

A CASE STUDY ANALYSIS OF MOTORCYCLE
ACCIDENTS IN THREE ILLINOIS COUNTIES

Thesis for the Degree of Ed. D.

MICHIGAN STATE UNIVERSITY

DUANE REED JOHNSON

1968



This is to certify that the
thesis entitled
A Case Study Analysis of Motorcycle Accidents
In Three Illinois Counties
presented by
Duane Reed Johnson
has been accepted towards fulfillment
of the requirements for
Doctoral degree in Education


Dr. Robert O. Nolan
Major professor

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ABSTRACT

A CASE STUDY ANALYSIS OF MOTORCYCLE ACCIDENTS IN THREE ILLINOIS COUNTIES

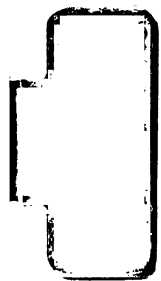
By

Duane Reed Johnson

The number of motorcycles increased rapidly in the mid-1960's. Injuries and deaths resulting from motorcycle accidents kept pace with that increase. This resulted in national attention to the problem.

It was found that there were little worthwhile data upon which sound programs of motorcycle accident prevention might be based. In Illinois, educators needed answers to many questions in order to establish a worthy motorcycle education program. A few of the questions were: What role do motorcycles play in motorcyclists' system of values? How experienced are motorcyclists? How do they handle emergency situations? How much warning do automobile drivers have before colliding with a motorcycle?

In an attempt to answer questions relative to the problem, a case study of motorcycle accidents was undertaken in three Illinois counties during May through August, 1967. Police reported 132 motorcycle accidents during the study period. The drivers involved in approximately every second accident were interviewed, and the accident site was investigated until 50 cases had been studied. Of the 50 cases, 32 involved two motor vehicles and 18 involved only a motorcycle.



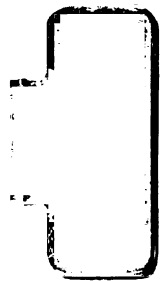
Of the 132 accidents, 25% involved a motorist turning left in front of a motorcyclist. When one vehicle cut another off, motorists were most often at fault (92%).

The median age of the motorcyclists in the case study group was nineteen years. One-sixth of the fifty motorcyclists had less than one month's riding experience. Their median driving experience was three years, while that of motorists was ten years. Motorcyclists' average traffic violations and accidents exceeded those of motorists.

Motorcyclists often rode in the middle of their lane where grease on the road made stopping more difficult. They failed to use their front brake in 25% of the cases, and they occasionally panicked. Virtually none used their headlight during daylight hours. Safety helmets were rarely worn (4%), and injury occurred to 88% of the operators and to all of their passengers.

Nearly one-half of the motorists disliked motorcycles, motorcyclists or both. Nearly all motorists had insurance on their vehicle, whereas approximately one-half of the motorcyclists had.

Prior to the accident, nearly two-thirds of the motorcyclists believed that they might become involved in an accident; only one-half of the motorists believed that they might be involved. In two-vehicle accidents, motorists received traffic tickets more frequently than did motorcyclists. However, more than one-half of the motorists believed the motorcyclist must prevent such accidents. One-third of the motorists did report being more watchful for motorcycles following the accident.

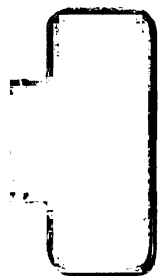


Motorcyclists' inexperience, inappropriate use of their vehicle controls and distractions while riding figured highly in factors contributing to the accidents. Perceptual errors were common to motorists, and they frequently noted how difficult it was to see motorcycles.

Motorcyclists failed to perceive the complexities involved in riding a motorcycle. They were not cognizant of the high degree of awareness necessary to ride safely in traffic. They were deeply involved in the emotional satisfactions derived from the motorcycle.

It was recommended that a case study of motorcycle accidents be made by a team representing several professions to investigate pre-accident, accident, and post-accident events. Research regarding motorcyclists' recognition of traffic hazards was recommended.

Until sound research has established reliable criteria to properly evaluate programs of motorcycle accident prevention, it was suggested that the mass media and driver education teach motorists and new drivers to look for motorcycles. It was also suggested that aspiring motorcyclists be taught how to operate a motorcycle safely. Manufacturers were urged to improve the visibility of motorcycles from the front and from the rear.



A CASE STUDY ANALYSIS OF MOTORCYCLE ACCIDENTS
IN THREE ILLINOIS COUNTIES

By

Duane Reed Johnson

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1969



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CHAPTER I

THE PROBLEM

Statement of the Problem

Motorcycles appeared upon the American scene in about 1901 and until the 1950's remained a minor vehicle on the roads. Then Soichiro Honda of Japan employed American production and advertising techniques and spurred the recent surge of light-weight motorcycles in this country. Motorcycle registrations increased by 19.1% (1963), 25.2% (1964), 40.3% (1965), and 38.5% (1966) to 1,914,700.¹

The rapid increase in motorcycles has been reflected in a motorcycle accident problem that has elicited considerable attention from numerous sources such as the National Safety Council, the United States Public Health Service, insurance companies, state legislators, doctors, educators, driver licensing authorities, parents, and the motorcycle industry itself. Indeed motorcycle accident statistics are appalling as evidenced by a national increase in deaths of 16.2% (1963), 26.8% (1964), 35.5% (1965) and 42.3% (1966) as reported by the National Safety Council.² The National Safety Council reported 2,160 motorcycle deaths in 1966 and that they might soar to 3,000 by 1970. While the deaths are in perspective with increased registrations,

¹National Safety Council, Accident Facts (1967 ed.; Chicago: National Safety Council, 1967), p. 56.

²Ibid.

the mileage death rate for motorcycle accidents may be from four to eight times worse than that for all motor vehicles. Furthermore, it is the youth of America that are most involved in these fatal and disabling accidents.

Approximately 75% of the motorcyclists killed were under twenty-five years of age. They comprise only about 10% of the number killed in all motor vehicle accidents between the ages of fifteen and twenty-four (in 1963).³

Importance of the Study

In 1965 Illinois experienced an 80% increase in motorcycle fatalities and a 163% increase in injuries over 1965. Furthermore, 38% of the 1965 motorcycle deaths in Illinois occurred in the fifteen to nineteen year age group. Preliminary figures for 1966 indicated a 150% increase in injuries over 1965.⁴

If legislators, traffic law enforcement agencies and educators are to make material gains in reducing the magnitude of the problem, then they must be better informed regarding the salient factors involved in motorcycle accidents.

The investigator became aware of the gross lack of meaningful information regarding motorcycle accidents when he was appointed chairman of the Motorcycle Curriculum Committee for the Superintendent of Public Instruction in the State of Illinois. The committee was

³Ibid., pp. 56, 60.

⁴Department of Public Works and Buildings, The Motorcycle in Traffic Accidents in Illinois in 1966 (Springfield, Illinois, 1967), p. 16.

charged with the responsibility of evolving a meaningful and appropriate body of knowledge to be incorporated into high school driver and traffic safety education classes. Through letters and telephone calls it was discovered that authorities in other states also shared this information vacuum.

Only generalized information regarding motorcycle operation and accidents was available to educators. The types of data yielded by accident reports were of limited value in revealing such information as learning the role that the motorcycle plays in the cyclist's scheme of needs and values, his experience as an operator of a motorcycle, why he was travelling where he was when the accident occurred, his responses in the stressful moment before impact, his attitude towards the possibility of involvement in an accident, and numerous other factors that might prove valuable in motorcycle accident prevention efforts. It was hoped that more pertinent and specific data might result from a case study approach to selected motorcycle accidents.

Basic Assumption

It was assumed that important factors regarding motorcycle accidents could be discovered through a planned interview with the vehicle operators with a higher degree of accuracy and inclusiveness than if police accident reports were relied upon alone.

Purpose of the Study

The purpose of the study was to analyze through the case study technique motorcycle accidents in selected Illinois counties to

ascertain common factors which contributed to motorcycle accidents. The study was considered exploratory in nature. Two specific problems were involved:

1. To determine common characteristics or combinations of operator behavior and environmental conditions bearing upon those accidents that were investigated by the case study technique.
2. To determine the common data regarding all the motorcycle accidents and the operators involved in those motorcycle accidents that occurred during the period of the study as derived from police accident reports and abstracts of drivers' records.

Definition of Terms

For the purpose of the study these terms are defined:

1. Motorcycle. A motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, but excluding tractors.
2. Motorcycle accident. An accident involving a motorcycle reported by police authorities in collision with another vehicle or object, animate or inanimate, or had overturned in the roadway or had run off the roadway.
3. Motorist. The operator of an automobile or truck in collision with a motorcycle.
4. Case study. For the purpose of this study a case study is defined as a collection of all the factors of significance derived from the police accident report, the driver's record, an investigation of the accident site, and the interview with the motorcyclist and (if any) the motorist involved in the accident.

5. Driver's record. An official statement (abstract) of a driver's record by the Illinois Secretary of State with respect to such official actions as convictions for moving traffic violations, warning letters, accidents, suspensions, revocations and reinstatement of the driving privilege, and others.

6. Investigated accident. A motorcycle accident which was investigated by the case study method.

7. Non-investigated accident. A motorcycle accident which was not investigated by the case study method.

Delimitations

The study was limited in the following manner.

1. Included are those motorcycle accidents reported by police authorities. Other accident reports, even though reported to the Illinois Department of Public Works and Buildings, were not accessible since state law does not permit it.

2. Only accidents in which the motorcycle operator survived were investigated. Without his testimony no interview was possible.

3. The Illinois counties of Boone, DeKalb and Winnebago, which were within an area readily reached by the investigator, constituted the geographical area of the study.

4. The data collected in the investigated accidents were limited to those derived from police accident reports, state driver records, investigation of accident sites, and personal interviews.

5. The data collected in the non-investigated accidents were limited to those derived from police accident reports and state driver records.

6. The case studies were limited to fifty motorcycle accidents that occurred during the months of May through August, 1967; the non-investigated accidents occurred during the same period.

Organization of the Study

In chapter two an extensive review of literature related to motorcycle accidents and allied topics is found. It may be noted that in the main statistical studies from accident reports typify motorcycle accident studies.

Chapter three deals with the design and methods used in gathering data. Three counties were selected as the source of accident data. The cooperation of police authorities was achieved and an interview form was developed for the case studies. Following the receipt of accident reports during May through August, 1967, approximately every second accident was investigated until fifty cases were obtained. Accident report data were compared with other statistical studies. Data from interviews were analyzed by a computer and also on a case by case search for common factors involved in the accidents.

In chapter four there first appear comparisons between the accident report data from the study period and other accident report based studies. Second there appear common factors of the motorcycle accidents as identified by the case study technique.

A summary, recommendations for further research, and a discussion section are to be found in chapter five.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Several statistical studies based upon police accident reports were available on motorcycle accidents. However, research dealing with motorcyclists' attitudes, culpability of motorcyclists and motorists in accidents, motorcyclists' riding experience, exposure to potential accident involvement and other research of value to the study were available from other countries. Not a single motorcycle accident study employing the case study technique was discovered.

Popularity of Motorcycles

Motorcycles declined in number in the United States during the early 1950's reaching a pre-1960's low in 1954. A gradual increase in registrations then took place until 1963 when phenomenal yearly increases began to take place.¹ Los Angeles county reported one motorcycle for every 169 persons in 1962, but it increased to one for every 73 persons by 1965.² Yamaha dealers were reminded in 1967 that

¹U. S. Department of Health, Education and Welfare, Motorcycles in the United States--Popularity, Accidents, Injury Control (Washington, D.C., 1966), p. 6.

²Los Angeles County, "A Survey on Motorcycles Involved in Traffic Accidents" (unpublished report, Los Angeles, 1965), p. 1.

there were 3,000,000 new motorcycle prospects in the United States every year.³

Some General Factors of Motorcycle Accident Involvement

Motorcycles were involved in accidents during the same days of the week and hours of the day as other motor vehicle accidents. They were more likely to occur on a clear dry day than were other motor vehicle accidents.⁴ No data relevant to the mechanical condition of motorcycles involved in accidents were discovered.

Severity of Motorcycle Accidents

While motorcycle accidents have increased, the accident rate has remained nearly constant according to the registration rate.⁵ However, some jurisdictions have noted a more rapid rise in fatal accidents than in the registration increase. From 1962 to 1966, Michigan's motorcycles increased 179% while motorcycle accident fatalities increased 247%.⁶ Canada reported a 45% increase in motorcycles in 1966 and an 81.4% increase in fatal accidents.⁷

³Universal Underwriters Insurance Company, "Facts on Cycle Safety that Can Help You Sell" (talk delivered at Yamaha dealer schools, Kansas City, Missouri, 1967), p. 1.

⁴Department of Motor Vehicles, Motorcycle Accidents in New York State in 1962 (Albany, 1963), pp. 4-7.

⁵National Safety Council, op. cit., p. 56.

⁶Michigan State Police, Michigan Motorcycle and Motor Scooter Data, 1962-1966 (East Lansing, 1967), p. 1.

⁷Stuart Munro, "The Deadliest Vehemence." A Paper on Motorcycle Safety (Ottawa Safety Council, Ottawa, Canada, 1967), p. 1. (Mimeographed.)

Motorcycles are reported to not average as many miles of travel per year as do automobiles so they appear to be involved in accidents approximately fifty per cent less frequently than automobiles on a registration basis.⁸

However, when fatal accidents are considered on a registration basis, motorcycles compare unfavorably with automobiles.

Table 1. Motor vehicle deaths per
10,000 vehicles registered^a

Jurisdiction	Year	Motorcycles	Autos
Mississippi	1965	10.0	6.2
Illinois	1965	12.1	5.0
Illinois	1966	12.4	5.3
New York	1962	19.0	4.3
Entire U. S.	1962	13.0	5.1

^aDana B. Brammer, "A Look at the Motorcycle Problem," Public Administration Survey (University, Mississippi: School of Business and Government), XIV, No. 3 (January, 1967), p. 2; Department of Motor Vehicles, Motorcycle Accidents in New York State in 1962 (Albany, 1963), p. 1; Department of Public Works and Buildings, op. cit., p. 1; and "Two-Wheeled Trouble," Journal of American Insurance, XL, No. 9 (September, 1964), p. 22.

In England, based upon 1948-1952 data, it was determined that a motorcycle was no more likely to become involved in an accident than an automobile on a registration basis, but that on a mileage basis it was twice as likely. Furthermore, if one were to undertake a

⁸Department of Motor Vehicles, A Review of Motorcycle Safety Problems in New York State (Albany, 1966), p. 2; and Department of Public Works and Buildings, op. cit., p. 4.

journey on a motorcycle he would be twenty times as likely as a motorist to be injured and forty times as likely to be killed.⁹

Peculiarly enough, however, a study in California pointed out that small cars had nearly twice the casualty rate of larger cars, and in Maine a study revealed that in collisions of large cars with small cars, the small to large car ratio of persons killed was 5.5:1.¹⁰

While much mention has been made of deaths in motorcycle accidents, personal injuries appear to be an extremely frequent occurrence. Personal injuries have been noted in 75% to 95% of motorcycle accidents reported. The lack of protection has been regarded as a significant factor in motorcycle accidents. Indeed, motorcycle accidents may perhaps be most nearly likened to an accident where an automobile strikes a pedestrian. In 1953 a Massachusetts study found that the cost of a collision when an automobile collided with another motor vehicle was \$381, in collision with a fixed object \$414, and in collision with a pedestrian \$572.¹¹ The severity of motorcycle accidents has been recognized by insurance companies.¹²

⁹G. O. Jeffcoate and F. Garwood, "A Review of Information on Motor Cycle Accidents with Special Reference to Age of Motorcyclists" (Crowthorne, England: Road Research Laboratory, 1956), p. 2. (Mimeographed.)

¹⁰Universal Underwriters Insurance Company, op. cit., p. 2.

¹¹"The Economic Costs of Motor Vehicle Accidents of Different Types," Public Roads, XXX, No. 2 (June, 1958), p. 42.

