Compliance with the 1992 California Motorcycle Helmet Use Law

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ABSTRACT

To evaluate helmet use in California before and after the introduction of an unrestricted helmet use law on January 1, 1992, observations of motorcycles and their riders were made at 60 locations in seven California counties, twice before and four times after the law was introduced. Helmet use increased from about 50% in 1991 to more than 99% throughout 1992. Compliance was achieved despite variations in helmet use by motorcycle design and road type. Seven percent of riders used nonstandard helmets after the law. With adequate enforcement, unrestricted helmet use laws can achieve almost 100% compliance and reduce the number of people riding motorcycles. (*Am J Public Health.* 1995;85: 96–99)

Introduction

Although California has the highest number of registered motorcycles and motorcycle crash–related fatalities in the United States, it had no helmet use law before 1985, and the 1985 law covered only riders under age 15½. In 1991, the California legislature passed a mandatory helmet law requiring all motorcycle drivers and passengers to wear a helmet as of January 1, 1992. California is the 26th state to introduce a mandatory helmet use law for all riders without restriction.[1] Helmet laws have been introduced because helmets reduce head injuries and the likelihood of being killed in a crash by between 32% and 73%.[2]

Observations throughout the country have consistently shown that without a law, between 40% and 60% of motorcyclists wear helmets. When an unrestricted law is implemented, helmet use approaches 100%, and when a helmet use law is repealed, helmet use falls to prelaw levels.[3–7] States with restricted helmet laws have use rates similar to those of states with no helmet laws, indicating that restricted laws are not effective in increasing helmet use.[8]

Studies in Louisiana, Nebraska, and Texas revealed substantial decreases in overall motorcycle crash fatalities and severe head injuries following implementation of mandatory helmet use laws.[5,9,10] Studies in South Dakota, Colorado, South Carolina, and Kansas show that after repeal of mandatory helmet use laws in the 1970s, motorcycle fatalities increased.[3,4,6,11] The findings from states with newly enacted laws as well as those from states that repealed helmet use laws show that mandatory helmet use laws are an effective intervention strategy for reducing motorcycle-related head trauma.[3–7,9–13]

The present study documents observed helmet use before and after the implementation of the California mandatory helmet use law and compares helmet use with respect to season, type of road, and type of motorcycle.

Methods

Motorcycle helmet use observations were completed at 60 sites located in seven counties in California (Table 1) twice before implementation of the law (September and December 1991) and four times after implementation (January, March, September, and December 1992). Length of observations at each site ranged from 2 to 6 hours (average: 3 hours). The observation locations were not selected to provide a weighted representation of the entire state, but rather to represent diverse riding conditions, different levels of motorcycle traffic volume (based on traffic reports), and major types of surface intersections, freeways, and state urban and rural roads.

Observations were conducted from Thursday to Sunday at various times between 6 AM and 9 PM. Mondays, Tuesdays, and Wednesdays were excluded because a pilot test indicated that traffic patterns on these days were similar to those of other weekdays. Hours after 9 PM were excluded from observations because of limited observer visibility and safety considerations. Motorcycles traveling in either direction on freeways and every motorcycle entering a primary road intersection were observed. Locations and lengths of observations were replicated exactly in each observation period.

Data were collected on weather and lighting conditions, motorcycle design type, and helmet use for driver and passenger(s). Motorcycle designs were classified as street, racing, touring, dual-purpose,

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This paper was accepted May 31, 1994.

Note. The opinions, findings, and conclusions expressed in this paper are the authors' and do not necessarily reflect the views of the Insurance Institute for Highway Safety.

scooter, and unknown. Because the California law requires riders to wear a helmet approved by the US Department of Transportation, additional information on the prevalence of nonstandard helmet use was collected in the September 1992 observation period.

Helmet use was counted only if the helmet was worn on the head. Observers were trained to record helmets as nonstandard if they did not meet criteria outlined by the National Highway Traffic Safety Administration (e.g., if the helmet's thickness was obviously less than the required 1 in. of padding plus covering material). Pilot tests were conducted to standardize observers' responses.

Results

During the six observation periods, 25 342 motorcycle drivers and 2803 passengers were observed. This total of 28 145 observed riders excludes 62 riders for whom helmet use could not be determined.

Table 2 shows the percentage of all motorcycle riders observed who were wearing helmets for each observation period. For drivers and passengers combined, helmet use was about 46% 4 months before the law (September 1991) and rose to about 58% 1 month before the law (December 1991). In January 1992, the first month of the law, 99% of the observed motorcyclists were helmeted. Helmet use remained over 99% throughout the first year of the law. Passenger helmet use was lower than that of drivers during the prelaw period. Subsequent to the law, passenger helmet use exceeded 96% in all observation periods but was still lower than driver helmet use.

