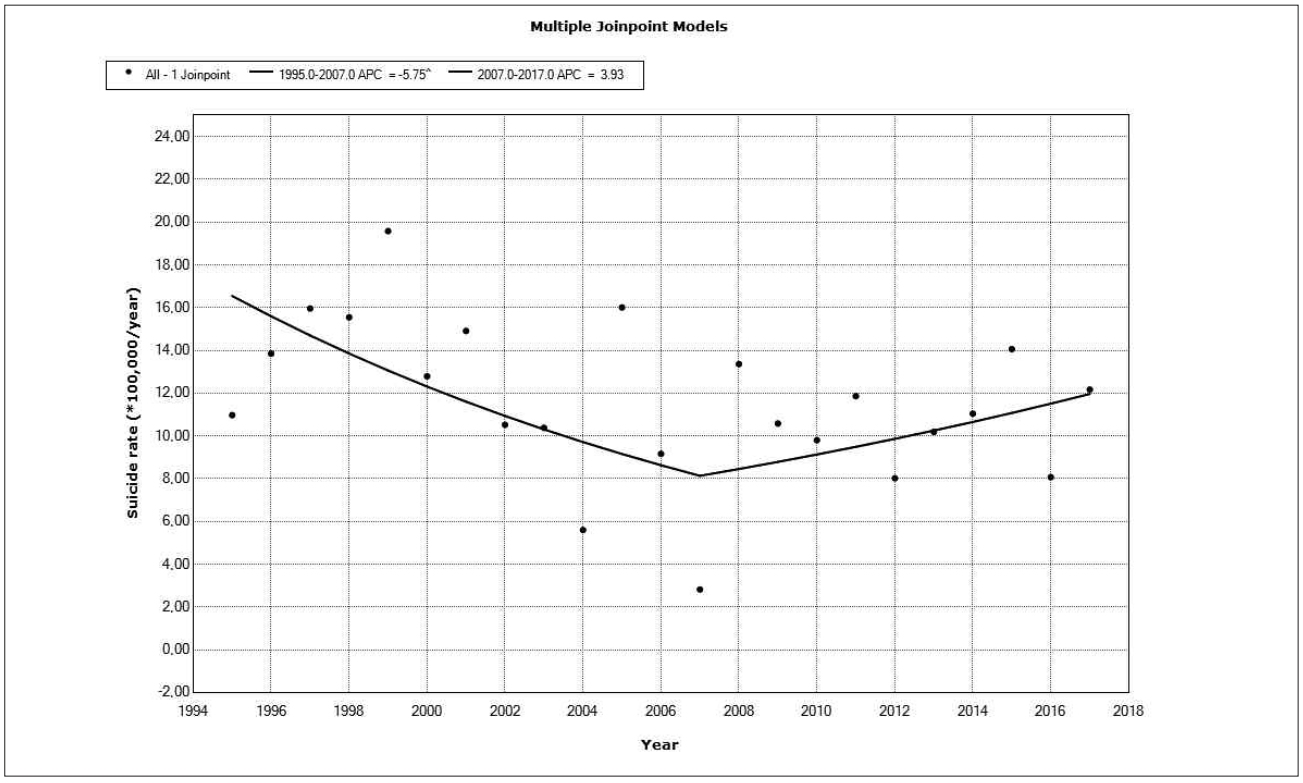

Figure 1. Trends of suicide rates among Italian police officers - single Joinpoint (1995-2007-2017).

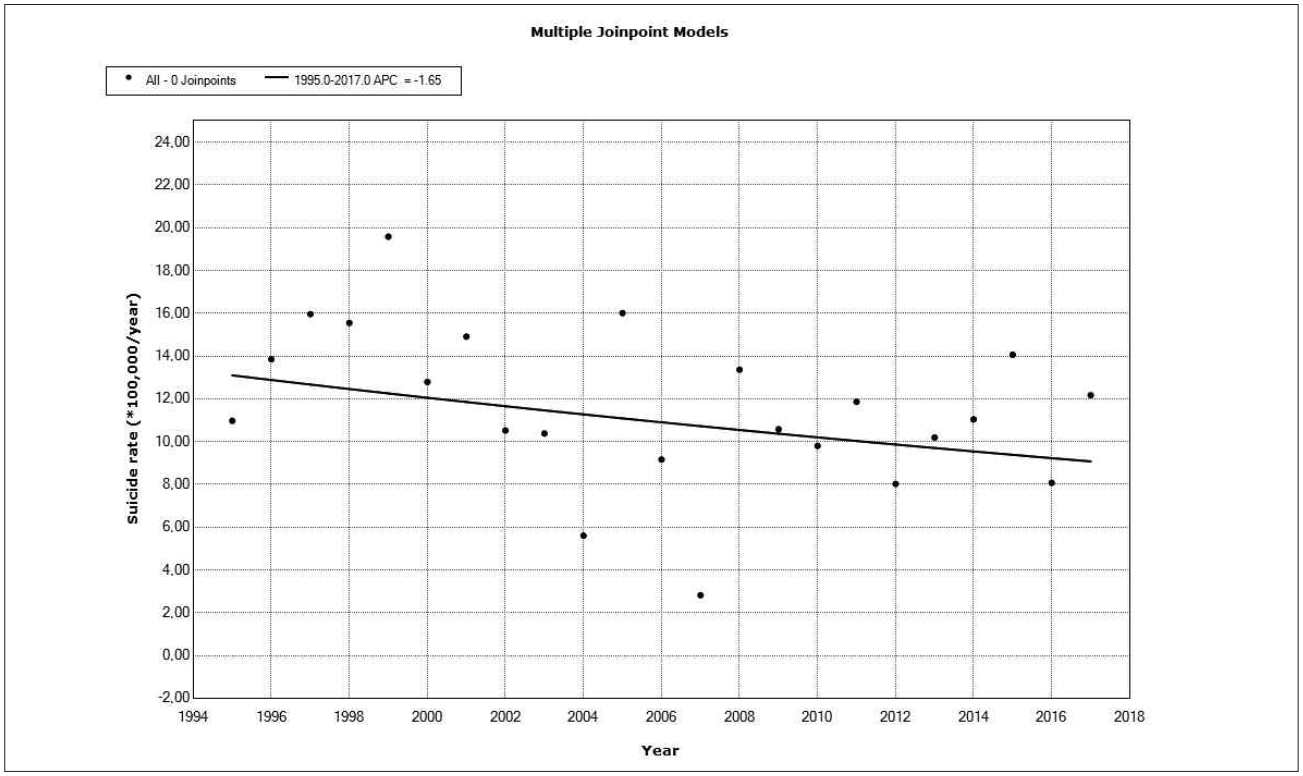

Figure 2. Trends of suicide rates among Italian police officers - whole study period (1995-2017).

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CONCLUSIONS

The suicide rates of Italian police officers were significantly higher than those of the national resident population younger than 65 years. The annual suicide rate trends among police officers indicated a significant reduction over the period 1995-2007, followed by a stable trend until 2017.

Conflicts of interests: the authors declare no conflicts in the subject matter of this article.

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