¹²"Meeting the Motorcycle Menace," Journal of American Insurance, XLIV, No. 4 (April, 1967), p. 23.

Because deaths have frequently been caused by head injuries, helmets have been recommended for use and many states have passed laws requiring their use. From two-thirds to three-fourths of the motorcycling fatalities in the United States have resulted from head injuries. Helmet use in England and Australia has been credited with an estimated 25% to 50% reduction in deaths.¹³ Shattering injuries to arms and legs have been frequent, too, and will remain a serious problem even with helmet usage.

State summaries of motorcycle accidents revealed that motorcycles have been involved in collision with other motor vehicles at a high rate, ranging from 57% (Michigan, 1966) to 78% (Illinois, outside the Chicago area, 1966).¹⁴

Factors Contributing to Motorcycle Accidents

Driving Errors

Categories of factors contributing to motorcycle accidents might include driver condition, driver actions, driver violations, environmental conditions and condition of the vehicle(s).

¹³Anthony L. Ellison, "The Helmet," Traffic Safety, LXVII, No. 1 (January, 1967), p. 23.

¹⁴Department of Motor Vehicles, Accident Facts, 1967 (Albany, 1967), p. 18; Department of Motor Vehicles, Motorcycle Accidents in New York State in 1962 (Albany, 1963), p. 2; Department of Public Works and Buildings, op. cit., p. 20; Los Angeles County, op. cit., p. 2; Michigan State Police, op. cit., p. 2; Washington State Police, Motorcycle Accidents in Washington, 1964--Rural Areas Only (Olympia, Washington, 1965), p. 1; and Washington State Police, Motorcycle Accidents in Washington, 1965--Rural Areas Only (Olympia, Washington, 1966), p. 2.

However, as shown in Table 2, accident report data revealed but a few of these categories. Apparently factors contributing to the

Table 2. Factors contributing to motorcycle accidents^a

Driver Action	Jurisdiction		
	N. Y. (1962)	Ill. (1966)	Wisc. (1965)
Failed to yield	20%	36.0%	8.5%
Speed	11	11.4	25.9
Following too closely	14	8.8	5.7
Reckless driving	36	. . .	. . .
Passed stop sign	. . .	17.0	. . .
Other	19	26.8	59.9

^aDepartment of Motor Vehicles, Motorcycle Accidents in New York State in 1962 (Albany, 1963), p. 3; Department of Public Works and Buildings, op. cit., p. 18; and Wisconsin Motor Vehicle Department, "Summary--Motorcycle Safety Conference" (unpublished report of conference, February 15, 1966, Madison), p. 1. (Mimeographed.)

accidents varied considerably in the above jurisdictions, or differences in reporting existed, or both situations existed to varying degrees.

According to Baker's multi-disciplinary pilot study of accidents in Evanston, Illinois, factors contributing to accidents might be assigned to seven categories:

1. Deficiencies in the design of the road and traffic control systems.
2. Obstructions to the drivers' and pedestrians' views.
3. Social interaction between drivers and their passengers.
4. Misconceptions relating to the driver's knowledge.

5. Inaccurate expectancies concerning the actions of other drivers or pedestrians.
6. Social forces.
7. Common factors in uncommon configurations.¹⁵

Baker apparently probed more deeply than typically reported drivers' actions, conditions or even violations. Baker found an average of 4.3 factors present in each accident investigation.¹⁶

In a study in Oregon it was found that motorcyclists involved in accidents had a higher accident and hazardous moving traffic violation conviction rate during the five years preceding the accident than a random sample of non-motorcyclist male drivers of the same age, as shown in Table 3. The motorcyclists had most likely been

Table 3. Five-year driving record, Oregon males, (1957-1962)^a

Age	Accidents		Convictions	
	Motorcyclists	Others	Motorcyclists	Others
20-24	1.37	1.12	4.26	2.44
25-34	1.00	.89	2.87	1.62
35 up	1.21	.68	1.14	.95

^aNoel F. Koestner, Motorcycle Accident Study, January 1 to July 31, 1963 (Salem, Oregon: Department of Motor Vehicles, 1963), p. 6.

¹⁵Leon M. Goldstein, "Research in Traffic Accident Prevention: An Overview of Research Supported by the Public Service, U. S. Department of Health, Education and Welfare," Traffic Safety Research Review, XI, No. 2 (June, 1967), p. 56.

¹⁶J. Stannard Baker, "Case Studies of Traffic Accidents," Traffic Safety Research Review, V. No. 4 (December, 1961), p. 16.

cited for speeding in the last police contact preceding the accident studied.¹⁷

Speeding violations constituted 43.4% of the violations in motorcycle accidents in the state of Washington in 1964 and 40.7% in 1965.¹⁸

In heavily populated Los Angeles County speeding constituted 9.2% of the violations in 1965, improper left turns at intersections 19.3%, and entering a through highway 10.8%.¹⁹

According to three studies, when motorcyclists were in an accident with another motor vehicle the motorcyclists were less likely to be found at fault than the motorists. Blame resided with the motorist 63.9% in Los Angeles County, 70% in the state of Washington, and more than 60% in Toronto.²⁰

In a study done in New York it was determined that in 46.3% of the accidents in which motorcycles and automobiles were involved one vehicle cut the other off. The automobiles had cut off the motorcycles 83% of the time.²¹ On March 21, 1967, the New York Times

¹⁷Noel F. Koestner, Motorcycle Accident Study, January 1 to July 31, 1963 (Salem, Oregon: Department of Motor Vehicles, 1963), p. 6.

¹⁸Washington State Police (1965), op. cit., p. 2; and Washington State Police (1966), loc. cit.

¹⁹Los Angeles County, op. cit., p. 3.

²⁰Los Angeles County, loc. cit.; "Meeting the Motorcycle Menace," Journal of American Insurance, XLIV, No. 4 (April, 1967), p. 24; and Munro, op. cit., p. 11.

²¹Department of Motor Vehicles, Accident Facts, 1967 (Albany, 1967), p. 18.

reported, "... car drivers rarely grant the motorcyclist the courtesies of safety extended to other vehicle operators."²²

Visibility of Motorcycles

O'Mara noted that motorcycles have a small profile making it difficult for drivers to see them, and added, "... the ordinary driver's vision and mind are not trained or disciplined to watch for and recognize a cycle, its speed or distance away."²³

Some have wondered whether or not dark colored motorcycles have a higher accident involvement with other motor vehicles than light colored ones, but no studies involving the color of the motorcycles were uncovered. However, a study in Sweden pointed out that while but 4.4% of the registered automobiles were black they were involved in 22.2% of the accidents, whereas pink cars comprised 6.2% of the registered vehicles but were involved in but 2.4% of the accidents. Furthermore it was discovered that drivers tend to overestimate the distance to a dark colored car and to underestimate the distance to a pink car. Black cars appeared to move slower than they were moving, pink ones faster than they were moving.²⁴

²²Munro, op. cit., pp. 23, 24.

²³John J. O'Mara, "Motorcycle Accidents--An Epidemic." Paper read before Highway Research Board, National Academy of Sciences, National Research Council, Washington, D.C., January 18, 1967, pp. 13, 14.

²⁴George Embree, "Color of Car Might Influence Crash Rate," The DeKalb Daily Chronicle (DeKalb, Illinois) September 18, 1964.

Motorcycle Size and Accident Involvement

In England Munden found that large motorcycles were involved in more severe accidents than small motorcycles. He also found that owners under twenty-five years of age with motorcycles of over 350 cc were involved in 20% of the fatal and serious accidents though they comprised but 5% of the registrations.²⁵ The sizes of motorcycles in accidents in Munden's study appear in Table 4. However, no data were presented to determine whether or not that statistic was a result of motorcycle size alone.

Table 4. Sizes of motorcycles in accidents

Rate	Size of Engine by Cubic Centimeters					
	to 60	61-150	151-250	251-350	351-500	>500
Per 1,000 veh.	.9	3.1	6.0	8.1	13.0	24.4
Per 1,000,000 mi.	1.6	3.2	4.8	5.9	8.4	11.1

The Young Male

Age

In the late 1950's motorscooters came under sharp attack as a result of soaring accident rates. The increase in accidents followed the enactment of licensing laws in some states that permitted fourteen and fifteen year olds to operate two-wheeled motor vehicles

²⁵J. M. Munden, "The Variation of Motorcycle Accident Rates with Age of Riders and Size of Machine," International Road Safety and Traffic Review, XII, No. 1 (Winter, 1964), p. 14.

under five horsepower. Illinois Cook County coroner McCarron demanded that scooters be banned.²⁶

In South Africa Biesheuvel and Barnes expressed dismay over the lack of public concern for the four hundred youths under twenty years of age who were killed in road accidents in 1947 while a great cry was raised for the one hundred polio victims of that year.²⁷

In 1962 New York reported that 34% of all motor vehicle accidents occurred to drivers twenty-nine years of age and under; however, that age group accounted for 52% of the motorcycle accidents. In Los Angeles County 76% of the motorcycle accident victims were under twenty-six years of age, 42% of whom were teenagers. Washington found its median age for motorcycle fatalities to be twenty-two years while it was thirty-three years for all motor vehicle accidents.²⁸

As shown in Table 5, motorcycle accident involvement from several jurisdictions points to the high involvement of the young persons.

Exposure

Klein argued that since mileage and time exposures are not accurately known in motor vehicle accidents age may not be so

²⁶"Too Young to Scoot?" Newsweek, (August 25, 1958), p. 18.

²⁷S. Biesheuvel and P. M. Barnes, "A Study of Motor-Cycle Accidents--An Analysis of Their Incidence and of the Factors that Influence Their Occurrence," South Africa Journal of Science (January, 1958), p. 3.

²⁸Alfred Crancer, Motorcycle Fatality Study, 1965 and 1966 Data (Olympia, Washington: Washington Department of Motor Vehicles, 1967), p. 2; Los Angeles County, op. cit., p. 4; and "Two Wheeled Trouble," Journal of American Insurance, XL, No. 9 (September, 1964), p. 23.

important a criterion as is often supposed,²⁹ but he offered no substantive proof for his contention.

Table 5. Age distribution of motorcyclists in selected motorcycle accident studies^a

Age	Jurisdictions					Cumulative---(Ill.)	
	Ore.	Ill.	Mich.	Kans.	Wash.	M'cyclists	All
Under 16	2%	} 27.9%	2.5%	3.9%	2.5%	} 27.9%	} 6.1%
16, 17	25		22.25	16.5	22.9		
18, 19	18	30.7	27.75	21.8	22.5	58.6	15.7
20-24	28	24.2	23.25	21.6	26.0	82.8	29.7
25-34	15	12.0	13.75	12.2	15.2	94.8	47.3
35-44	7	3.5	5.0	7.8	5.5	98.3	64.9
45-54	2	} 1.7	2.0	6.0	2.4	} 100.0	} 100.0
55 & up	1		2.5	8.2	.8		

^aDepartment of Public Works and Buildings, op. cit., p. 16; Koestner, op. cit., p. 1; Michigan State Police, op. cit., p. 2; and State Highway Commission, Summary of Motor Vehicle Accidents Involving Motorcycles, 1966 (Topeka, Kansas, 1967), p. 3.

Experience

A corollary of age appears to be the riding experience of the motorcycle operator. Motorcyclists with less than six months of riding experience were reported to have approximately twice as many accidents as those with more experience.³⁰ In Ontario, Canada it was discovered that motorcyclists with current model motorcycles

²⁹David Klein, "A Reappraisal of the Violation and Accident Data on Teen-Aged Drivers," Traffic Quarterly, XX, No. 4 (October, 1966), p. 504.

³⁰O'Mara, op. cit., p. 6; and Ontario Department of Transport, Motorcycle Accidents in Toronto, An Analysis (Toronto, 1965), p. 16.

were involved in accidents at nearly twice the rate of motorcyclists with older models,³¹ and over one-half of the owners of new motorcycles had not qualified for a regular operator's license.³² Two hospitals in Minneapolis reported that 70% of their motorcycle accident patients had either rented or borrowed the motorcycle and that 20% were taking their first or second ride. A study done in Wisconsin reported that nearly one-half of the motorcyclists who were killed had either borrowed or rented the motorcycle.³³

In Australia Foldvary investigated approximately one thousand motorcycle accidents involving another motor vehicle and compared several variables: culpability as determined by the police, age, experience with the vehicle and type of operator (automobile or motorcycle). He concluded that only the variables of age and experience of the operator were independently statistically significant. Culpability was not a significant variable alone or in any combination of variables. The interaction of age, experience and type of operator were statistically significant. Hence the young, inexperienced operator, whether motorist or motorcyclist was highly involved in the motorcycle accidents.³⁴ Klein noted that disproportionate accident experience occurs in Europe at higher age levels

³¹Ontario Department of Transport, op. cit., p. 7.

³²Ibid., p. 10.

³³Universal Underwriters Insurance Company, op. cit., p. 3.

³⁴J. N. Hanks, Letter to the Editor, Australian Road Research, II, No. 4 (June, 1965), p. 60.

than in the United States, but that the average licensing age in each case ushers in the motor vehicle accident problem.³⁵

In South Africa Biesheuvel and Barnes reported that, with the exception of speeding, motorcyclists' faults in accidents had no consistent bearing upon age by those motorcyclists under thirty-five years of age. They believed the higher involvement of younger riders was a degree of intensity of those faults found in the older riders.³⁶ They found motorists most frequently not making right turns with due care (comparable to left turns in the United States). They also cited inattention, carelessness, and failure to observe the rules and courtesies of the road as significant factors in motorcycle accidents.³⁷

Personality Factors

Jeffcoate and Garwood concluded that no data existed to separate the effects of inexperience and youthfulness in motorcycle accidents in a study conducted in England in 1956.³⁸

With reference to accidents in general, Fox divided the population engaging in any specific hazardous activity into four groups: (1) those who did not think of any hazard, (2) those who equate uncertainty of any hazard with zero risk (3) those who believe there is no hazard, and (4) those who deliberately appraise the

³⁵Klein, op. cit., p. 508.

³⁶Biesheuvel, op. cit., p. 14.

³⁷Ibid., p. 12.

³⁸Jeffcoate, op. cit., p. 5.

hazard; in all four groups Fox contended there is a belief of personal invulnerability.³⁹

Turfboer, like Tillman in 1949, believed that driving a motor vehicle is a social activity in which personality and social attitudes may be expressed; however, he believed that many act out inner conflicts as they drive dangerously, but this is not associated with their normal pattern of living. He said that containment of feelings may result in undercurrents that explode behaviorally and that people need to get their problems out in the open and to learn to recognize what feelings are likely to lead to dangerous driving practices.⁴⁰

Youth may use the automobile as an equalizer, Klein stated, when unfulfilled needs exist with respect to grades, athletic prowess and recognition by adults. In drawing from other sources Klein added that such frustrations may lead to aggressive behavior in automobile usage.⁴¹

Durbin, in reporting on what an automobile means to a driver said, "To the adolescent it may mean freedom and escape, both real and symbolic, from parental control and supervision." He continued,

"The automobile for many people is a symbol of sex, speed, wealth, and power and convenience. And the

³⁹Herbert H. Jacobs et al., Behavioral Approaches to Accident Research (New York: Association for the Aid to Crippled Children, 1961), pp. 52-53.

⁴⁰Robert Turfboer, "Do People Really Drive as They Live?" Traffic Quarterly, XXI, No. 1 (January, 1967), pp. 101, 103, 105, 108.

⁴¹Klein, op. cit., p. 509.

act of driving . . . is an act of expression of psychological and emotional needs. . . . The automobile makes it possible for persons to express hostility, discourtesy and emotional conflict often without fear of reprisal."⁴²

Lower class children have higher accident rates, Deutsch noted, but their environment also appears to be hazardous; a fatalistic attitude prevails among their class and more independence is granted them by parents, mainly through neglect.⁴³ Yet highly disciplined or overprotected children may live a restricted life with respect to exposure to hazards.⁴⁴

O'Mara noted that when parental reluctance existed prior to a youngster's purchase of a motorcycle, psychological problems frequently ensued following his involvement in an accident.⁴⁵

Klein pointed out that socially useful risk-taking is rewarded in Western cultures and as youths mature they replace youthful risk-taking endeavors of a physical nature with responsibilities in the adult world that provide sufficient sources for gratification. But for teenagers with few sources of worthwhile gratification, there is continuing involvement ". . . in a high level of socially dysfunctional risk taking in order to gain the peer-group admiration which it can elicit."⁴⁶

⁴²Samuel S. Dubin, "Emotions and Traffic Accidents--A Psychologist Looks at the Problem of Highway Safety," Traffic Safety Research Review, V, No. 2 (June, 1961), pp. 7, 8.

