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HOMICIDES, NON-TRAFFIC ACCIDENTS, AND PROPORTION OF YOUNG DRIVERS PREDICT TRAFFIC FATALITIES

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16. Abstract

The relation of violence/aggression and other macro-level variables to traffic accidents was investigated by applying multiple regression to 1977 data from each of the 50 states and the District of Columbia. Motor-vehicle-accident fatalities per registered vehicle was the dependent variable. The independent variables were homicide rate, suicide rate, fatality rates from other causes, unemployment rate, personal income, density of physicians, alcohol consumption, motor vehicles per capita, road mileage per vehicle, sex and age distribution of drivers, and attained education.

The main finding is that homicide rates (but not suicide rates) predict states' motor-vehicle-accident fatalities; additional significant predictors are the proportion of young drivers, and fatalities from accidents other than those connected to motor vehicles. These three variables account for 68% of the variance of motor-vehicle-accident fatalities.

The findings are discussed in terms of the contribution of aggression/violence, general risk-taking, and lack of driving experience to motor-vehicle accidents.

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INTRODUCTION

The relation of motor-vehicle-accident fatalities to measures of aggression and violence have interested researchers for some time. Several pioneering studies (e.g., Porterfield, 1960; Whitlock, 1971) have shown strong positive correlations between homicide/suicide rates in a given region (e.g., metropolitan areas, U.S. states, and countries) and the corresponding motor-vehicle fatalities. On the basis of such results, Whitlock (1971) concluded that "road-death and injury rates are the results, to a considerable extent, of the expression of aggressive behavior" (p.104), and that "those societies with [the] greatest amount of violence and aggression in their structure will show this by externalizing some of this violence in the form of dangerous and aggressive driving with corresponding high casualty and accident rates" (p.104). This provocative conclusion, however, was based on evidence derived only from correlational studies. Correlational analyses have a major limitation in the present context. They cannot control for effects of other variables (e.g., age, income, unemployment) that could contribute to a correlation between homicides/suicides and traffic fatalities. To control for the effects of other, potentially significant variables on the relationship of interest, multivariate statistical techniques such as multiple regression have to be used.

The present study was designed to investigate the separate and joint effects of a range of variables, including homicide and suicide rates, on motor-vehicle-accident fatalities. The basic units of analysis were each of the 50 states and the District of Columbia. Multiple regression was the primary analytical method used.

VARIABLES AND DATA SOURCES

Dependent Variable

Motor-vehicle-accident fatalities per registered vehicle (MVACCFA) was the dependent variable. The value for each state was obtained by dividing the number of motor-vehicle-accident fatalities in 1977 (U.S. Department of Health and Human Services, 1980) by the number of registered vehicles (U.S. Department of Transportation, 1978).

Independent Variables

The independent variables, data sources, and respective applicable years are presented in Table 1. The two primary variables (HOMICID, SUICIDE) were selected to provide indexes of aggression/violence and despondency climates, respectively. The additional variables, each potentially related to motor-vehicle fatalities, estimated general risk-taking (NTRAFAC), quality of health care (OTHERFA, PHYSICI), degree of motorization (MVEHPCA), traffic density (ROADPVE), age distribution of drivers (YOUNGDR, OLDDRI), sex distribution of drivers (MALEDR), economic climate (UNEMPLO, INCOME), educational level (HIGHSCH), and alcohol consumption (BEER, DISTSPI, WINE).

RESULTS

The correlation matrix for all variables is shown in Table 2. These results indicate that homicide and suicide rates are significantly correlated with motor-vehicle-accident fatalities. Other variables that correlated significantly with motor-vehicle-accident fatalities are: proportion of young drivers, fatalities from accidents other than those related to motor vehicles, density of physicians, income per capita, road mileage per vehicle, and non-accidental fatalities. However, as is

TABLE 1

Independent Variables, Data Sources, and Applicable Years

VARIABLE		SOURCE		APPLICABLE
CODE	DESCRIPTION	COMPUTED	DIRECT	YEAR
HOMICID	homicides per capita	homicides (U.S. Department of Health and Human Services, 1980)/population (U.S. Bureau of the Census, 1979)		1977
SUICIDE	suicides per capita	suicides (U.S. Department of Health and Human Services, 1980)/population (U.S. Bureau of the Census, 1979)		1977
NTRAFAC	fatalities per capita from accidents other than those related to the operation of motor vehicles	non-motor-vehicle accident fatalities (U.S. Department of Health and Human Services, 1980)/population (U.S. Bureau of the Census, 1979)		1977
OTHERFA	fatalities due to causes other than accidents (traffic, or non-traffic), homicides, and suicides	fatalities due to causes other than the above (U.S. Department of Health and Human Services, 1980)/population (U.S. Bureau of the Census, 1979)		1977
PHYSICI	physicians per capita		(U.S. Bureau of the Census, 1979)	1977
MVEHPCA	motor vehicles per capita	registered vehicles (U.S. Department of Transportation, 1978)/population (U.S. Bureau of the Census, 1979)		1977
ROADPVE	road mileage per vehicle	road mileage (U.S. Bureau of the Census, 1979)/registered vehicles (U.S. Department of Transportation. 1978)		1977

