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The Prediction of Suicide and Homicide Rates Cross-Nationally by Means of Stepwise Multiple Regression

David Lester*

Stepwise multiple regression techniques were used to find predictors of the male and female suicide and homicide rates in a sample of eighteen industrialized nations. The best predictors of both male and female suicide rates were the birth rate and the nation's need to affiliate. The best predictors of the male and female homicide rates were somewhat different: thunderstorm days and population density for the male rate, and cigarette consumption and thunderstorms for the female rate.

A previous study of suicide and homicide in a sample of industrialized nations indicated that the male and female suicide rates of the nations were strongly related and that the male and female homicide rates of the nations were strongly related (Lester 1974). The study also identified a number of social, economic, and demographic variables that were related to the suicide and homicide rates.

Recent research (Diggory and Lester 1976) has suggested that, although male and female suicide rates are related, different variables may predict their values in a community. The aim of the present study is to derive equations that predict the male and female suicide and homicide rates in a

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sample of industrialized nations. In doing so, it will become possible to explore whether the predictors of the male and the female rates are similar or different, and it will also be possible to demonstrate the use of stepwise multiple regression analyses to derive predictive equations.

Method

The sample of industrialized nations used for this study included Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States of America. This sample is that used by Lynn (1971) in his study of national character.

The measures of suicidal and homicidal behavior were for the year 1966 and came from the *World Health Statistics Annual, 1966* (WHO 1969). Measures of the political stability of the nations for 1955-61 were obtained from Feierabend and Feierabend (1966). Measures of the dependency ratios for the young and the old were obtained from Keyfitz and Flieger (1968), as were measures of the male life expectancy, the female life expectancy, the crude birth rate, the age-sex adjusted birth-rate, and the net reproduction rate. These measures were for 1960-65. A number of measures were taken from Lynn (1971), primarily for 1960 and 1961. The variables included: caloric intake, number of psychiatric patients, percent Roman Catholics, per capita income, population density, percent in agriculture, cigarettes per adult, pounds of tobacco consumed per adult, percent single males, temperature of the coldest month, humidity of the coldest month, temperature of the warmest month, humidity of the warmest month, mean annual temperature, number of weather storms, number of thunderstorm days, and the death rates from cirrhosis, motor vehicle accidents, hypertension, ulcers, and arteriosclerosis and heart disease. In addition, a measure of caffeine consumption was obtained from Lynn (1973), together with the rating given by Lynn for the anxiety of each of the nations.

Measures of national motives were obtained from McClelland (1961). McClelland has derived coding manuals to rate a person's needs for achievement, affiliation, and power from stories the person tells concerning the pictures contained in the Thematic Apperception Test (TAT). These coding techniques can be applied to any written material, and McClelland applied them to the stories read to children in different nations around the world. He felt that the content of stories written for children would reflect the strength of particular motives in the adults of the nations. The national scores for the needs for achievement, affiliation, and power were based on twenty-one stories from children's readers in the countries in 1950. A measure of the degree of external restraint felt by members of the society (called by McClelland "other-directedness") was also obtained from the children's stories. One final measure, the deviation from expected growth of the electrical output during 1952-58, was also obtained from McClelland.

The data were subjected to a stepwise multiple regression analysis, using a program from the University of California at Los Angeles and available through the BIOMED Statistical Package, number BMDO2R.

Results

The multiple regression analysis was run separately for the male homicide rate, the female homicide rate, the male suicide rate, and the female suicide rate. The first six variables extracted as the best predictors are shown in Table 1, together with the multiple regression coefficient and the coefficient for each variable in the final predictive equation using the six variables extracted.

An examination of Table 1 indicates that six steps were sufficient to raise the multiple regression coefficient to a very high level. Furthermore, it can be seen that the six best predictor variables for the male and the female homicide rates differed considerably. The two sets of six variables had only two variables in common: number of days with thunderstorms and population density. This is especially noteworthy