⁴³Jacobs, op. cit., p. 95.

⁴⁴Ibid., p. 100.

⁴⁵O'Mara, op. cit., p. 8.

⁴⁶Klein, op. cit., pp. 509, 510.

According to Biesheuvel and Barnes, the subjects in a survey of motorcyclists' attitudes in South Africa revealed that those who had been involved in an accident had a lower sense of social responsibility than the non-accident subjects. The accident involved group had an unfavorable attitude towards safety measures and traffic control and had a poor attitude towards other road users upon which they tended to project their own lack of discipline. They concluded, "In brief, character defect, particularly in respect of social consciousness, is at the root of the motor-cycle accident."⁴⁷ Early in their study they had said that if accidents may be traced to human nature, and if it is not readily changed, then a fatalistic attitude towards accidents is engendered. They said, "There is a general belief that the youthful exuberance, irresponsibility and love of speed of motorcyclists is the principal cause."⁴⁸

Brezina, in concluding a 1965 study of motorcycle accidents in Canada, stated,

"Because it has not been possible to discover any strong action characteristic possessed by the high-rate group, there is no specific behavioural problem to attack. Any improvement in accident experience must result from a general improvement in the driving attitude of this group of motorcyclists."⁴⁹

That a better motorcycle accident record may be obtained is revealed by the statistic that the Los Angeles police on motorcycles achieved an accident rate of 17.9/100,000,000 miles

⁴⁷Biesheuvel, op. cit., p. 14.

⁴⁸Ibid., p. 4.

⁴⁹Ontario Department of Transport, op. cit., p. 15.

travelled while the patrol car accident rate the same year was 27.9.⁵⁰

Answers to the Problem

" . . . when thousands are added to already grim statistics, concern must be expected, especially when the new toll is exacted at the cost of our young people. Indeed, we accept the right of the state to take active measures to protect its youth,"

is reported from Canada.⁵¹ However, a fatal motorcycle accident study in Illinois reported that no single simple corrective action could be found to apply to the accidents.⁵²

In the midst of reporting the trauma associated with motorcycle accidents Dr. Robert Walz, Chairman of the Trauma Committee of the Academy of Medicine of Cleveland recently said,

"It is often implied that motorbikes are so dangerous that no one should ride them. This attitude is not only unrealistic, but will be totally unsuccessful in providing any solutions to the problem. It is essential to face the fact that riding a motorbike on a summer day is an exciting, exhilarating experience. It is unquestionably great fun, it is here to stay, and will undoubtedly increase in popularity."⁵³

Various agencies and individuals have called for a balanced attack on the motorcycle accident problem. They have suggested

⁵⁰Paul Ditzel, "Can Motorcycling Be Safe?" Westways (December, 1966), (reprint of article).

⁵¹Munro, op. cit., p. 8.

⁵²Francis S. Lorenz, "Fatal Motorcycle Accidents," Unpublished report delivered to the Governor's Official Traffic Safety Coordinating Committee, Springfield, Illinois, November 16, 1966, p. 2.

⁵³Universal Underwriters Insurance Company, op. cit., p. 2.

special licenses for operators, protective headgear, face protection, safety equipment on the motorcycle, inspection of the motorcycle, and driver education for motorcyclists.⁵⁴

Smeed reported that motor vehicle injury accidents in Great Britain would be reduced by 34% if all motorcycles were replaced by four wheel vehicles, but he did not believe that such an idea would be enthusiastically received.⁵⁵

Dr. Robert H. Kennedy, representing the American College of Surgeons, suggested a broad attack on the motorcycle accident problem because, "We are fed up with trying to patch up the bodies of young kids unnecessarily injured. . . ." He also suggested medical seminars be established for doctors, nurses, and ambulance attendants.⁵⁶

⁵⁴"Air Force Holds Seminar on Two-Wheeler Accidents," Traffic Safety, LXVII, No. 2 (February, 1967), p. 19; Biesheuvel, op. cit., p. 16; "Conference Stirs Public Debate on Motorcycle Safety Measures," Wisconsin Traffic Safety Reporter (March, 1966), pp. 1, 2; Walter E. Davidson, "What the Motorcycle-Motorscooter Industry is Doing to Promote Safe Operation," Traffic Digest and Review, XV, No. 1 (January, 1967), pp. 14-16; LeRoy W. Dunn, "Teach Them How to Ride," Safety, III, No. 2 (March-April, 1967), p. 17; Duane R. Johnson, "What Are the Challenges to Driver Education?" Traffic Safety, LXVII, No. 1 (January, 1967), p. 34; Beth Majid, "Danger Rides Two Wheels," Parent's Magazine, XXXVIII, No. 9 (September, 1963), pp. 68+; "Meeting the Motorcycle Menace," op. cit., pp. 23, 24; O'Mara, op. cit., pp. 17, 18; U.S. Department of Commerce, Draft Highway Safety Program Standard No. 4.4.3--Motorcycle Safety (Washington: National Highway Safety Agency, February, 1967), p. 2; U.S. Department of Health, Education and Welfare, "Exploratory Meeting on Motorcycle Safety Education," (Washington: 1966), pp. 5-8, (Mimeographed); and Perritt, op. cit., p. 398.

⁵⁵R. J. Smeed, "Methods Available to Reduce the Numbers of Road Casualties," International Road Safety and Traffic Review, XIII, No. 4 (Autumn, 1964), p. 10.

⁵⁶"Safety Group Demands Safer Conditions for Motorcycle Use," Medical Tribune and Medical News, VII, No. 143 (November 30, 1966), p. 1.

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Research Needed

Harry Porter, Jr. of the National Safety Council suggested that there is a need for conducting studies of motorcycle accidents to determine where the chain of accident causes might be broken.⁵⁷

J. Stannard Baker recommended that because there are several factors (he avoids using the word causes) which contribute to an accident involving the road, driver and vehicle, accident investigation by police should include such things as the nature of the trip, kind of road, driver's recollection of the discovery of a hazard and what action the driver took.⁵⁸

After reviewing the motorcycle accident problem in the State of New York, the Department of Motor Vehicles suggested research be undertaken to ascertain the relationship of motorcycle size, driver experience, and accidents; the department also suggested vehicle ownership should be investigated.⁵⁹

Munro suggested the following for further research:⁶⁰

1. Operator's attitude and experience.
2. Faulty operating procedures through ignorance or inadequacy of driving skill.
3. Cues which may have indicated dangers.
4. Evasive action which may have averted the accident.
5. Benefits of training and/or experience.
6. Need for protective devices for the operator and vehicle.

⁵⁷Perritt, loc. cit.

⁵⁸Baker, op. cit., pp. 16, 17.

⁵⁹Department of Motor Vehicles, A Review of Motorcycle Safety Problems in New York State (Albany, 1966), p. 10.

⁶⁰Munro, op. cit., p. 27.

The search to identify remedial factors in accident prevention has been a difficult task as the more obvious factors have tended to be subtle and difficult to identify. It has not been easy to produce acceptable countermeasures for these subtle factors.⁶¹

Bronfenbrenner believed that an accident should be viewed as a sequence of gradual development, although often of sudden occurrence. He contended that descriptive studies are needed to gather data not contained in accident reports. These descriptive studies, as a result of situational characteristics conducive to particular types of accidents, may lead to further exploration.⁶²

Ross and Baldwin, in separate investigations, concluded that motor vehicle accident reports are not as reliable as has often been assumed and that to rely upon them for either research or practical purposes poses severe limitations.⁶³

The need for undertaking research of motorcycle accidents is implied by actions such as the 1966 legislation in Michigan which stated that motorcyclists should ride as near to the right side of the road as possible. Data supporting this legislation is not available. Jacobs contended that many accident countermeasures and programs are not the result of carefully planned experiments.⁶⁴

⁶¹Jacobs, op. cit., p. 4.

⁶²Ibid., pp. 45, 136-140.

⁶³H. Laurence Ross, "Driving Records of Accident-Involved Drivers," Traffic Safety Research Review, IV, No. 4 (December, 1960), p. 24; and David M. Baldwin, "Accident Records and Research," Traffic Safety Research Review, VII, No. 3 (September, 1963), p. 7.

⁶⁴Jacobs, op. cit., p. 21.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

Summary

The review of literature revealed that within the four years prior to this study considerable accident report data have been accumulated, and that in-depth research dealing with motorcycle accidents is sparse. The majority of research done prior to 1967 had been undertaken abroad, particularly in Great Britain, Australia and South Africa.

Motorcycles have increased in popularity in recent years with the advent of low-cost, small import models. Accident involvement has matched the increase in registrations. A higher percentage of injuries and deaths have occurred in motorcycle accidents than in other motor vehicle accidents. As a result, the use of safety helmets has been strongly advocated. In several states legislation has required their use. The evidence to date supports the effectiveness of safety helmets in reducing the severity of accidents.

Wide variations in driver actions leading up to the accident were reported by various motorcycle accident studies. In motorcycle accidents in which two motor vehicles were involved, the motorist was reported at fault in more than 60% of the cases. The greatest fault was motorists who had turned left in front of motorcyclists.

Several motorcycle accident studies showed that young males were most often involved. Several studies reported that motorcyclists with less than six months' riding experience were involved at a rate perhaps double that of other motorcyclists. A study conducted in England reported that no good data were available to factor out the effects of youthfulness and inexperience.

It was reported that automobiles are used to satisfy otherwise unmet youthful needs and desires, but no such data were discovered relative to motorcycles. A study done in South Africa surveying motorcyclists reported that subjects involved in motorcycle accidents had a lower sense of social responsibility than did those not involved. The study concluded that youthful exuberance and irresponsibility were principal causes of motorcycle accidents. The researchers recommended that an improvement in the motorcyclists' driving attitude was necessary to reduce the accident experience.

Suggestions to improve the motorcycle accident problem ranged from banning motorcycles, requiring special operator's licenses, protective riding apparel, vehicle inspection, to driver education for motorcyclists. It was recommended by various individuals and groups that studies be conducted to determine what important factors exist regarding motorcycle accidents in order that positive steps might be taken to reduce them.

Accident reports were believed to lack important data useful and necessary for establishing sound accident prevention programs.

CHAPTER III

DESIGN AND METHODOLOGY OF THE STUDY

Introduction

The study was planned as an exploratory search for common factors that contributed to motorcycle accidents. Although studies had revealed common factors in automobile accidents, no such studies were found covering motorcycle accidents.

A review of literature revealed that nearly all prior studies regarding motorcycle accidents were based upon data from police accident reports. It was also found that data derived from accident reports were not sufficiently complete that viable accident prevention efforts ought to be based upon them.

The literature suggested that in relatively unexplored areas descriptive studies might initially reveal data that would be valuable in suggesting direction for subsequent research.

In 1959, R. W. Bishop conducted a study in Michigan that revealed common factors that contributed to one-car accidents. He employed the interview method of investigation along with an investigation of the accident site.¹ It was believed that such an approach should be used in the study of motorcycle accidents.

¹Richard W. Bishop, "Case Studies of One Car Accidents Involving Young Drivers" (unpublished Ed.D. dissertation, New York University), 1961.

It was realized that persons involved in motorcycle-car accidents might be less cooperative in consenting to an interview or in responding during an interview than those involved in motorcycle-only accidents. This is due to a common human trait to make oneself appear as favorable as possible, particularly when another person is involved. However, the serious motorcycle-car conflicts identified in accident statistics indicated that two-vehicle accidents must be included in the study if the study was to be meaningful.

Development of the Interview Instrument

The interview form² was used to derive personal background data regarding the operator involved in a motorcycle accident, specific accident data, and driving and riding behavior. It was intended that certain data might also be gathered regarding motorists' and motorcyclists' attitudes.

Certain questions to be answered by only the motorist or by only the motorcyclist were designated throughout by prefacing those numbers with an A or an M respectively. Questions common to both bore no prefatory designation.

Questions 1-7 revealed basic personal background data and were placed first to gain rapport with an interviewee.

Question 8 permitted the interviewee to tell in his own words what happened. Sub-parts of question 8 (and questions 79-82) served to provide a comparison with the accident report prepared by police and to furnish leads to possible roadway faults.

²The interview form is found in appendix A.

Questions 9-17 revealed possible problems related to visual observation and in controlling the vehicle.

Questions 18-25 expanded the accident data relative to possible passenger and environmental distractions.

Questions 26-49, 58, 83 and 84 developed pre-accident data relevant to either the operator or the vehicle.

Questions 49-53 revealed the satisfactions that the motorcyclists derived from the motorcycle in three social settings.

Questions 54-57 and 59-62 probed at the emotional and physical condition of the respondent.

Questions 63 and 64 derived motorists' opinions towards motorcycles and motorcyclists.

Questions 65-70 established the basis of personal familiarity with two-wheeled vehicles.

Questions 71-73, 85-87, 89 and 93 probed attitudes towards accidents, acceptance of driving responsibilities, attitudes towards financial responsibilities in an accident, and the interviewee's driving record.

Questions 74-80 derived data regarding operator's and passenger's injuries. Also revealed were data regarding the presence and use of protective apparel and/or devices.

Question 88 provided for any additional data that might otherwise have been missed.

Questions 90-92 and 94-96 revealed the interviewee's opinion regarding motorcycle education and driver education.

Question 97 provided an official end to the interview.

Site Investigation Form³

So that each accident site might be investigated following the case interview(s), a form was developed to gather data from which it might be determined whether or not the conditions present at the accident site may have contributed to the accident.

Selection of the Geographical
Area for the Study

The geographical area for the study was limited to:

1. An area within a reasonable travelling distance from the investigator's home.

2. An area that would represent a cross-section of probable motorcycle accidents with respect to:

- a. Rural and towns of various sizes.
- b. Motorcycle ownership by urban and rural persons.
- c. Population cross-section to represent working groups and students of various levels.

3. An area that generated enough motorcycle accidents for a study.

4. An area that would include these kinds of roadways: urban, rural (state, county and federal highways), freeways and roads within parks.

5. An area that did not have an imbalance of motorcycle registrations in the total motor vehicles registered.

Three counties were selected as sufficiently meeting the criteria. Selection by entire counties permitted the inclusion of

³The site investigation form is to be found in appendix B.

the entire jurisdiction of sheriffs' departments. The characteristics of the three counties appear below.

Boone County. This county had a balance of rural and small urban communities, and it represented agriculture and industry (a Chrysler assembly plant at Belvidere, population 13,500). The county had a complete variety of roads.

DeKalb County. This county had a balance of rural and urban communities that included agriculture, industry and Northern Illinois University (enrollment 15,600 during the regular year and 11,000 during the summer) located in DeKalb, a city of 29,000 population.

Winnebago County. This county had a heavy representation of industry located in Rockford (population 139,000), a community that has had a moderate rate of growth with an above-average level of home ownership. A complete variety of roads included roads within urban and rural parks.

The registration of motorcycles in the three counties was 16.4% greater than the average of the three counties chosen plus the seven counties bordering them. However, since other criteria were well met the three counties were selected. In none of the ten counties did motorcycles constitute more than 2.91% of the registered motor vehicles.

Selection of the Time Period for the Study

The Division of Highways, Bureau of Traffic in Illinois furnished motorcycle accident data for 1966. From that data it was determined that the accident problem became noteworthy during the month of May and was on the wane during September. It was deemed

desirable to obtain accident data during the period when most motorcycle accidents occurred. Therefore, May through August, 1967, was selected as the time period for the study.