TABLE 1 (continued)

Independent Variables, Data Sources, and Applicable Years

VARIABLE		SOURCE		APPLICABLE
CODE	DESCRIPTION	COMPUTED	DIRECT	YEAR
YOUNGDR	proportion of young drivers (24 and under)		(U.S. Department of Transportation, 1978)	1977
OLDDR	proportion of old drivers (65 and over)		(U.S. Department of Transportation, 1978, 1979, 1980)	1977*
MALEDR	proportion of male drivers		(U.S. Department of Transportation, 1978)	1977
UNEMPLO	unemployment rate of civilian labor force		(U.S. Bureau of the Census, 1978)	1977
INCOME	income per capita		(U.S. Bureau of the Census, 1978)	1977
HIGHSCH	proportion of high school graduates (persons 18 and over)		(U.S. Bureau of the Census, 1978)	1976
BEER	consumption of beer per capita		(U.S. Brewers Association, 1978)	1977
DISTSPI	consumption of distilled spirits per capita		(U.S. Brewers Association, 1978)	1977
WINE	consumption of wine per capita		(U.S. Brewers Association, 1978)	1977

* Except: Alabama 1979, Massachusetts 1979, Rhode Island 1978, Vermont 1979.

TABLE 2

Correlation Matrix for All Variables.

	MVACCFA	HOMICID	SUICIDE	NTRAFAC	OTHERFA	PHYSICI	MVEHPCA	ROADPVE	YOUNGDR	OLDDR	MALEDR	UNEMPLO	INCOME	HIGHSCH	BEER	DISTSPI
HOMICID	.42															
SUICIDE	.38	.15														
NTRAFAC	.59	.28	.35													
OTHERFA	-.29	.07	-.48	-.36												
PHYSICI	-.30	.42	-.18	-.21	.15											
MVEHPCA	.17	-.39	.43	.23	-.22	-.56										
ROADPVE	.30	-.29	.18	.35	-.17	-.41	.70									
YOUNGDR	.62	-.14	.25	.39	-.55	-.55	.46	.52								
OLDDR	-.27	-.34	-.32	-.33	.69	-.14	.26	.30	-.23							
MALEDR	.15	.19	.07	.38	-.04	.00	-.18	-.04	-.13	-.30						
UNEMPLO	-.02	.35	.10	.01	-.02	.44	-.54	-.53	-.36	-.35	.17					
INCOME	-.30	.11	.14	.11	-.35	.46	-.26	-.28	-.29	-.41	.17	.35				
HIGHSCH	-.25	-.41	.35	-.03	-.54	.14	.30	.21	.09	-.09	-.10	-.06	.56			
BEER	.01	-.10	.54	-.05	-.28	.09	.27	.20	.05	-.11	.03	.00	.28	.52		
DISTSPI	-.11	.31	.37	.06	-.10	.49	-.16	-.02	-.28	-.29	.04	.28	.46	.27	.57	
WINE	-.18	.31	.36	-.04	-.14	.67	-.26	-.21	-.39	-.29	-.02	.55	.59	.40	.50	.81

$|r| \geq .28$, $p < .05$

apparent from Table 2, each of the variables that are correlated with motor-vehicle-accident fatalities are also correlated with a range of other variables, some of which, in turn, are correlated with motor-vehicle-accident fatalities. For example, while homicide and suicide rates are both correlated with motor-vehicle-accident fatalities, they are also correlated with fatalities from accidents other than those related to motor vehicles. Consequently, as was argued above, fatalities from accidents other than those related to motor vehicles could potentially explain the relationship between homicide/suicide rates and motor-vehicle-accident fatalities.

To evaluate the individual contribution of the partially confounded independent variables to the variation of motor-vehicle-accident fatalities, multiple regression analysis was performed on standardized variables (Kerlinger and Pedhazur, 1973). This analysis tests whether each independent variable is a statistically significant predictor of the dependent variable when all other variables are held constant. The results (Table 3) show that even after controlling for the effects of the other variables, the homicide rate contributes significantly to the explanation of motor-vehicle-accident fatalities (beta weight = .40; $p < .01$). Two additional variables (proportion of young drivers and non-motor-vehicle accident fatalities) also contribute significantly to the variance accounted for, while the remaining 13 variables (including suicide rate) do not.

The total set of 16 independent variables accounts for 79% of the variance in states' motor-vehicle-accident fatalities (see Table 3). In comparison, if only homicide rates and the proportion of young drivers are entered as independent variables into another multiple regression,

TABLE 3

Least Squares Regression
of Motor-Vehicle-Accident Fatalities.