The number of drivers (equal to the number of motorcycles) observed decreased by 16% from September 1991 to September 1992 and by 28 percent from December 1991 to December 1992. The decline in motorcycle passengers for the two observation periods was greater: there were 29% fewer passengers after the law in September 1992 and 45% fewer in December 1992. The weather conditions in September 1991 were slightly worse than in September 1992, with 8 more sites reporting inclement weather. December 1992 had 11 more sites reporting fog and 8 more reporting rain than in December 1991.

Table 3 displays driver helmet use rates before and after the law by road type and motorcycle design. In September 1991, helmet use was highest on freeways and lowest on other state roads, which are usually in rural areas. Riders of scooters and street motorcycles were less likely than riders of racing, touring, or dual-purpose motorcycles to be helmeted. However, these differences almost completely disappeared after the law went into effect, although scooter riders consistently had the lowest helmet use.

Observations of helmet type at 29 locations in September 1992 revealed that of the 3214 helmeted riders observed, 7% appeared to be using helmet types not certified by the US Department of Transportation. The percentage of nonstandard helmet use varied by site, ranging from 22.5% at one site to 0% at several others.

TABLE 1—Number of Motorcycle Observation Sites, by County, and Total Hours per Observation Period, California, 1991 through 1992

County	No. of Sites	Hours of Observation
San Diego	12	36
Los Angeles	21	63
San Bernardino	3	9
Riverside	2	5
Santa Clara	9	29
Sacramento	9	25
Fresno	4	12
Total	60	179

Discussion

The results of this study confirm that mandatory unrestricted helmet use laws achieve nearly universal compliance. In California, opposition to passage of the law included demonstrations and threats by motorcyclists to violate the law. Yet helmet use rose to 99% immediately after the law was enforced and was almost 100% in the 12th month of the law.

The decreased number of motorcyclists observed after the law went into effect suggests that helmet use laws may reduce motorcycle riding. A subset of motorcyclists who do not want to buy or wear a helmet may drop out of the motorcycle riding population once a use law is enacted. The greater decline among passengers suggests that passengers are less likely than drivers to own or have access to a helmet and are less likely to acquire one in response to laws requiring their use.

The observed decreases in motorcycle riding may not be solely attributable to the law. A downward trend in motorcycle registrations in California may account for part of the decline. Inclement weather in December 1992 may have contributed to the substantial decline in the number of motorcycles observed, although a decline was also seen in the subset of sites not reporting inclement weather during these observations.

Assuming that motorcycle ridership has decreased because of the law, it may be the high-risk rider who is no longer represented. In the absence of a helmet use law, those who do not use helmets have been identified as a high-risk crash group. For example, in a study of injured motorcyclists in California, unhelmeted riders were more likely than helmeted riders to be young (younger than age 20), unlicensed, uninsured, nonowners of the crashed motorcycle, and to have high blood alcohol concentrations.[14] It seems likely that if reductions in motorcycle use occur in response to laws, the reductions would occur largely in the group that was unhelmeted prior to the law.

The effectiveness of the mandatory helmet law will be weakened by the use of nonstandard helmets. Observations of nonstandard helmet use may be low because it is difficult to identify these helmets from a distance, and these estimates are only approximate. The basis for the use of these helmets is unknown, but the main motivation may be objections to the law. Cost considerations do not appear to be important because some nonstandard models are priced similarly to approved helmets. The use of nonstandard helmets can be decreased through stringent enforcement of the law and regulations on the helmet market. The National Highway Traffic Safety Administration has recalled several nonstandard helmets, but this process is costly and time-consuming. More information is needed about the prevalence of nonstandard helmet use and the effectiveness (if any) of these helmets in reducing head injuries. □

Acknowledgments

This work was supported by the Insurance Institute for Highway Safety. Additional support was provided by the Southern California Injury Prevention Research Center.

The authors thank Walter Beck, Juliana Betancourt, Kathryn Brown, Ditos Daranciang, Elizabeth Daranciang, Jeanne Delaney, Linda Lange, Roberta McKean, Carol Muldavin, Joyce Phillips, Lupe Samaniego, Soumi-

TABLE 2—Number of Motorcycle Riders Observed and Percentage Helmet Use, by Rider Status, before and after California Helmet Use Law

	Before Law				After Law									
									September 1992			December 1992		
	September 1991		December 1991		January 1992		March 1992							
Rider Status	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	% Change in No. Observed[a]	No. Observed	% Wearing Helmet	% Change in No. Observed[b]
Driver	5995	48.0	3522	60.1	3318	99.0	4955	99.5	5028	99.8	−16	2524	99.7	−28
Passenger	796	29.8	365	32.1	277	98.6	598	98.5	567	96.5	−29	200	99.5	−45
Total	6791	45.8	3887	57.5	3595	99.0	5553	99.4	5595	99.4	−18	2724	99.7	−30

[a]From September 1991 to September 1992.
[b]From December 1991 to December 1992.