Table 1. *The Stepwise Multiple Regression Equations*

Variable	Multiple Regression Coefficient	Coefficient
Male Homicide Rate		
1. Days with thunderstorms	0.66	**0.24**
2. Population density	0.83	−0.012
3. Need to affiliate	0.90	1.56
4. External restraint	0.94	−0.070
5. Electrical output	0.97	−0.83
6. Mean annual temperature	0.98	−0.051
	constant	0.28
Female Homicide Rate		
1. Cigarettes per adult	0.63	0.00012
2. Number of weather storms	0.79	0.00065
3. Male life expectancy	0.84	−0.13
4. Percent Roman Catholic	0.89	−0.0057
5. Days with thunderstorms	0.94	0.047
6. Population density	0.97	−0.0021
	constant	9.20
Male Suicide Rate		
1. Crude birth rate	0.64	−3.62
2. Need to affiliate	0.79	−13.57
3. Cigarettes per adult	0.87	0.0063
4. Deaths from hypertension	0.92	−0.70
5. Need to achieve	0.95	−4.86
6. Percent single males	0.97	−0.28
	constant	122.35
Female Suicide Rate		
1. Age-sex adjusted birth rate	0.70	−0.74
2. Need to affiliate	0.80	−4.72
3. Deaths from ulcers	0.87	1.02
4. Percent single males	0.94	−0.23
5. Humidity of coldest month	0.95	0.15
6. Deaths from hypertension	0.97	−0.11
	constant	20.95

in light of the fact that in the factor analysis of these data (Lester 1974) both the male homicide rate and the female homicide rate loaded heavily on the homicide rate factor. (In

fact, the male and female homicide rates do correlate, r = 0.95.)

The variables that best predicted the male and female suicide rates were quite similar. For both rates, the birth rate was the best predictor, and the society's need to affiliate was the second predictor extracted. The two sets of six variables had four variables in common. (The male and female suicide rates correlated highly, r = 0.81.)

To illustrate the use of the stepwise multiple regression equations, the male homicide rate was computed using the regression equation and is shown for each of the countries in the sample in Table 2, along with the actual male homicide rate. Although there are discrepancies for some countries in the sample between the predicted and the actual rate, the

Table 2. *The Male Homicide Rate as Predicted by the Stepwise Multiple Regression Equation and the Actual Male Homicide Rate*

Country	Predicted Male Homicide Rate	Actual Male Homicide Rate
Australia	2.02	1.5
Austria	1.58	1.1
Belgium	0.62	0.6
Canada	2.15	1.6
Denmark	0.68	0.4
Finland	2.37	2.9
France	0.63	0.8
West Germany	0.92	1.3
Ireland	0.59	0.6
Italy	0.47	1.2
Japan	2.02	1.9
Netherlands	0.79	0.5
New Zealand	0.31	0.7
Norway	0.47	0.5
Sweden	0.71	0.9
Switzerland	1.09	0.6
United Kingdom	0.90	0.8
U.S.A.	9.69	9.1

Product-Moment Correlation
r=0.98

product-moment correlation between the two variables was 0.98. Thus, the predicted rates were extremely close to the actual rates, particularly if the data are arranged in an ordinal fashion (i.e. if they are ranked).

Discussion

The use of stepwise multiple regression equations has been demonstrated by using the technique to predict male and female suicide and homicide rates in a sample of industrial nations. In a previous report (Lester 1974), the male and female homicide rates were found to be highly correlated, as were the male and female suicide rates. The present set of analyses has indicated that, despite these high correlations, the variables that best predict these rates in the nations differ.

The male homicide rate was best predicted on the basis of the following variables: the number of days per year with thunderstorms, the population density, the need to affiliate, the degree of external restraint felt by members of the society, the electrical output of the nation, and the mean annual temperature. The female homicide rate was best predicted by the following variables: cigarette consumption, the incidence of storms, the male life expectancy, the proportion of Roman Catholics, and the population density.

Clearly, both homicide rates are strongly related to the incidence of thunderstorms. Pokorny and Davis (1964) reported a failure to find any association between homicides and the weather, but their study was conducted in one locale (Texas), and the correlations were made over time. As Lester (1971) has argued, correlations between two behaviors over time and over locale can give quite different results.

The male and female homicide rates were also strongly related to the population density. The more densely the nation was populated, the lower the homicide rate. This result may be partly a function of the sample of nations chosen. The sample chosen is the same as that used by Lynn (1971), so as to facilitate comparison between the research. The sample includes the United States, whose homicide rate is far greater

than that of the other nations and whose population density is less. The problems of deriving meaningful measures of population density for different nations has been discussed in detail by Day and Day (1973). (We might note in passing, however, that although the United States has a low overall population density, most of the population lives in densely populated portions of the country.)