VARIABLE	BETA WEIGHT	STANDARD ERROR	SIGNIF
HOMICID	.40	.14	<.01
SUICIDE	.25	.16	.13
NTRAFAC	.30	.13	.03
OTHERFA	.07	.22	.76
PHYSICI	-.03	.17	.87
MVEHPCA	-.27	.17	.11
ROADPVE	.18	.18	.31
YOUNGDR	.41	.17	.02
OLDDR	-.03	.22	.89
MALEDR	-.03	.12	.82
UNEMPLO	.08	.13	.55
INCOME	-.22	.15	.15
HIGHSCH	-.02	.20	.92
BEER	.20	.13	.13
DISTSPI	-.26	.18	.16
WINE	-.02	.23	.92

$r^2 = .79$

the amount of variance accounted for is 64% (68% if non-motor-vehicle-accident fatalities are also added).

DISCUSSION

Homicide Rates

The correlational analysis indicates that homicide rate is significantly related to motor-vehicle-accident fatalities. This finding is in agreement with previous correlational studies (e.g., Porterfield, 1960; Whitlock, 1971). Importantly, the multiple regression analysis implies that this relation is not due to the effects of other potentially confounding variables. Even after controlling for the effects of 15 other variables, homicide rates account for a significant amount of the variance of motor-vehicle-accident fatalities. This result supports the notion of Whitlock (1971) that motor-vehicle accidents may be manifestations of aggression and violence in a society.

Suicide Rates

Suicide rates are also significantly correlated with motor-vehicle-accident fatalities. However, in contrast to the homicide rates, the suicide rates do not predict motor-vehicle-accident fatalities, *if* the effect of other independent variables is partialled out. This finding does not support a conclusion by Adams (1970), based on correlational findings, that the automobile is employed "as an instrument of self-destruction" (p.10).

Non-Motor-Vehicle Accidents

The correlational analysis indicates that fatality rates from accidents other than those connected to motor vehicles (e.g., falls, accidental poisonings, fires, etc.), are related to motor-vehicle-

accident fatalities. This relation remains statistically significant even after controlling for the effects of 15 other variables, suggesting general risk-taking as a significant factor in accident causation. This result is not due to the tendency of young drivers to exhibit more risky driving behaviors (e.g., Hodgdon, Bragg, and Finn, 1981), since the effect of the proportion of young drivers was controlled in the regression analysis.

Driver-Age Distribution

The proportion of young drivers is both significantly correlated to motor-vehicle-accident fatalities, and also predicts motor-vehicle-accident fatalities even after controlling for the effects of a range of other variables. The implication is that young drivers, in general, create a more hazardous driving environment than older drivers. This is in agreement with the finding that young drivers have a higher accident rate per mile traveled than middle-aged drivers (Carsten, 1981; Planek, 1972). Since young drivers also accumulate a relatively high annual mileage (Carsten, 1981; Planek, 1972), it is not surprising that they contribute to motor-vehicle-accident fatality rates at the state level, as shown by the present study.

The proportion of older drivers, however, does not contribute significantly to motor-vehicle accident fatalities. Previous studies indicate that older drivers have a higher accident rate per mile traveled than middle-aged drivers (Carsten, 1981; Planek, 1972). However, since they accumulate a relatively low annual mileage (Carsten, 1981; Planek, 1972), they do not significantly affect motor-vehicle-accident fatality rates at the state level.

The present data do not allow positive identification of underlying processes for the strong effect of young drivers on motor-vehicle-accident fatalities. Nevertheless, since aggression/violence and general risk-taking levels were controlled in the multiple regression, it is reasonable to speculate that lack of driving experience per se might be a contributing factor.

Correlative but Nonexplanatory Variables.

Several variables exhibit significant correlations with motor-vehicle-accident fatalities, but do not contribute significantly to the explanation of motor-vehicle-accident fatalities, if the effects of other variables are controlled. These variables are: the above-discussed suicide rate; fatalities due to causes other than accidents, homicide, or suicide; density of physicians; road mileage per vehicle; and income per capita. This finding demonstrates the need to control for the effects of potentially confounding variables in accident-causation research. Relying only on correlational analysis, as other studies have done, might result in misleading interpretations.

CONCLUSIONS

This study found statistically significant, independent effects of the following three variables on the motor-vehicle-accident fatalities: homicide rate, non-motor-vehicle accident fatality rate, and proportion of young drivers. These three factors account for 68% of the variance of motor-vehicle-accident fatalities for the 50 states and the District of Columbia.

These findings suggest that (1) society's level of violence and aggression affects the extent of aggressive driving and consequently the

frequency of traffic accidents; (2) general risk-taking contributes significantly to traffic accidents; and (3) young drivers are a significant factor in the traffic-accident problem, possibly because of their lack of experience.

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