Selection of the Study Sample

The 1966 data revealed that there had been 114 motorcycle accidents during the months of May through August in the three counties. Since both one and two-vehicle accidents were included in the study, it was decided that fifty cases would be necessary to generate a sufficient quantity of useful data to permit generalizations to be made from the findings.

It was assumed that there would be no increase in the number of accidents over 1966. Therefore, it was estimated that it would be necessary to reach persons involved in every second accident reported by police. It was also believed some persons would not consent to an interview. It was also believed that some persons involved in accidents would reside outside the state or outside the area of reasonable accessibility.

It was determined that it would be unwise to rely upon a random sampling of the accidents since it was believed that the interviews should be made as soon after the accident report was received as possible.

Cooperation of Police Authorities

The cooperation of the Illinois State Police Commissioner and the State Bureau of Traffic was helpful in conducting the study. All

state, county, city and municipal police departments in the three county area furnished a copy of each motorcycle accident report for the study.

Cooperation of Interviewees

Following the receipt of accident reports from police, involved person(s) in each second case were sent a letter seeking their consent to be interviewed. They were informed that the study was being done with the cooperation of the local police and state authorities. Furthermore, they were informed that complete anonymity would be afforded them.

If they had a telephone an interview was arranged by telephone; if not, a visit to the residence followed the letter.

The Pilot Study

To determine the effectiveness of the contact letter, the method of arranging the interview, the adequacy of the interview form, and to give the investigator opportunities to conduct interviews, a pilot study involving five cases (eight interviews) was conducted upon receipt of the first accident reports in May, 1967.

The letter, method of arranging the interview and the interview form proved to be acceptable and adequate. The five cases in the pilot study were then placed in the non-interview group and not included in the case study.

The Interviewer

The interviewer made all telephone and personal contacts prior to each interview. His professional experience, education, and

experience in operating motorcycles qualified him to conduct the study.

Conducting Interviews and Site Investigations

Accident reports from police arrived sporadically; therefore, letters and telephone calls to police were necessary to maintain the flow of reports. Not all accident reports were received in their order of occurrence (by date).

If contact with each second accident involvee(s) was not possible, the next accident report was selected for investigation.

Reasons contacts were not made were:

1. Lived out of state--2.
2. Refused to be interviewed--6.
3. Drafted or enlisted in military service--2.
4. Lived outside the area of reasonable contact--5.
5. Insurance pending and the lawyer advised against the interview--2.
6. Injuries too severe to be interviewed within a reasonable period of time--4.
7. Fatal--1.
8. Could not locate--2.

If, for one of the above reasons, a case could not be studied, attempts to successfully conclude a subsequent case were more frequently successful when the accident involved a motorcyclist only. Thus, single-vehicle accidents comprised a larger percentage of the study sample than the entire accident population.

Each accident site in the study sample was investigated. (See site investigation form in appendix B.) With the accident report and interview form(s) as references, appropriate measurements were taken and observations made. A color slide was prepared from a photograph of the accident site. The photograph was taken from the direction of approach of the vehicle whose operator had the poorest view as determined by obstructions to his vision.

Treatment of Accident Report Data

Relevant data from the accident reports were coded. The computer center at Northern Illinois University key punched I.B.M. cards and processed data. It was then determined how closely gross accident report data compared with findings of other studies based solely upon accident report data.

The data were also grouped which permitted a determination of the number and per cents of data on the accidents according to these categories:

1. Investigated single-vehicle accidents (motorcycle only).
2. Investigated two-vehicle accidents.
3. Non-investigated single-vehicle accidents (motorcycle only).
4. Non-investigated two-vehicle accidents.
5. All single-vehicle accidents combined.
6. All two-vehicle accidents combined.
7. All accidents combined.

This permitted an analysis to be made of how data for the case study group compared with all the motorcycle accidents that occurred during the study.

Treatment of Interview Form Data

The responses to most questions were coded according to identifiable differences and analyzed by a computer as to frequencies and per cents. Five categories were created to investigate possible combinations and/or differences in responses. The five categories were as follows:

1. Motorcyclists' responses in one-vehicle accidents.
2. Motorcyclists' responses in two-vehicle accidents.
3. Motorists' responses in two-vehicle accidents.
4. Pooled responses of motorcyclists.
5. Pooled responses of all operators.

Some data on the interview form were not coded for analysis for these reasons:

1. A careful survey of the relevance of responses to questions was made. It was discovered that the responses to certain questions did not make any contribution to the study. Responses to other questions were either revealed or analyzed adequately elsewhere. Questions in these categories were 4, 37, 46, 59-61, 65-68 and 78.

2. Some questions were designed so information could be studied systematically case by case. These are reported on pages 72-78; the questions were 11, 13, 14, 16, 24, 25, 29-31, 35, 54-57, 80 and 88.

3. Some data were used to verify accident report data and were not needed beyond that point, such as 44, 45, 81, 82 and parts of 8.

Data from Driver's Record Abstracts

Abstracts of driver records were examined to ascertain whether or not the records in the case study group were comparable to those in the non-investigated group. The abstracts were obtained from the state drivers' records division of the Office of the Illinois Secretary of State. Abstracts for 192 of the 232 operators were available. Others were not received because of inaccuracies in drivers' license numbers on accident reports, out-of-state persons, lost licenses and temporary licenses.

Motorcycle Color and Size

Since no motorcycle registration data were available with respect to the engine size or color of motorcycles, 1967 sales data of approximately 2,500 motorcycles were obtained from two dealers in Winnebago County. Though better data were desired, the information was helpful in determining roughly whether or not the motorcycles involved in accidents represented the sizes and colors registered in the study area.

Investigation of Individual Cases

The data from interviews and site investigations were evaluated in a search for factors and combinations of factors that had apparently contributed to investigated accidents. Data were sought for indications of operators' gross inexperience with vehicles, roadway and road surface conditions and deficiencies, and perceptual lapses and/or distractions by vehicle operators. Also sought were data revealing operators' emotional or health status, inappropriate handling of the

vehicle for the circumstances, inaccurate expectancies regarding other drivers, and shortcomings in the operators' knowledge.

Summary

The review of literature revealed that most available data on motorcycle accidents were based upon accident reports. Such data furnished few viable leads for revealing common factors contributing to motorcycle accidents. The literature indicated that a descriptive study might reveal common factors contributing to motorcycle accidents and/or furnish viable leads for further motorcycle accident research.

The case study method of research was chosen for the study. The study was based mainly upon an interview with persons involved in motorcycle accidents. An interview form was developed similar to the one employed by R. W. Bishop for his study of one-car accidents in Michigan. A site investigation form was also devised.

Three counties in Northern Illinois were selected as the locus for the study. They contained a satisfactory cross-section of urban and rural populations factors and were within an area that could be handled. It was believed that the area would generate a sufficient number of motorcycle accidents during May through August, 1967, for the study. It was decided that each second accident would be investigated provided that the cooperation of the involved operator(s) could be secured.

The Illinois State Police, sherrifs' departments and local police departments agreed to furnish copies of motorcycle accident reports for the study.

A letter was devised to contact potential interviewees. A pilot study of five cases was conducted to determine the efficacy of the letter and the interview form and to provide the interviewer with practice in conducting interviews.

The study was begun immediately following the pilot study. Cooperation was gained from the vast majority of the prospects contacted. An interview with the involvees and an accident site investigation followed.

Driver records were obtained for 82.8% of the persons involved in the motorcycle accidents.

Motorcycle sales for 1967 were obtained from representative dealers and furnished data regarding motorcycle engine size and color.

Data from accident reports were analyzed by computer to compare (1) the relative "fit" of the accident population in the study to previously reported studies and (2) the relative "fit" of the investigated cases to the accident population in the study.

Data from the interviews were analyzed in two ways:

1. Much of the data were coded and analyzed by computer in a search for common factors contributing to the accidents.

2. A case-by-case evaluation was undertaken in a search for factors and combinations of factors in each case study individually and collectively. Both coded and uncoded data were used in the evaluation.

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

In the first part of the chapter data from the motorcycle accident reports are shown. Several comparisons are made with other accident studies based upon accident reports. Differences between case study (sample) results and the total number of cases are also reported.

In the second part of the chapter data resulting from computer treatment of responses from the interviews are reported.

In the third part of the chapter the case by case study of interrelated responses of interviewed motorcyclists and motorists are reported.

Part 1: Relevant Data from the Accident Reports

General Information Regarding the Accidents

Of 132 reported motorcycle accidents during May through August, 1967, in the three counties studied, 100 were two-vehicle accidents and 32 were one-vehicle accidents. Of those 50 accidents in the case study, 32 involved two vehicles and 18 involved one vehicle. One-vehicle accidents were overrepresented in the study sample for the reasons explained in Chapter III, page 30.

The days of the week on which accidents occurred were as follows (case study accidents are in parentheses): Sunday, 21 (10); Monday, 15 (4); Tuesday, 13 (7); Wednesday, 15 (2); Thursday, 24 (8); Friday, 21 (12); and Saturday, 23 (7).

All vehicle year models, makes and colors in the case study group very closely matched the total accident group.

The accidents occurred in daylight hours (81%) and in the rain (3%). They occurred on laned roads as follows: two-lane, 65%; four-lane, 30%; and other, 6%. The accidents occurred primarily in built-up areas. Accidents occurring in shopping and business areas comprised 36%; residential, 31%; industrial, 8%; rural, 13%; not stated, 8%.

Of the motorcyclists 73% were injured (one fatally) while 75% of the riders suffered injury. No motorist nor passenger was injured.

Motorcyclists' and motorists' age and sex

As seen in Table 6, the age of motorcyclists in the two-vehicle case study group was highly similar to those in the non-investigated accident group. The age of motorcyclists in the one-vehicle case study group was younger than that of those in the non-investigated group. The overall age of motorcyclists closely resembled earlier studies (see page 18).

Motorcyclists were males in 97% of the cases (96% in the case study group, 98% in the non-investigated group). Motorists were male 70% of the time (78% in the case study group, 66% in the non-investigated group). The age of motorists is shown in Table 7.

Table 6. Age of motorcyclists

| Age | Single-Vehicle | | Two-Vehicle | | Total | Per Cent | Cum. Per Cent | Cum. Per Cent in 1966, Ill. ^a |
|------------|----------------|-------------|-------------|-------------|---------|----------|---------------|--|
| | Case Study | Non-Invest. | Case Study | Non-Invest. | | | | |
| 16 | 2 | 0 | 7 | 6 | 15 | 11.4 | 25.8 | 27.9 |
| 17 | 2 | 0 | 5 | 12 | 19 | 14.4 | | |
| 18 | 4 | 0 | 4 | 14 | 22 | 16.7 | | |
| 19 | 2 | 4 | 7 | 4 | 17 | 12.9 | 55.4 | 58.6 |
| 20 | 2 | 0 | 1 | 1 | 4 | 3.0 | | |
| 21 | 3 | 0 | 2 | 7 | 12 | 9.1 | | |
| 22 | 0 | 0 | 1 | 3 | 4 | 3.0 | 81.9 | 82.8 |
| 23 | 0 | 1 | 2 | 5 | 8 | 6.1 | | |
| 24 | 1 | 2 | 0 | 4 | 7 | 5.3 | | |
| 25-29 | 0 | 4 | 1 | 8 | 13 | 9.8 | 94.0 | 94.8 |
| 30-34 | 0 | 0 | 1 | 2 | 3 | 2.3 | | |
| 35-44 | 1 | 1 | 1 | 1 | 4 | 3.0 | | |
| 45 up | 1 | 1 | 0 | 0 | 2 | 1.5 | 97.0 | 98.3 |
| Unknown | 0 | 1 | 0 | 1 | 2 | 1.5 | | |
| Total | 18 | 14 | 32 | 68 | 132 | 100 | 100 | 100 |
| Median age | 19 yrs. | 24 yrs. | 18 yrs. | 19 yrs. | 19 yrs. | | | |

^aSee page 18.

Classification of accidents

According to the Manual on Classification of Motor Vehicle Traffic Accidents, published by the National Safety Council, the accidents in the study were classified as shown in Table 8.

What operators were doing; violations given

Table 9 reports points of conflict between motorcyclists and motorists.

Table 7. Age of motorists

| Age | Case Study | Non-Invest. | Per Cent | National Per Cent 1966 ^a |
|------------|---------------------------------|-------------|----------|-------------------------------------|
| 16-19 | 7 | 6 | 13 | 16.9 |
| 20-24 | 5 | 14 | 19 | 16.5 |
| 25-29 | 5 | 9 | 14 | 11.3 |
| 30-34 | 1 | 3 | 4 | 9.1 |
| 35-44 | 5 | 12 | 17 | 17.7 |
| 45-54 | 5 | 9 | 14 | 14.0 |
| 55 up | 4 | 14 | 18 | 14.5 |
| Unknown | 0 | 1 | 1 | . . . |
| Totals | 32 | 68 | | |
| Median age | 28 yrs. + 35 yrs. + n = 30 yrs. | | | 33 yrs. |

^aNational Safety Council, op. cit., p. 46.

Table 8. Classification of accidents

| Type | Case Study One-Vehicle | Non-Invest. One-Vehicle | All Accidents |
|--------------------------|------------------------|-------------------------|---------------|
| Ran off road | 50% | 41% | 11% |
| Overturned in road . . . | 22 | 19 | 5 |
| Pedestrian | 0 | 6 | 1 |
| Motor vehicle in traffic | . . | . . | 73 |
| Parked motor vehicle . . | 5 | 9 | 4 |
| Bicyclist | 0 | 3 | 1 |
| Animal | 5 | 0 | 2 |
| Fixed object | 17 | 12 | 3 |

Citations issued by police for moving traffic violations appear in Table 10.

Table 9. What operators were doing

| Action | One-vehicle
(cyclists) | Two-vehicle | |
|--------------------------|---------------------------|-------------|-----------|
| | | M'cyclists | Motorists |
| Right turn | 3% | 7% | 2% |
| Left turn | 6 | 6 | 45 |
| Going straight | 62.5 | 77 | 36 |
| Slowing or stopping . . | 6 | 3 | 0 |
| Stopped in traffic lane | 0 | 0 | 7 |
| Parked | 0 | 0 | 2 |
| Leaving parking | 3 | 1 | 0 |
| Other | 3.5 | 3.5 | 3 |
| Unknown | 16 | 2 | 5 |

Table 10. Moving traffic violations

| Violation | One-vehicle
(cyclists) | Two-vehicle | |
|------------------------|---------------------------|-------------|-----------|
| | | M'cyclists | Motorists |
| None | 72% | 68% | 52% |
| Failure to yield . . . | . . | 6 | 21 |
| Improper left turn . . | 0 | 4 | 23 |
| Speeding | 16 | 4 | 0 |
| Careless driving . . . | 9 | 4 | 0 |
| Following too closely | 0 | 5 | 0 |
| Wrong lane | 3 | 3 | 0 |
| Other | 0 | 6 | 4 |

The primary conflicts between motorcycles and automobiles where they struck at nearly right angles is shown in Table 11. Two categories accounted for 26% of the accidents. Those two were where the automobile drove in front of the motorcycle (action 3) and where the automobile drove in front of the motorcycle from the right (action 5). In Accident Facts those two actions were reported in 18.5% of all

urban accidents.¹ In a third category the automobile drove in front of the motorcycle from the left (action 3). It was found that this accounted for 25% of the collisions whereas Accident Facts reported that it accounted for 6% of all urban accidents.²

In a New York study it was reported that the motorist cut the motorcyclist off 83% of the time. In this study the motorist cut the motorcyclist off in 92% of the cases.

Table 11. Directional analysis where motorcycles and autos struck nearly at right angles

| Action | Accidents | | |
|--|-----------|-------------|---------|
| | Total | Non-Invest. | Invest. |
| 1. Auto struck cycle in side | 5 | 2 | 3 |
| 2. Auto turned left from the opposite direction  | 25 | 21 | 4 |
| 3. Auto drove in front of cycle from the left  | 15 | 6 | 9 |
| 4. Auto turned left from the left of the cycle  | 2 | 2 | 0 |
| 5. Auto drove in front of the cycle from the right  | 11 | 9 | 2 |
| 6. Auto turned left from the right of the cycle  | 8 | 7 | 1 |
| Total occurrences | 66 | 47 | 19 |

¹Ibid., p. 46.