Aside from population density and thunderstorms, the male and female homicide rates were predicted best by different variables. This makes sense when we realize that male and female homicide victims are victims in different kinds of acts. For both male and female homicide victims, the murderer is most often male. Males are murdered by other males, often after drinking in bars and usually by friends or acquaintances and fellow drinkers. Females are also murdered by males, usually their spouses or lovers. Males are found more often to provoke their own murders (by striking the murderer first, for example) than are females. In these and many other ways, the murder of a female is a different kind of act than the murder of a male (Lester and Lester 1975).

The male and female suicide rates were found to be predicted best by a similar set of variables: the birth rate, the need to affiliate, deaths from hypertension, and the percentage of single males in the society. Suicidal deaths are brought about by the deceased, and so both male and female suicides could be triggered by similar societal stresses. The present data suggest that this is so.

Suicide rates for both sexes are lowest in nations where the birth rate is high. A high birth rate often means a high proportion of young people and a correspondingly low proportion of the elderly. Since suicidal behavior is more common in the elderly, we would expect to find the inverse relationship between the birth rate and the suicide rate that is found in this study.

The data indicate that the higher the need to affiliate in a society, the lower the suicide rate. Suicide is usually a behavior of the isolate, the person who lives alone and has no

one to turn to for help. A society with a high need among its members to affiliate would be expected to have members who seek out and form many relationships with other people, and these networks of relationships may in some sense "immunize" the members of the society from suicide.

Suicide was higher in nations where deaths from hypertension were relatively low. Deaths from hypertension (and deaths from ulcers) would seem to be a measure of the external stress in a society and the pressures to perform on the members of a society. The more external stress, the greater the incidence of ulcers and hypertension. Suicide, though in some sense precipitated by stress, is a behavior shown commonly by the depressed, the apathetic, and the resigned. The stress that provokes suicide is usually a result of chronic depression or rejection by a close, significant, other person. It would appear that where the members of a society are striving to perform, the suicide rate is low—suggesting that assertive activity counteracts suicidal tendencies. This suggestion is supported by the fact that the need to achieve was also inversely related to the suicide rate in the sample of nations.

In conclusion, it is worth noting that the technique utilized here is a statistical procedure, and that the variables that best predict a particular dependent variable may or may not make psychological or sociological sense. However, the predictors identified here may serve as fruitful leads for future investigators.[1]

Summary

Stepwise multiple regression was used to identify the best predictors of male and female suicide and homicide rates in a sample of industrialized nations. The equations derived were compared, and it was found that the best predictors for the male homicide rate differed from the best predictors for the female homicide rate. The predictors for the male and female suicide rates were quite similar.

NOTE

[1] Replication of these results on an alternative sample of nations would be desirable, but no second set of industrialized nations presently exists. It may, however, prove possible to replicate the results on the same set of nations in another ten or twenty years.

REFERENCES

Day, Alice Taylor, and Lincoln H. Day
  1973 "Cross-national comparison of population density," *Science 181*: 1016-23.
Diggory, James, and David Lester
  1976 "Suicide rates of men and women," *Omega 7*: 95-101.
Feierabend, Ivo K., and Rosalind R. Feierabend
  1966 "Aggressive behaviors within polities, *1948-62: a cross-national study,*" *Journal of Conflict Resolution 10*: 249-72.
Keyfitz, N., and W. Flieger
  1968 *World population*, Chicago, University of Chicago Press.
Lester, David
  1971 "Suicide and homicide," *Social Psychiatry 6*: 80-82.
  1974 "A cross-national study of suicide and homicide," *Behavior Science Research 9*: 307-18.
Lester, David, and Gene Lester
  1975 *Crime of passion*, Chicago, Nelson-Hall
Lynn, R.
  1971 *Personality and national character*, New York, Pergamon.
  1973 "National differences in anxiety and the consumption of caffeine," *British Journal of Social and Clinical Psychology 12*: 92-93.
McClelland, David C.
  1961 *The achieving society*, Princeton, Van Nostrand.
Pokorny, Alex, and Fred Davis
  1964 "Homicide and weather," *American Journal of Psychiatry 120*: 806-08.
World Health Organization (WHO)
  1969 *World health statistics annual, 1966*, Geneva, World Health Organization.