TABLE 3—Number of Motorcycle Drivers Observed and Percentage Helmet Use, by Road Type and Motorcycle Design, before and after California Helmet Use Law

	Before Law				After Law							
	September 1991		December 1991		January 1992		March 1992		September 1992		December 1992	
	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet	No. Observed	% Wearing Helmet
Road type												
Intersection	4030	45.1	2351	58.8	2100	98.8	3326	99.4	3309	99.8	1598	99.7
Freeway	1304	61.1	789	66.9	890	99.1	1074	99.9	1060	99.9	674	100.0
State road	661	39.3	382	54.5	328	99.7	555	98.0	659	99.7	252	99.2
Motorcycle design												
Street	3282	46.4	1844	61.1	1819	99.3	2573	99.5	2800	99.8	1414	99.8
Racing	1127	59.4	700	74.3	325	99.7	1143	99.5	1033	99.6	552	99.8
Touring	555	65.2	305	74.1	738	99.3	534	100.0	455	100.0	205	99.0
Dual-purpose	189	52.9	84	67.9	91	100.0	135	100.0	127	100.0	63	100.0
Scooter	538	34.0	361	43.2	227	96.0	371	99.2	333	99.1	155	98.7
Unknown	304	12.2	228	13.2	118	94.9	199	99.0	280	97.6	135	100.0
Total	5995	48.0	3522	60.1	3318	99.0	4955	99.5	5028	99.8	2524	99.6

tra Sarkar, Heidi Smith, Michael Welch, Carol White, and Donna Winham—trained observers who spent countless hours on roads and streets observing and counting motorcycles and helmet use. We also acknowledge with thanks the California Highway Patrol and the city and county police departments and sheriffs' offices for their assistance and support. The editorial assistance of Sharon Rasmussen and technical review by Brian O'Neill of the Insurance Institute for Highway Safety are much appreciated.

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World War II–Veteran Male Twins Who Are Discordant for Alcohol Consumption: 24-Year Mortality

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ABSTRACT

The role of genetic and shared environmental influences in the association of alcohol with mortality was studied by using the National Academy of Sciences–National Research Council World War II–veteran male twin registry. An epidemiologic questionnaire administered from 1967 through 1969 permitted identification of twin pairs discordant for alcohol consumption. The subsequent 24 years of mortality follow-up yielded data on time and cause of death. Analyzing the first or only death in drinking-discordant pairs, we observed 27 deaths in abstainer twins and 14 deaths in their light- to moderate-drinker cotwins (relative risk [RR] = 1.93). Excess mortality in twin abstainers was also indicated for deaths from cardiovascular diseases (RR = 2.0) and other causes of death excluding cancers (RR = 3.2). The protective effect, however, of light to moderate drinking did not persist in twins who were smokers at baseline. (*Am J Public Health.* 1995; 85:99–101)

Introduction

Evidence from a number of epidemiologic studies suggests that moderate consumption of alcohol may be associated with lower morbidity and mortality than either abstention or heavy drinking.[1] The discovery of this U- or J-shaped association in which moderate drinkers are at lowest risk of death, especially from cardiovascular diseases, has led some investigators to propose that alcohol in moderate amounts may exert a protective effect on health.[2]

Careful examination of the literature, however, reveals a marked inconsistency of results.[3] It has been observed that the alcohol-mortality relationship varies among subgroups defined by age, smoking habits, socioeconomic status, and type of alcohol consumed.[4] The "constitutional hypothesis," whereby genetic and shared environmental factors are the link between the exposure (e.g., smoking, drinking) and health outcomes, has been proposed as an alternative explanation for these associations.[5] The objective of the present study was to test the constitutional hypothesis on a large cohort of US-born male twins.

Subjects and Methods

Sample

Subjects in this report are a subset of the twins from the National Academy of Sciences–National Research Council Twin Registry who responded to an epidemiologic survey conducted from 1967 through 1969. The methods used to construct this twin panel have been described elsewhere.[6,7] Briefly, multiple births of White males occurring in the continental United States from 1917 through 1927 were identified by searching birth certificates. About 93% of all such births estimated from national statistics to have occurred during those years were found. Twin pairs in which both members had records in the Veterans Administration Master Index File were selected, and information on the induction physical examination, service hospital admissions, and outpatient visits was abstracted from their military records. The methods of zygosity determination have been previously described and are estimated to be correct in approximately 95% of the twin pairs.[6]

Periodic mortality reviews in the twin registry are performed through the computer-based Beneficiary Identification and Records Locator Subsystem of the Veterans Administration. Veterans are eligible for a burial allowance, and the Veterans Administration is notified by relatives or morticians claiming this allowance. The Medical Follow-up Agency at the National Academy of Sciences requests a copy of these death certificates as part of a routine update of vital status of the twin registry. A trained nosologist then codes these certificates for underlying and associated causes of death using the *International Classification of Diseases,* 8th edi-

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This paper was accepted September 23, 1994.

Editor's Note. See related annotation by Klatsky and Friedman (p 16) in this issue.