²Ibid.

Part 2: Data from the Interview, Site
Investigation and Drivers' Records

Data from the Interview Which Were
Coded and Computer Analyzed

The motorcyclists' median age was 19 years, motorists' 28 years. Males comprised 96% of the motorcyclists, 78% of the motorists. Motorcyclists were young, and their mean education was less than the twelfth grade. Few of the motorcyclists had attended college. Motorists' average education was twelfth grade, and 31% reported having attended college.

Driver/rider education; driving/riding experience

Of the motorcyclists, 64% had completed a high school driver education course. Of the motorists, only 31% had completed driver education. It should be noted that it has been only within recent years that driver education has had much impact upon the population within the geographical area studied.

No motorcyclist had received formal training in the operation of a motorcycle, and 66% had taught themselves. Friends had taught the remainder, except for one who had received instruction at the dealership where he had purchased his machine.

Motorcyclists' mean driving experience was three years; motorists' was ten years.

Motorcyclists' riding experience on a motorcycle revealed that 16% had less than one month's experience, 36% had less than six months' experience, and 50% had less than one year's experience.

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Vehicle ownership and usage

Motorcyclists owned the machine they were operating 70% of the time, borrowed their friends (16%), used another family members (10%), and 4% had rented it. Of the motorcyclists, 43% had owned a motorcycle prior to the one they were riding at the time of the accident.

Motorcyclists' mean annual riding mileage was reported to be 2,000-3,000 miles, and 28% stated that their annual mileage would be fewer than 1,000 miles. The areas they rode in were reported as follows: in town 22% of the time; commuting and in town (16%); commuting, town and rural (16%); primarily rural (4%); and all areas (26%).

Thirty-eight per cent of the motorcyclists did not own a car. They reported driving a car between 5,000-10,000 miles yearly which is the same mileage that the motorists reported they drove. However, 3% of the motorists reported driving an automobile less than 3,000 miles annually while 24% of the motorcyclists did.

Of the motorists, 43% reported they had operated a motorcycle. However, 83% of the males and 71% of the females stated that they had been a passenger on one.

Make and size of motorcycles

Hondas accounted for 58% of the motorcycles involved in accidents (16%), Suzukis (8%) and other makes 20%. Of these motorcycles, 48% were equipped with at least one mirror. The motorcycles of recent manufacture were most prevalent; 1967 models comprised 34% of the total, 1966 (32%), and 1965 (10%).

Thirty per cent of the motorcycles had engines no greater than 100cc displacement and 50% no greater than 160cc. The machine cited most frequently was a 305cc Honda.

Table 12 shows the size of motorcycle ridden by various age groups. No sixteen or seventeen year olds were riding heavy motorcycles. These machines were ridden by the older drivers.

Table 12. Motorcycle size according to age of rider

| Age | Lt.-weight
50-90cc | Lt.-medium
to 160cc | Hvy.-medium
to 305cc | Heavy
to 1200cc |
|--------|-----------------------|------------------------|-------------------------|--------------------|
| 16, 17 | 9 | 2 | 5 | 0 |
| 18, 19 | 5 | 5 | 5 | 2 |
| 20-24 | 1 | 1 | 5 | 5 |
| 25-54 | 0 | 2 | 2 | 1 |

Two motorcycle dealers in Winnebago County who sold more than 2,500 motorcycles in 1967 reported that approximately 30%-35% of the motorcycles had engines of less than 100cc displacement. In the case study sample, 30% of the motorcycles had engines of less than 100cc.

Driving record

Interview responses relative to previous accidents, traffic tickets, and loss of license were compared against driver records obtained from the Secretary of State. Driving records were obtained for 192 of the 232 drivers in the entire accident group. Records

were obtained for 72 of the 82 drivers in the case study group. In Table 13 the average number of moving violations per operator are reported.

Table 13. Average number of moving traffic violations of operators as reported by the State of Illinois and by the operators themselves

| Classification of operator | No. of Violations per Person | |
|-------------------------------|------------------------------|-----------------------|
| | Reported by State | Reported in Interview |
| <u>Motorcyclists</u> | | |
| Case studies, one-vehicle | 1.19 | 1.11 |
| Case studies, two-vehicle | .92 | 1.56 |
| Non-investigated, one-vehicle | 2.10 | . . . |
| Non-investigated, two-vehicle | 1.30 | . . . |
| All m'cyclists | 1.22 | . . . |
| <u>Motorists</u> | | |
| Case studies | .97 | .90 |
| Non-investigated | .77 | . . . |
| All motorists | .84 | . . . |

Even though the motorcyclists were younger and had fewer years of driving experience than the motorists, they had an official record of moving traffic violations somewhat higher than the motorists. It was noted that the case study two-vehicle accident group reported a greater number of moving traffic violations than state records revealed. This may be partly due because four motorcyclists were interviewed who reported five or more violations each,

whereas no driver records were received in that category. However, there were six driving records unavailable for operators with five or more violations. Unfortunately, no data were gathered with respect to the number or type of violations obtained while operating a motorcycle only.

More interviewees reported being involved in accidents prior to the case study than were reported by state driving records, as shown in Table 14.

Table 14. Prior accidents as revealed by state records and as reported by involved operators

| | M'cyclists | | Motorists | |
|--------------------------|------------|-----------|-----------|-----------|
| | State | Interview | State | Interview |
| Had had a prior accident | 8 | 34 | 5 | 19 |
| Had not had prior acc. | 34 | 16 | 25 | 13 |
| No record available | 8 | . . | 2 | . . |

If the "no record available" category was combined with the "had had a prior accident" category, the state driver records would still have shown that fewer operators had had accidents prior to the case study accident than were reported in the interviews.

Motorcyclists were involved in accidents more frequently than motorists despite the fact that they had driven considerably fewer years than the motorists had driven. The distribution of accident experience is shown in Table 15.

Table 15. Accidents previous to the case study
accident as reported by interviewees

| Category | M'cyclists | | Motorists | |
|---|------------|----------|-----------|----------|
| | No. | Per Cent | No. | Per Cent |
| None | 16 | 32 | 13 | 41 |
| As the operator of a car only | 13 | 26 | 15 | 47 |
| As the operator of a cycle only | 6 | 12 | 1 | 3 |
| As the operator of a cycle
and a car | 15 | 30 | 3 | 9 |

The driver's license of none of the operators in the case study had ever been revoked or suspended at the time of the case study accident, although several were suspended following the accident.

With respect to driver license actions taken by the state, there appeared to be somewhat greater activity shown in official action against the motorcyclists than against the motorists as shown in Table 16.

Roadway incidents prior to the case study accident

Table 17 reveals further indications of incidents prior to the case study accident were furnished by the interviewees' responses to the question, "Had you had any accidents or close calls during the month before this accident?"

Motorcyclists stated that prior to the case study accident motorists had pulled out in front of them and turned left in front of them. In spite of the near misses reported prior to the case study accident, 32% of the motorcyclists had given little, if any, thought

to the possibility that they might have an accident, and 18% reported that they had definitely thought about the possibility.

Table 16. State action taken against the driving privilege

| Action | M'cyclists | | Motorists | |
|--|------------|-------------|------------|-------------|
| | Case Study | Non Invest. | Case Study | Non-Invest. |
| One warning letter | 2 | 7 | 0 | 0 |
| One warning letter plus one suspension | 0 | 0 | 1 | 3 |
| One or two suspensions | 2 | 10 | 1 | 1 |
| No action | 38 | 47 | 28 | 52 |
| No record | 8 | 18 | 2 | 12 |
| Totals | 50 | 82 | 32 | 68 |

Table 17. Accidents or close calls during the month prior to the case study accident

| Occurrences | M'cyclists | | | Motorists |
|-----------------------------|----------------------|----------------------|---------|-----------|
| | One Vehicle Accident | Two Vehicle Accident | Average | |
| No accidents or close calls | 72% | 51% | 58% | 97% |
| One close call | 6 | 22 | 16 | 3 |
| Two close calls | 0 | 12 | 8 | 0 |
| Three or more close calls | 0 | 6 | 4 | 0 |
| One accident | 22 | 6 | 12 | 0 |
| Two accidents | 0 | 3 | 2 | 0 |

Trip plan

The points of origin and destinations of the trips were similar for motorcyclists and motorists, as were the intended activities at their destinations. Motorcyclists were less familiar with the route than were motorists. These data are shown in Table 18.

Table 18. Trip data

| | Motorcyclist | Motorist |
|---|--------------|----------|
| <u>Where Trip Began</u> | | |
| Home | 56% | 69% |
| School | 0 | 3 |
| Work | 20 | 16 |
| Recreation place | 8 | 3 |
| At home of friend or relative | 8 | 9 |
| Rental agency | 4 | .. |
| Other | 4 | 0 |
| <u>Destination</u> | | |
| Home | 38% | 38% |
| School | 4 | 6 |
| Work | 4 | 6 |
| Recreation place | 14 | 9 |
| Friend or relative | 22 | 19 |
| Rental agency | 4 | .. |
| Shopping center | 4 | 16 |
| On a ride | 10 | 6 |
| <u>Intended Activity at Destination</u> | | |
| Eat | 12% | 22% |
| Sleep | 10 | 9.5 |
| School | 4 | 6 |
| Work | 12 | 9.5 |
| Shop | 4 | 9.5 |
| Recreation | 24 | 22 |
| Ride around | 16 | 6 |
| Talk | 12 | 3 |
| Other | 6 | 12.5 |

Table 18--Continued

| | Motorcyclist | Motorist |
|-----------------------------------|--------------|----------|
| <u>Familiarity with the Route</u> | | |
| Very | 72% | 94% |
| Quite | 12 | 3 |
| Somewhat | 10 | 0 |
| Unfamiliar | 6 | 3 |
| <u>Why the Route was Chosen</u> | | |
| Best and/or shortest | 60% | 78% |
| Safest | 10 | 6 |
| Detour | 4 | 0 |
| Just did | 22 | 13 |
| Other | 4 | 3 |

Visibility of the motorcycle

The motorists' difficulty in seeing motorcycles was mentioned in Chapter II. Several questions were asked to get at possible recesses of that problem. It was frequently noted by motorists who had turned left in front of motorcycles that they had not seen the motorcycle prior to the collision, or that they had seen it too late to avoid the accident. Twenty-five per cent of all two-vehicle accidents reported during the study period involved motorists who had turned left in front of a motorcycle.

Color of the motorcycle

The colors of motorcycles in accidents are reported in Table 19.

Whether an apparent overrepresentation of red was because motorcyclists with red motorcycles mistakenly believed that they were seen is not known. Nor is it known whether or not the underrepresentation

of black was because motorcyclists with black motorcycles believed they were not seen and took extra precautions. However, the colors of only 228 motorcycles constituted but a rough estimate for comparative purposes. Colors of motorcycles were distributed evenly over the years of riding experience of motorcyclists.

Table 19. Colors of motorcycles

| Color ^a | Two-Vehicle Accidents | | Colors of New Cycles ^c |
|--------------------|-----------------------|--------------------------|-----------------------------------|
| | Case Study | Non-Invest. ^b | |
| Red | 31% | 38% | 17% |
| Black | 38 | 47 | 63 |
| White | 19 | 6 | 15 |
| Blue | 12 | 9 | 5 |

^aColor of fuel tank and frame.

^bPercentages are computed by spreading unreported colors according to the reported colors.

^cColors of 228 motorcycles sold by a dealer in Winnebago County in 1967.

Color of motorcyclists' shirt/jacket

The colors of motorcyclists' shirts or jackets in the case study accidents were of good visibility (white, yellow, red) in 30% of the cases and of poor visibility (black, blue, green, brown) in 70% of the cases. There were eleven accidents where automobiles pulled directly in front of motorcyclists. In three of the cases

shirt colors were of good visibility. In those eleven cases the colors of the motorcycles were red (4), black (4), and white (3).

Motorcyclists' use of their headlight in the daytime

Motorcyclists in two-vehicle, daytime accidents had their headlight on in 13.5% of the cases. Motorcyclists reported that they used their headlight in the daytime as follows: always 6%, usually 14%, rarely 22%, never 48%, when in rural area and on highway 6%, and did not know 4%.

Motorcyclists' position in their travel lane

The motorcyclists rode in the three portions of their lane as reported in Table 20.

Table 20. Motorcyclists' position in their travel lane^a

| Lane Position | One-vehicle Accident | Two-vehicle Accident | Total |
|----------------------|----------------------|----------------------|-------|
| Left third of lane | 22% | 28% | 26% |
| Middle third of lane | 39 | 35 | 36 |
| Right third of lane | 11 | 28 | 22 |
| Out of own lane | 0 | 6 | 4 |
| Do not know | 28 | 3 | 12 |

^aNote: So as to not blend in with the roadside, and to avoid being crowded to the right by overtaking motorists, the left one-third of the lane is recommended for solo riding by most experienced motorcyclists. Furthermore, the middle one-third of the lane contains the greatest concentration of grease droppings from other motor vehicles and yields a lower coefficient of friction for stopping.

1300

1300

1300

1300

1300

1300

Distractions

The distractions and view blockage for vehicle operators are reported in Table 21.

Table 21. Distractions and view blockages affecting vehicle operators

| | Motorcyclists | | | Motorists |
|--|---------------|-------------|-------|-----------|
| | One-vehicle | Two-vehicle | Total | |
| <u>Distractions in the car or on the m'cycle</u> | | | | |
| Controls | 11% | 6% | 8% | 0% |
| Gauges | 11 | 9 | 10 | 0 |
| Passenger | 0 | 3 | 2 | 3 |
| Radio | 0 | 0 | 0 | 3 |
| Malfunctioning cycle | 10 | 0 | 4 | 0 |
| None | 68 | 82 | 76 | 94 |
| <u>Distraction in the environment</u> | | | | |
| Looking for an address | 0% | 3% | 2% | 6% |
| Looking at a car . . . | 11 | 9 | 10 | 3 |
| Looking at a person . | 11 | 9 | 10 | 0 |
| Looking at a cyclist . | 6 | 16 | 12 | 3 |
| Other | 11 | 7 | 8 | 0 |
| None | 61 | 56 | 58 | 88 |
| <u>View blockage</u> | | | | |
| Another vehicle . . . | 17% | 13% | 14% | 13% |
| Building | 0 | 9 | 6 | 0 |
| Tree/shrub | 6 | 6 | 6 | 3 |
| Lights | 6 | 0 | 2 | 3 |
| Other | 5 | 6 | 6 | 9 |
| None | 66 | 66 | 66 | 72 |

Awareness of hazard and response to it

In the moment just prior to an accident, there may be some warning of its coming, some attempt to avert it, or circumstances that prevent escape or make the accident worse. The responses to those possibilities are reported in Table 22.

Apparently motorcyclists in collision with automobiles had an earlier awareness of a potential collision than did the operators of the automobiles. Motorcyclists in single vehicle accidents apparently had less awareness. Motorcyclists involved in two-vehicle accidents were able to attempt evasive action more frequently than motorists; however, a number of motorcyclists panicked. The vulnerability of the motorcyclists became apparent where a loss of control was reported and where environmental conditions notably impaired their attempts to regain control.

Injuries to motorcyclists and their passengers

Most of the motorcyclists (88%) and all of the passengers in the case study group were injured. Four of the operators in the case study group wore a safety helmet; one credited it with saving his life. Of the eight passengers involved, five received head injuries. A greater percentage of passengers received head injuries than operators. Table 23 shows the injuries sustained by motorcyclists.

Attitudes revealed

Several questions were asked motorcyclists to ascertain how they perceived themselves as motorcyclists. Additional questions were asked to reveal how motorists perceived motorcyclists.

Table 22. Awareness of hazard, evasive response and worsening effects of environmental conditions

| | Motorcyclists | | Motorist |
|--|---------------|-------------|----------|
| | One-vehicle | Two-vehicle | |
| <u>Awareness of Hazard</u> | | | |
| When other vehicle or object was seen . . | 28% | 44% | 34% |
| When auto pulled out . | . . | 31 | . . |
| When cycle pulled out | . . | . . | 19 |
| When cycle was heard . | . . | . . | 6 |
| Lost control | 28 | 13 | 0 |
| No warning | 39 | 6 | 41 |
| Other | 5 | 6 | 0 |
| <u>Evasive Action</u> | | | |
| Braked | 11% | 28% | 15% |
| Swerved | 33 | 22 | 0 |
| Swerved and braked . . | 6 | 22 | 19 |
| Got stopped | 0 | 0 | 13 |
| Accelerated | 0 | 0 | 6 |
| Could do nothing . . . | 28 | 9 | 47 |
| Panicked | 22 | 19 | 0 |
| <u>Worsening Effects of Environmental Con-
ditions</u> | | | |
| Curb | 17% | 3% | 0% |
| Tree | 17 | 0 | 0 |
| Road shoulder | 11 | 0 | 0 |
| Ditch | 11 | 0 | 0 |
| Other traffic | 0 | 19 | 9 |
| Passenger's action . . | 0 | 6 | 0 |
| Other | 5 | 0 | 0 |
| None | 39 | 72 | 91 |

Interviewees' opinions were also sought regarding their attitudes towards accidents, avoidance of accidents, and the training of new drivers and motorcyclists.

Table 23. Injuries sustained by motorcyclists

| | One-vehicle ^a | Two-vehicle ^b |
|----------------|--------------------------|--------------------------|
| Arms | 14 | 18 |
| Legs | 10 | 16 |
| Head | 10 | 5 |
| None | 1 | 5 |

^aThirty-five injuries in 18 cases.

^bForty-four injuries in 32 cases.

Motorcyclists' feelings when riding

Table 24 depicts responses that reflect motorcyclists' feelings when riding alone, with a passenger, and with other motorists.

Reasons for feeling as they did are also reported.

Table 24. Motorcyclists' feelings when riding and how the feelings are expressed

| | Number | Per Cent |
|--|--------|----------|
| <u>When Riding Alone</u> | | |
| "How do you feel when you ride a cycle?" | | |
| Free | 25 | 50 |
| Exhilarated | 13 | 26 |
| Just ordinary | 6 | 12 |
| Challenged | 3 | 6 |
| Powerful | 2 | 4 |
| Uncertain of myself | 1 | 2 |
| "Why do you suppose you feel that way?" | | |
| I'm out in the open | 25 | 50 |
| I can't really explain it | 8 | 16 |
| I appreciate the machine | 6 | 12 |
| The machine is a masculine symbol . . . | 5 | 10 |
| I'm noticed | 2 | 4 |
| Other | 4 | 8 |

Table 24--Continued

| | Number | Per Cent |
|---|--------|-----------------|
| "How do your feelings show in your riding?" | | |
| I don't think they do | 32 | 64 |
| I ride fast | 13 | 26 |
| I ride carefully, precisely | 4 | 8 |
| I slip through traffic | 1 | 2 |
| <u>When Riding with a Passenger Along</u> | | |
| "How do you feel with a passenger?" | | |
| Cautious | 16 | 32 |
| Free | 14 | 28 |
| Awkward | 8 | 16 |
| I don't carry a passenger | 8 | 16 |
| If it's a girl, it's wonderful! | 2 | 4 |
| Crowded | 2 | 4 |
| "Why do you suppose you feel that way?" | | |
| There's more responsibility | 12 | 30 ^a |
| I have to fight the cycle and passenger | 7 | 18 |
| There's someone to talk to | 7 | 18 |
| The extra weight is a problem | 6 | 14 |
| I can't really explain it | 5 | 11 |
| It feels masculine | 2 | 4 |
| Other | 3 | 5 |
| "How do your feelings show in your riding?" | | |
| I ride carefully | 21 | 50 ^a |
| I ride slowly | 9 | 21 |
| Take no chances | 3 | 7 |
| Does not show | 4 | 10 |
| Other | 5 | 12 |
| <u>When Riding with Other Motorcyclists</u> | | |
| "How do you feel when riding with other motorcyclists?" | | |
| Free | 20 | 40 |
| Competitive | 10 | 20 |
| I don't ride with others | 10 | 20 |
| Uncertain of myself | 4 | 8 |
| Relaxed | 2 | 4 |
| Cautious | 2 | 4 |
| No different than when alone | 2 | 4 |

^aPer cent computed on those who do carry passengers.

Table 24--Continued

| | Number | Per Cent |
|---|--------|-----------------|
| "Why do you suppose you feel that way?" | | |
| Boldness | 10 | 25 ^b |
| Bunched in | 8 | 20 |
| More fun | 6 | 15 |
| Like to compete | 4 | 10 |
| I just can't explain it | 8 | 20 |
| More responsibility | 2 | 5 |
| Masculine image | 2 | 5 |
| "How do your feelings show in your riding?" | | |
| More careful | 14 | 35 ^b |
| Does not show | 8 | 20 |
| Ride faster | 4 | 10 |
| Show off | 4 | 10 |
| Like to be first in the bunch | 3 | 7 |
| Ride at rear--safer | 2 | 5.5 |
| Compete | 2 | 5.5 |
| Mimic the leader | 3 | 7 |

^b Per cent computed on those who do ride with other cyclists.

A car is less fun than a motorcycle

The motorcyclists' responses to the question, "Does driving a car make you feel the same way as when you are riding a motorcycle?" are reported in Table 25.

Table 25. "Does driving a car make you feel the same way as when you are riding a motorcycle?"

| Response | Number | Per Cent |
|--|--------|----------|
| No, a car is just transportation | 23 | 46 |
| No, I feel couped up in a car | 13 | 26 |
| Yes, if the car is a convertible | 5 | 10 |
| Yes, I get the same feeling in a car | 4 | 8 |
| Yes, when the car windows are open | 2 | 4 |
| No, the car feels safer | 3 | 6 |

Motorcycle equipment not modified

In 82% of the cases motorcyclists were riding machines that had not been modified. The nine cases that reported making modifications said they had removed or cut back the front fender, installed high handlebars and altered mufflers.

Few motorists approve of motorcycles

It is reported in Table 26 that only about one-fifth of the motorists approved of both motorcycles and motorcyclists. It could not be determined what effect the accident with a motorcycle had had on their opinion.

Table 26. Motorists' opinions of motorcycles and motorcyclists

| Opinion | Per Cent |
|--|----------|
| The cycles and riders are all right | 22 |
| The cycles are all right--the operators may
or may not be all right | 31 |
| I don't like cycles but the operators may
be all right | 28 |
| I don't like cycles or cvclists! | 19 |

Safety apparel/equipment

As a measure of the motorists' safety consciousness, they were asked if they were wearing a seat belt at the time of the accident. Nearly one-third of the cars did not have seat belts (which, according to state law, some should have had). In cars where seat belts were available, 27% of the drivers were wearing them.

Few motorcyclists (8%) were wearing a safety helmet. However, 66% stated they would wear one in the future; and several had obtained one prior to the interview.

2000

2001

2002

2003

2004

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2023

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2025

2026

Alcohol and driving

Although little evidence was obtained regarding the use of alcoholic beverages by the case study group, their opinions were obtained regarding the number of glasses of beer they believed they could imbibe before their driving would be affected. Of the motorists, 25% did not know how many beers it would take to affect their driving. Forty-four per cent stated that it would take but one or two to affect their driving, 16% said three to five, and 12.5% said six or more. Motorcyclists believed it would take fewer drinks to affect their riding a motorcycle than it would their car driving. Nearly one-third believed that one to two drinks would affect their riding but that they could handle two to three beers before driving a car. Fourteen per cent stated three to four drinks for riding and four to five drinks for driving, but 36% believed they could handle five to six beers when riding and more than that when driving.

Few motorcyclists insured

Of the motorists, 94% stated that they had insurance at the time of the accident. Only 54% of the motorcyclists had insurance. Sixteen per cent of the motorcyclists said that they had not gotten around to it, 10% stated that they could not afford it, and a few mentioned that the insurance would not cover personal injuries anyway. It was not known how many motorcyclists in the total population are without insurance.

Expectations of being in an accident--before and after

Tables 27 and 28 show the degree of awareness the subjects had towards the possibility of being involved in an accident before and

after the accident.

Table 27. Attitude towards accident involvement prior to the accident

| Attitude | Motorcyclists | | | Motorists | |
|------------------------------------|---------------|-------------|-------------------|-----------|----------|
| | One-vehicle | Two-vehicle | Combined Per Cent | No. | Per Cent |
| No, I drove carefully | 6 | 3 | 18 | 10 | 31 |
| No, never thought of it | 2 | 5 | 14 | 7 | 22 |
| Yes, it could happen | 0 | 9 | 18 | 7 | 22 |
| Yes, it's on every-one's mind | 2 | 6 | 16 | 4 | 13 |
| Yes, I'd had a close call recently | 1 | 4 | 10 | 1 | 3 |
| Yes, I've had other accidents | 3 | 1 | 8 | 2 | 6 |
| Yes, the way people drive | 3 | 4 | 14 | 1 | 3 |
| Yes, the way I ride | 1 | 0 | 2 | .. | .. |
| | | | 68 | | 47 |

Accepted
possibility

Table 28. Attitude toward being in an accident after involvement in this accident

| Attitude | Motorcyclists | | | Motorists | |
|---|---------------|-------------|-------------------|-----------|----------|
| | One-vehicle | Two-vehicle | Combined Per Cent | No. | Per Cent |
| No, I don't think so | 0 | 1 | 2 | 4 | 13 |
| No, I drive carefully | 3 | 5 | 16 | 0 | 0 |
| No, unless another person causes it | 3 | 3 | 12 | 5 | 16 |
| Yes, I had this one and it could happen again | 4 | 2 | 12 | 2 | 6 |
| Yes, I've had other accidents--I could repeat | 0 | 0 | 0 | 1 | 3 |
| Yes, the way people drive | 2 | 3 | 10 | 2 | 6 |
| Yes, it is possible | 5 | 18 | 46 | 18 | 56 |
| Yes, the way I ride | 1 | 0 | 2 | .. | .. |
| | | | 70 | | 71 |

Accepted
possibility

Ways the accident could have been prevented

In order to provide the subjects with an opportunity to accept blame for the accident or to project blame upon another person or upon governmental officials, they were asked how they believed their accident could have been prevented. Their responses are reported in Table 29.

Table 29. Ways the accident could have been prevented

| Preventive Measures | Motorcyclists in
18 One-Veh. Acc. | In 32 Two-Veh. Acc. | |
|--|--------------------------------------|---------------------|-----------|
| | | M'cyclists | Motorists |
| Watch out for cycles ^a | . . | . . | 2 |
| I should have watched out ^a | 6 | 6 | 5 |
| I should have slowed ^a | 1 | 3 | 0 |
| I should have practiced
off the street ^a | 1 | 1 | . . |
| The vehicle should have
been in better shape ^a | 1 | 1 | 0 |
| I should not have ridden
in the rain ^a | 1 | 0 | . . |
| Motorists should be more
alert ^b | 1 | 10 | . . |
| Cyclists should be more
alert ^b | . . | . . | 17 |
| Needed: traffic light or
some sign (yield; stop) ^c | 2 | 5 | 3 |
| A better road is needed ^c | 2 | 2 | 2 |
| Allow only one on a cycle | . . | . . | 1 |
| Do away with cycles | . . | . . | 1 |
| Cycles should have light on | . . | 0 | 1 |
| I do not know how it could
have been prevented | 3 | 4 | 0 |

^aAcceptance of personal responsibility is shown in 28 responses.

^bBlame is placed upon the operator of the other vehicle in 28 responses.

^cIt is reported later that in nine instances shortcomings were found to exist at the accident site.

Riding/driving differently after the accident?

Subjects were asked whether or not they were driving or riding any differently following the accident. Of the motorists, 59% thought they were driving differently, whereas 76% of the motorcyclists still riding (or planning on riding again) reported that they were riding (or would ride) differently as a result of having been in the accident. Table 30 reveals their responses.

Table 30. "Are you driving/riding differently as a result of the accident?"

| Response | Motorcyclists in
18 One-Veh. Acc. | In 32 Two-Veh. Acc. | |
|--|--------------------------------------|---------------------|-----------|
| | | M'cyclists | Motorists |
| No | 7 | 1 | 13 |
| Yes, more carefully | 2 | 12 | 8 |
| Yes, more slowly . . | 2 | 3 | 1 |
| Yes, watch road
surface carefully | 2 | 2 | . . |
| Yes, watch for cars | 0 | 3 | . . |
| Yes, watch for cycles | . . | . . | 10 |
| I'm not riding any-
more (some might) | 5 | 11 | . . |

Motorcyclists continue to ride following the accident

Motorcyclists were asked whether or not they were still riding, and if not, why not. Table 31 reveals that 82% indicated that they were still riding or that they would ride again.

Would a refresher driving course be beneficial

All subjects were asked whether or not they might benefit from a defensive driver course for experienced drivers patterned after the

Defensive Driver Course of the National Safety Council (wherein eight hours of class instruction highlights ways of avoiding accidents). Of the thirty motorcyclists who had completed a high school driver education course, twenty-two said that they would benefit from a refresher course. Of twenty motorcyclists who had not taken a driver education course, eleven said they would benefit from a refresher course.

Table 31. "Are you still riding a motorcycle?"

| Response | No. | Per Cent |
|---|-----|----------|
| Yes | 26 | 52 |
| No, but I will when the cycle is repaired | 5 | 10 |
| No, but I will when I am healed | 3 | 6 |
| No, but I will eventually | 7 | 14 |
| No, I can't risk it--a car is safer | 5 | 10 |
| No, I don't like a cycle | 2 | 4 |
| No, I can't handle a cycle | 2 | 4 |

Of the nine motorists who had driver education, seven believed such a course would be desirable. Of the twenty-three who had not taken a driver education course thirteen stated that they would benefit from a refresher course. Those with school training apparently saw the value in retraining, but those without school training doubted the value of a refresher course.

New motorcyclists and drivers should receive formal driver education

Responses were given relative to the efficacy of driver education for beginning motorcyclists and new automobile drivers and to a

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possible educational program requirement for licensing motorcyclists. Motorcyclists and motorists were in accord (88% and 87% respectively) that new drivers should take a driver education course. Table 32 shows that motorists and motorcyclists believed that motorcycle education for aspiring motorcyclists would be of considerable importance.

Table 32. Is motorcycle education desirable for motorcyclists and should it be required for licensing motorcyclists?

| Response | Motorcyclists | | Motorists | |
|--|---------------|----------|-----------|----------|
| | No. | Per Cent | No. | Per Cent |
| Education, yes; license requirement, yes | 35 | 70 | 26 | 78 |
| Education, yes; license requirement, no | 10 | 20 | 1 | 3 |
| Education, no; license requirement, yes | 1 | 2 | 1 | 3 |
| Education, no; license requirement, no | 4 | 8 | 5 | 16 |

Part 3: Factors Contributing to the Accidents
as Analyzed Case by Case

Responses to certain questions in the interview were analyzed, which revealed certain factors that apparently contributed to the accidents. The color slide and the accident site investigation also revealed contributing factors.

Those factors found to reside in the vehicle operator are reported in Table 33.

The categories from Table 33 are reported in depth in Table 34.

In addition to operator factors that apparently contributed to the accidents, there were two other categories: other factors,

and roadway and signing deficiencies. These appear in Tables 35 and 36 respectively.

Table 33. Operator factors that apparently contributed to the accidents

| Category | Motorcyclist
(50 acc.) | Motorist
(32 acc.) | Total |
|--|---------------------------|-----------------------|-------|
| 1. Perceptual errors | 20 | 14 ^a | 34 |
| 2. Distractions (visual and passenger) | 29 | 2 | 31 |
| 3. Improper response with vehicle controls, balance of cycle, lane positioning | 26 | 0 | 26 |
| 4. Mental state (elated, upset, preoccupied, harried) | 14 | 5 | 19 |
| 5. Physical state (ill, tired, had been drinking) | 4 | 2 | 6 |
| 6. Inexperience | 13 | 1 | 14 |
| 7. Poor judgment | 7 | 1 | 8 |
| Totals | 113 | 25 | 138 |

^aIf the case study group had had a greater number of instances where automobiles turned left in front of the motorcyclists, it is believed that motorists' perceptual errors in particular would have been more pronounced.

Contributing factors (including all categories) ranged from one to seven in each accident. There was a mean of 3.06 identifiable factors which apparently contributed to one-vehicle accidents. There was a mean of 3.62 factors in two-vehicle accidents. Motorcyclists'

Table 34. Specific operator factors that apparently contributed to the accident

| Part 1: Motorcyclists | | | |
|---|-------------|-------------|----------------|
| Factors | One-Vehicle | Two-Vehicle | Total |
| <u>Perceptual Errors</u> | | | |
| Saw motorist--believed motorist saw him | . . | 8 | 8 ^a |
| Misinterpreted motorists' action/inaction | . . | 8 | 8 ^a |
| Did not see motorist | . . | 1 | 1 |
| Saw motorist too late | . . | 2 | 2 |
| Ignored motorists' signal | . . | 1 | 1 |
| <u>Distractions</u> | | | |
| Other traffic | 4 | 3 | 7 |
| Defect on cycle | 5 | 1 | 6 |
| Another friend on a cycle | 1 | 4 | 5 |
| Gauges or controls on own cycle | 3 | 2 | 5 |
| Passenger | 1 | 1 | 2 |
| Non-traffic object | 1 | 3 | 4 |
| <u>Improper Response with Vehicle</u> | | | |
| Used rear brake only--should have used both | 1 | 8 | 9 |
| Controls used improperly or not at all | 2 | 4 | 6 |
| Position in traffic lane poor | 4 | 2 | 6 |
| Passenger movement induced loss of control | 0 | 2 | 2 |
| Did not lean enough for turn | 0 | 1 | 1 |
| Used front brake during turn | 0 | 1 | 1 |
| Improper gear for low speed | 0 | 1 | 1 |
| <u>Mental State</u> | | | |
| In a hurry to get to destination | 0 | 5 | 5 |
| Emotionally elated (d); upset (1) | 2 | 2 | 4 |
| Motorist honked and startled cyclist | 2 | 0 | 2 |
| Cycle defect angered, irritated | 1 | 1 | 2 |
| Mailing letter on mind | 0 | 1 | 1 |

^aThis is believed to be underrepresented due to the fact that only 12.5% of the two-vehicle accidents in the case study group reported an automobile turning left in front of a motorcycle. In the entire accident population it constituted 25% of the two-vehicle accidents.

Table 34--Continued

| Part 1: Motorcyclists | | | |
|--|-------------|----------------|-------|
| Factors | One-Vehicle | Two-Vehicle | Total |
| <u>Physical State</u> | | | |
| Had been drinking | 2 | 0 | 2 |
| Tired | 1 | 0 | 1 |
| Injured--ignored faint feeling--
passed out | 1 | 0 | 1 |
| <u>Inexperience</u> | | | |
| Less than three months' riding
experience | 3 | 4 | 7 |
| First or second time on cycle (not
included in three months category) | 3 | 3 | 6 |
| <u>Poor Judgment</u> | | | |
| Speed too fast for existing con-
ditions | 4 | 2 | 6 |
| Tried to turn before motorist
started | . . | 1 | 1 |
| Motorcyclists totals--18 one-vehicle,
32 two-vehicle | 41 | 72 | 113 |
| Part 2: Motorists | | | |
| <u>Perceptual Errors</u> | | | |
| Did not see cycle | | 4 ^a | |
| Saw cycle--believed could make
maneuver | | 2 | |
| Saw cycle too late | | 8 ^a | |
| <u>Distractions</u> | | | |
| Passenger | | 1 | |
| Non-traffic object | | 1 | |

^aSee remark for (a) at bottom of page 74.

Table 34--Continued

| Part 2: Motorists | | | |
|---|-------------|-------------|-------|
| Factors | One-Vehicle | Two-Vehicle | Total |
| <u>Mental State</u> | | | |
| Exams on mind | | 2 | |
| In a hurry to arrive at destination | | 1 | |
| Emotionally elated | | 1 | |
| Mind on new job site | | 1 | |
| <u>Physical State</u> | | | |
| Tired | | 1 | |
| Driving without required eye glasses | | 1 | |
| <u>Inexperience</u> | | | |
| Less than three months of driving | | 1 | |
| <u>Poor Judgment</u> | | | |
| Speed too fast for conditions | | 1 | |
| Motorists' totals--32 two-vehicle accidents | | 25 | |
| Grand Totals | 41 | 97 | 138 |

errors were more predominant than were motorists' errors. It was believed that there are several reasons why contributing factors to accidents were attributed to motorcyclists more often than to motorists.

1. Motorcyclists were less experienced as operators of vehicles and presumably less able to intelligently diagnose traffic situations than motorists.

2. Motorcyclists had relatively little experience as motorcyclists and were more likely to commit handling errors than were the more experienced motorists.

Table 35. Other factors that apparently contributed to the accident

| Factors | One-Vehicle | Two-Vehicle | Total |
|---|-------------|-------------|-------|
| <u>Motorcyclists</u> | | | |
| Other traffic blocked a swerving path | 0 | 2 | 2 |
| Curb or other object made accident worse or inescapable | 4 | 2 | 6 |
| Rain | 1 | 0 | 1 |
| Dog ran out | 1 | 0 | 1 |
| Gravel made accident worse | 2 | 1 | 3 |
| No mirror on cycle--hindered traffic check | 0 | 1 | 1 |
| <u>Motorists</u> | | | |
| Did not see cycle due to other cars | | 3 | 3 |
| Other traffic blocked a swerving path | | 1 | 1 |
| Totals | 8 | 10 | 18 |

Table 36. Roadway and signing deficiencies that apparently contributed to the accident

| Factors | One-Vehicle | Two-Vehicle | Total |
|--|-------------|-------------|-------|
| Gravel on paved roadway | 1 | 1 | 2 |
| Poor intersection geometrics | 1 | 0 | 1 |
| Bump in road | 1 | 2 | 3 |
| Traffic control or warning sign inadequate (8); knocked down (1) | 3 | 6 | 9 |
| Totals | 6 | 9 | 15 |

3. In two-vehicle accidents motorcyclists generally saw motorists before they were seen by motorists. This allowed them more time to commit handling errors more often than motorists.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

This study was conducted to determine whether or not common factors which may have contributed to motorcycle accidents could be discovered. Since police accident reports lacked certain important information relative to such a quest, the case study method of investigation was undertaken.

Of 132 motorcycle accidents that occurred during May through August, 1967, in Boone, DeKalb and Winnebago Counties in Illinois, approximately every second reported accident was investigated until a study sample of fifty cases was obtained. Persons involved in the accidents were interviewed. Following the interview, each case study site was investigated, photographed, and analyzed.

Data for 132 accidents were tabulated and analyzed by computer to compare accident report data with earlier motorcycle accident studies based upon accident reports conducted in the United States. Driver record data obtained from the Secretary of State of Illinois were also analyzed.

Much of the data from the case studies were analyzed by computer in a search for common factors that may have contributed to the accidents. Then a case by case analysis followed utilizing computer analyzed and non-computer analyzed responses in a search for interrelated factors in each case separately and corporately.

Summary of Results

The age of motorcyclists involved in the 132 accidents closely compared with earlier studies, and the age of motorists involved very closely matched the age distribution for all reported motor vehicle accidents in the United States in 1966.

Nearly three-fourths (100) of the 132 accidents involved a motorcycle and another vehicle. In 25% of the two-vehicle accidents, motorists turned left in front of motorcyclists and were given traffic citations more frequently than were motorcyclists. When one vehicle cut another off, the motorist was the guilty party 92% of the time.

Summary of Case Study Findings

Summary of coded data

Of the motorcyclists, 64% had completed a high school driver education course, and 31% of the motorists had. Motorcyclists' median age was 19 years, motorists 28 years.

Fifty per cent of the motorcyclists had less than one year's experience with a motorcycle and one-third of that group had less than one month's experience. Seventy per cent of the motorcyclists owned the machine they were riding, and 4% had rented it. The motorcyclists had relatively new machines (76% were 1965-1967 models) and rode them mainly in town. As a rule, the older the motorcyclist the larger his motorcycle. Forty-three per cent of the motorcyclists had owned another motorcycle previously.

Fewer than one-half of the motorists involved in accidents with motorcyclists had experience in operating a motorcycle.

Both motorcyclists and motorists reported previous traffic violations closely to what official state records reported. However, accident involvement was reported more frequently during interviews than driver records revealed. Though motorcyclists averaged less than one-third the driving experience of motorists, they had accumulated a greater number of moving traffic violations than motorists. Accident involvement was correspondingly greater for motorcyclists as was official action taken by the state against their driving privileges.

Of the motorcyclists, 42% reported having numerous close calls and accidents during the month before the accident; but only 3% of the motorists did. The total two-vehicle accident incidence revealed that 25% of the motorists had turned left in front of the motorcyclists.

Trip origins and destinations for all operators were similar; however, motorists were often better acquainted with the route.

Black motorcycles appeared to be underrepresented in the accidents and red ones overrepresented. No explanation for this was offered, since riding experience had no relationship to color. Motorcyclists' shirts and jackets were varied in color.

Motorcyclists were more likely than motorists to be distracted by both vehicular and environmental phenomena.

In 36% of the cases, motorcyclists rode in the middle of their lane where stopping distances were greater than for either the left or right lane positions due to oil droppings from other types of motor vehicles.

Motorcyclists reported that they generally saw the vehicle with which they collided prior to the accident. Motorists reported they

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seldom saw the motorcycle with which they collided prior to the accident.

In 25% of the cases motorcyclists failed to use their front brake. In 12.5% of the cases they either used various controls incorrectly or did not use the proper control at all.

Safety helmets were worn by only 4% of the motorcyclists. Injury occurred to 88% of the operators and to all passengers. Over 50% of the cases involved injury to the head.

The motorcycle appeared to be mainly a "fun" vehicle according to the interview results. Riding gave motorcyclists a "free" feeling (50%) and an "exhilerated" feeling (26%), although only 26% reported that they believed they permitted their feelings to show in their riding. Carrying passengers resulted in a cautious attitude by 32% of the motorcyclists. This was based primarily upon a perceived sense of extra responsibility towards the passenger. Riding with other motorcyclists gave rise to feelings of freedom (40%) and competitiveness (20%). Several motorcyclists expressed a distinct feeling of boldness when riding with a group; however, a concern for carefulness was expressed by 35% of those who rode in groups. Further evidence of the motorcycle's fun symbol was expressed when responses revealed that an automobile was a cooped up mode of "just transportation" (66%).

Forty-seven per cent of the motorists either did not care for motorcycles, motorcyclists, or both.

Motorcyclists, more often than motorists, believed that several bottles of beer could be consumed without affecting their driving ability.

While 97% of the motorists had their automobile insured, only 54% of the motorcyclists had their motorcycle insured. A feeling of unconcern pervaded the motorcyclists' thinking regarding insurance. Several mentioned that the small machine could do little to others' property and that the high cost of insurance seemed unrealistic. No data were available to determine what percentage of all motorcyclists in the study area had insurance.

In spite of close calls and accidents prior to the case study accident, 32% of the motorcyclists believed that they would not have an accident. A slight majority of the motorists (53%) believed that they would not have an accident. After the accident the motorists' opinion toward not having another accident dropped to 29%, but the motorcyclists' opinion remained unchanged.

Motorists in collision with motorcycles received numerous traffic violations for failure to yield the right of way. However, 35% of the motorists stated that the accident could have best been prevented had the motorcyclists been more alert. Only 17% of the motorists believed that they could have done something to have avoided the accident. Furthermore, 47% of them held a low opinion of motorcycles or motorcyclists. However, 31% of the motorists stated that they were looking for motorcycles after having been in an accident with one. Nearly all operators reported that they drove or rode more carefully following their accident.

Motorcyclists placed the preventive responsibility upon motorists in 31% of the two-vehicle accidents studied. Eighty-two per cent of the motorcyclists stated that they either were still riding a motorcycle or that they would ride one again.

Interviewees who had completed a driver education course believed that they could benefit from a refresher driving course, but those without driver education generally thought not. Nearly 90% of those interviewed believed that driver education for all new drivers, special motorcycling education courses for motorcyclists, and special licensing procedures for motorcyclists were sound ideas.

Summary of case-by-case analyses of factors contributing to motorcycle accidents

One-vehicle accidents were found to have a mean of 3.06 identifiable factors contributing to each accident, according to a careful case-by-case analysis of data from interviews and accident sites. Two-vehicle accidents were found to have a mean of 3.62 factors.

Motorcyclists had more contributory factors per accident than did motorists. Definitive data did not determine why this was so. However, the motorcyclists were inexperienced with motorcycles; they used their controls inappropriately, and they were easily distracted. For motorists, perceptual errors were most common.

From the interview data and from remarks made by motorcyclists and motorists during the interviews, several conclusions were drawn regarding motorcyclists and motorists in this study:

1. Motorcyclists apparently had a low perspective of the requirements that driving demands, particularly in the way of attention, perception (understanding), and predicting other drivers' moves. Furthermore, they assumed that if they could see others they could also be seen.

2. Motorcyclists were not appreciative of the handling complexities involved in operating a motorcycle, particularly with respect to the

appropriate use of the brakes and to properly positioning the motorcycle in the traffic lane in order to be seen and to stop quickly if necessary.

3. Motorcyclists were deeply involved in the emotional satisfactions derived from the machine and were not, therefore, in an appropriate mental state to adequately handle the driving complexities of the primarily urban areas in which they were riding.

4. The relative inexperience of motorcyclists as the driver of an automobile and considerably less experience as an operator of a motorcycle caused all of the above to be more serious. Even if they could have handled the machine properly, they seemed to repeatedly "read" the driving scene improperly. They did not regard potentially hazardous situations seriously enough.

5. Motorists were genuinely surprised at either their failure to see the motorcycle with which they collided, or with their failure to have seen it in time to have avoided the accident. When accident site investigations were made, it was frequently observed that even at low-volume intersections several motorists (and an occasional motorcyclist) drove through with little (and sometimes no) visual inspection for possible cross traffic.

6. Motorists said repeatedly that they were accustomed to looking for cars and trucks but not for motorcycles. They wished motorcycles were easier to see.

7. Motorists often commented that the wild motorcyclists annoyed them. A few motorists openly despised motorcyclists.

Recommendations for Further Study

It is believed that the following recommendations might bring about viable solutions to the motorcycle roadway accident problem.

1. A case study of motorcycle accidents might be carried out with a team of persons representing several professions. Immediately following an accident, they might investigate those elements involved in pre-accident, accident, and post-accident events. Such a team might properly include specialists in psychology, medicine, motor vehicle accident investigation, sociology, traffic engineering, and education.

2. Driving records revealed that the average number of traffic violations for motorcyclists was greater than for motorists. Therefore, it is suggested that a study be made to determine (1) whether motorcyclists have more traffic violations than do non-motorcyclists (for all age groups), (2) what proportion of the motorcyclists violations were received on motorcycles and what proportion were received in other motor vehicles, and (3) what comparisons exist between young motorcyclists and non-cyclists under twenty-five years of age with respect to traffic violations. To be meaningful, such a study must be controlled for exposure (mileage, geographical locus of driving, and the reputation of law enforcement agencies).

3. A study of a sample of the motoring public's regard for motorcycles and motorcyclists is recommended. Should as many as one-half of the motorists have a dislike for motorcycles and/or motorcyclists (as was found in this study) it would be of value to discover why, and what might be suggested as possible remedies to the situation.

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4. This study revealed that motorcyclists apparently did not recognize hazards, and that when they did, they often responded inappropriately. Therefore, it is recommended that educators and driver licensing officials conduct research dealing with motorcyclists' recognition of traffic hazards and their methods of reacting to them.

5. A most interesting study would be one of motorcyclists' and non-cyclists' personalities and behavior. A personality inventory might aid in first determining whether or not motorcyclists and/or non-motorcyclists may be classified into identifiable groups (a criteria development project). If they could be, then a longitudinal study might follow to determine whether or not potential motorcycle users may be identified.

6. A study to determine an effective method of making motorcycles more visible from the front and the rear is recommended.

7. For the benefit of researchers and consumers of research, two words of caution are suggested:

a. Official driving records should be viewed suspiciously for the demonstrated reason that accident data are likely to be highly unrepresentative of drivers' actual accident involvement. Police and court uniformity may vary making traffic violation comparisons questionably valid.

b. Police accident reports should not be relied upon heavily as a source of accident data unless the quality of accident reporting in the particular jurisdiction is known to be of a high quality. Even then much important data necessary for the establishment of sound accident prevention programs are not asked for by typical accident report forms.

It is further recommended that the findings of this study be used cautiously, inasmuch as the sample size included but fifty cases and was regarded at its inception to be an experimental search for common factors contributing to motorcycle accidents.

Discussion

Studies are necessary to scientifically test the validity of suggested solutions to the motorcycle accident problem. However, in the meantime apparently positive efforts must be initiated until the evidence of basic research is at hand.

Some positive suggestions for the motorcycle accident problem occurred during the course of the study. Others came to light after reviewing the findings of the study. Several suggestions that might be initiated at this time are reported below.

1. Motorists must be educated to a real awareness of motorcycles and to an acceptance of their responsibility toward them. The observed failure of many motorists (and motorcyclists, too) to visually scan intersections prior to entering led to a belief that many accidents are due mainly to inattention on the part of one or more drivers. Motorists must be taught to look for motorcycles. The various media could mount a campaign to attack that careless practice which is compounded when a small vehicle such as a motorcycle is present.

2. High school driver education courses should include information that is essential to the coexistence of automobiles and motorcycles. Included should be critical automobile-motorcycle points of conflict, such as an automobile turning left in front of a motorcycle, an automobile emerging in front of a motorcycle from crossroads and

driveways, an automobile and a motorcycle overtaking one another, and a motorcycle following an automobile too closely or overtaking it on the right. While efforts to improve motorists' awareness of motorcycles may be successful, the motorcyclist must never forget that a moment's inattention on his part may well result in an injury far worse than that suffered by a motorist in an accident.

3. In the high school driver education course, it should be made clear that the task of properly operating a motorcycle is a complex one. The many dangers involved in riding in traffic and the ever-changing road surface conditions should be mentioned in particular.

4. Through public information and through the schools, there must be successful attempts to alert motorists to the fact that motorcyclists are often emotionally involved in the satisfactions derived from motorcycles. Therefore, motorcyclists may be less alert and less aware of their traffic responsibilities than when they are driving an automobile. At the same time, efforts must be made so that the social conscience of certain motorcyclists who arouse the animosity of motorists might be improved. Perhaps involving motorcyclists in properly directed small-group discussions might contribute toward that end.

5. Pre-service and in-service motorcycle education courses should be offered by colleges and universities that prepare driver education teachers in order that educators might meet this new educational challenge. Such courses should include riding instruction, since many of today's teachers do not operate motorcycles.

6. Wherever a qualified teacher may be obtained, secondary schools should initiate motorcycle education courses to fulfill a growing need that has been largely unmet in the United States. In addition to developing basic riding skills on off-street practice areas, such courses might emphasize the recognition and avoidance of traffic and road hazards peculiar to motorcycling. The benefits of approved safety helmets and protective clothing should also be stressed.

7. At present the most effective way to improve the frontal visibility of a motorcycle in daylight is to turn on the headlight. This practice was followed by virtually none of the motorcyclists in this study. At night motorcycles tend to blend with automobiles that are in front of, and behind, them. Manufacturers of motorcycles must develop methods to improve the visibility of motorcycles from the front and rear. In the meantime, motorcyclists must be aware of their limited visibility and ride with their headlight on.

In our society, learning to ride a motorcycle is not as important as learning to drive an automobile. For that reason, many people believe that motorcycle education is relatively unimportant. However, many people do occasionally ride motorcycles; and they should be afforded the opportunity to receive proper instruction. All motorists share the road with motorcyclists, so they must learn the essentials necessary for coexistence on our streets and highways.

APPENDIX A

**INTERVIEW FORM FOR CASE STUDIES OF MOTORCYCLE
ACCIDENTS IN BOONE, DEKALB AND
WINNEBAGO COUNTIES IN THE
STATE OF ILLINOIS**

INTERVIEW FORM FOR
CASE STUDIES OF MOTORCYCLE ACCIDENTS
IN BOONE, DEKALB AND WINNEBAGO COUNTIES
IN THE STATE OF ILLINOIS

Case # _____ M A Accident Site _____

Numbers preceded by the letter M are for motorcycle operators only.
Numbers preceded by the letter A are for automobile and/or truck
operators only.

1. Sex _____ 2. Age _____ 3. Education (highest grade) _____
Now in school? _____
4. Job experience:
 - a. Present occupation _____
 - b. How long employed there? _____
 - c. How many jobs have you held in the last five years? _____
5. How did you learn to drive an automobile?
 - ___ a. Family or friend
 - ___ b. High school driver education: Class _____ Driving _____
 - ___ c. Self
 - ___ d. Commercial driving school
6. How old were you when you learned to drive? _____
- M 7. How did you learn to ride a motorcycle?
 - ___ a. Family or friend
 - ___ b. Self
 - ___ c. Motorcycle dealer
 - ___ d. Other _____
8. Could you tell me how the accident happened, beginning just a few minutes before the accident?

Checklist for the accident:

- a. What time of day did it happen? _____ A.M. P.M.
- b. What was the light condition? _____
- c. What was the weather? _____
- d. Type of road surface _____
 - (1) If gravel or dirt, was it hard? _____ loose? _____
 - (2) If concrete or asphalt, was there any gravel or dirt on it? _____
- e. If on concrete or asphalt, do you remember in what part of the lane you were riding? _____
- f. How many lanes of travel were there? 2 3 4 4 divided
- g. One way street? _____
- h. Were there bumps or ruts? _____ If so, were you concentrating on them? _____
- i. Was the road level slight grade steep grade
a hill crest a dip
- j. Was the road straight slight curve sharp curve
other _____

- M 9. Did you have your headlight on at the time of the accident? _____
- M 10. How frequently would you say you ride with your headlight on during the day? a. always b. usually c. rarely d. never
11. Show (on form provided) the position of the vehicle(s) when you first realized that you were in trouble.
12. What told you that you were in a tight spot?
13. What was your speed then? _____ mph
14. Were you: a. at a constant speed b. slowing c. speeding up
15. What did you do to avoid the emergency?
16. Then what happened?
17. Did any surrounding condition (road shoulder, trees, ditch, other) make the accident worse after you realized you had no way out?
- A 18. Were there any passengers with you? _____ If so, what was their relationship to you?
- M 19. Was there a passenger with you?
- a. If so, what was the relationship to you? _____
 - b. Was the passenger holding onto you _____ the hand strap _____ other _____
 - c. Was the motorcycle designed for a passenger? _____
 - d. Did the motorcycle have passenger footrests? _____
 - e. Was the passenger riding side saddle? _____

20. Do you recall any distractions (inside the car/on the motorcycle) that affected you? If so, what?
- A 21. Was there any object in the car that hindered your vision?
22. Was there anything around you such as signs, people, an address you were seeking, or other cars, motorcycles, etc., that took your attention from your driving/riding? _____ If so, what?
23. Was your view of the surrounding area or of any struck vehicle reduced in any way just before the accident? _____ If so, how?
24. Were you confused by:
- a. Signs _____ Or lack of signs _____ How? _____
 - b. Signals _____ How? _____
 - c. Highway markings _____ Or lack of markings _____ How? _____
25. What was the legal speed limit at the location of the accident?
26. Where did your trip begin? a. home b. school c. work
d. other _____
27. Where were you going?
28. What were you going to do when you arrived?
29. Did you make any stops on this trip?
30. How long did you drive before the accident? a. Total _____
b. Since the last stop _____ c. Hours during the previous
24 hours _____
- M 31. How long did you ride before the accident?
- a. Total _____ b. Since the last stop _____ c. Hours during the
previous 24 hours _____
32. How familiar were you with the route you chose?
33. Why did you choose that route?
- M 34. Motorcycle; what make, model, year and color?
Make _____ Model _____ Year _____ Color _____
- M 35. What tread does the tire have? Front _____ Rear _____
- M 36. How long have you ridden a motorcycle? Years _____ Months _____
Weeks _____
- M 37. How old were you when you learned to ride a motorcycle? _____

M 38. Was the motorcycle:

- ☐ a. Your own
- ☐ b. Relative's
- ☐ c. Friend's
- ☐ d. Rental agency's
- ☐ e. Other _____

M 39. If not your own, did you ride it often? _____
How relaxed did you feel with it?

M 40. How many miles a year do you ride?

- a. Less than 1,000 b. 1,000-2,000 c. 2,000-3,000
- d. 3,000-5,000 e. _____

M 41. What purposes do you have for riding a motorcycle? a. Commuting
b. Fun--town c. Fun--country d. Fun--trailing

M 42. Have you owned other motorcycles? _____ If so, how many? _____

M 43. Do you own a car? _____ If so, what make _____ Model _____
Year _____

A 44. Car driver; what make, model, year, color?
Make _____ Model _____ Year _____ Color _____

A 45. Was the car your own? _____ If not, did you drive it often? _____
How relaxed did you feel with it?

46. How long have you driven a car? (All respond)
a. Years _____ b. Months _____ c. Weeks _____

47. How many miles a year do you drive?
____ a. Under 3,000 ____ b. 3,000-5,000 ____ c. 5,000-10,000
____ d. 10,000-20,000 e. _____

M 48. Do you have a rearview mirror on your motorcycle? _____ If so,
how many? _____ Is it a flat faced or convex mirror? F C

M 49. Was any of the motorcycle equipment modified? _____
If so, what item(s)?

M 50. How do you feel when you ride a motorcycle?

- a. Why do you suppose you feel this way?
- b. How does it show in your riding?

M 51. How do you feel when you have a passenger riding with you?

- a. Why...?
- b. Does it show in your riding? How?

- M 52. How do you feel when riding with several other cyclists?
- Why...?
 - How does it show in your riding?
- M 53. Does driving a car make you feel the same way as when you are riding a motorcycle?
Why, or why not?
54. A. Was there anything on your mind the day of the accident that caused you to feel elated, worried, or anxious? (Financial loss, disappointment, argument, reprimand, family illness)
- Or something that had happened not long before that day, or perhaps something that would happen in a day or two?
55. How many hours of sleep did you have the night before the accident?
56. On the day of the accident, would you say there was anything unusual about the way you spent your time before the accident?
57. Were you sick or injured within a day or two before the accident?
If so, what happened?
58. Had you had any accidents or close calls during the month before this accident?
59. Are you bothered by such things as:
- | | |
|-----------------------------|------------------------|
| a. Dizzy spells _____ | d. Bad headaches _____ |
| b. Nervous spells _____ | e. Eye problems _____ |
| c. Hearing difficulty _____ | f. Other _____ |
60. Were you taking any medicine (drugs) on the day of the accident? ____
If so, what kind? _____ What was it intended to treat?
_____ Was it on the order of a physician?

61. Did you have any alcoholic drinks within six hours before the accident? _____ If so, what kind? _____ How many? _____
62. How many drinks does it take to affect your driving? _____
Riding? _____
- A 63. What is your opinion of motorcycles? _____
- A 64. What is your opinion of motorcycle operators? _____

- A 65. Have you ridden a bicycle? _____
66. How many years have you ridden a bicycle? _____
67. At what age did you learn (to ride a bicycle)? _____
68. How long has it been since you last rode a bicycle? _____
- A 69. Have you ever operated a motorcycle? _____ If so, how
extensively? _____ How recently? _____
- A 70. Have you ever been a passenger on a motorcycle? _____
71. Before the accident did you think you might ever have an accident?
_____ Why, or why not? _____
72. Do you think you might have another accident? _____
Why, or why not? _____
73. Did you have insurance at the time of the accident? _____
If not, why not? _____
- A 74. Were you wearing a seat belt? _____ Was one available? _____
- M 75. a. Were you wearing any of these items
at the time of the accident?
- | | | |
|---------------------|------------------------|-------------------------------------|
| (1) Safety helmet | Name _____ Model _____ | Passenger
Name _____ Model _____ |
| | Did it come off? _____ | Did it come off? _____ |
| | If so, why? _____ | If so, why? _____ |
| (2) Leather gloves | | _____ |
| (3) Sturdy shoes | | _____ |
| (4) Sturdy jacket | | _____ |
| (5) Eye protection | | _____ |
| (6) Face protection | _____ Tinted _____ | _____ Tinted _____ |
| | Did it break? _____ | _____ |
- b. If carrying a passenger (yes) (no), was passenger wearing any
of those items? _____
- M 76. Which of these items will you use in the future?
____1 ____2 ____3 ____4 ____5 ____6
- M 77. What color was your jacket, shirt or blouse? _____
- M 78. Was your eye protection dirty or scratched before the accident?
(Or had none) _____

79. Were you injured? If so, what parts of the body?

| | <u>Motorcyclist</u> | <u>Rider</u> | <u>Auto Driver</u> | |
|-------|---------------------|--------------|--------------------|-------|
| Head | _____ | _____ | _____ | _____ |
| Arms | _____ | _____ | _____ | _____ |
| Hands | _____ | _____ | _____ | _____ |
| Legs | _____ | _____ | _____ | _____ |
| Feet | _____ | _____ | _____ | _____ |
| Torso | _____ | _____ | _____ | _____ |
| Back | _____ | _____ | _____ | _____ |
| Neck | _____ | _____ | _____ | _____ |

80. If any passengers, were any injured? (Note above)

M 81. Where did the motorcycle sustain damage?

L _____ R _____ Front _____ Rear _____

A 82. Where did the automobile sustain damage?

L _____ R _____ Front _____ Rear _____

83. Have you ever had another accident with an automobile? _____

84. Have you ever had another accident with a motorcycle? _____

85. Was any previous accident your fault? _____

86. Were you convicted for a violation in any accident? _____

87. Have you any (other) convictions for traffic law violations? _____
If so, what were they for?

88. Is there anything else you would like to tell me about the accident?

89. How do you think such an accident could be prevented?

90. If you had a driver education course, do you feel the elements of your accident were adequately taught in the course?

91. If you did not have driver education...

a. Do you feel you could benefit from a defensive driving (refresher) course?

b. If not, why not?

92. If you did have a driver education course, do you feel you could benefit from a short, say eight hour, refresher course? _____
If not, why not? _____

93. Are you driving (riding) differently as a result of the accident?

94. Do you believe that a special course in operating a motorcycle is desirable?

Motorcyclist _____
Auto driver _____

95. Should there be, in your opinion, a motorcycle licensing requirement that applicants shall have successfully completed a motorcycle operation course?

Motorcyclist _____
Auto driver _____

96. Should new automobile drivers be required to take a driver education course?

Motorcyclist _____
Auto driver _____

- M 97. Are you still riding a motorcycle? _____ If not, do you
think you will ever ride one again? _____ If not, why not?

APPENDIX B
SITE INVESTIGATION FORM

SITE INVESTIGATION FORM

Case # _____

Roadway

1. Type _____
2. Construction:¹ C M G B S _____
3. Surface D W _____
4. Contour
 - a. Linear _____
 - b. Vertical _____
 - c. Horizontal _____
5. Condition _____
6. Shoulder
 - a. At/not at road level _____
 - b. None _____
 - c. Curb _____

Signs

1. Adequate _____
2. Inadequate _____
3. Missing _____
4. Visible _____
5. Hard to read _____
6. Obscured _____
7. Damaged _____
8. Nonstandard _____
9. Location G P _____

Related Accident Data

1. Kind of locality:²

Res R I B F _____
2. Time _____ A P
3. Light _____
4. Weather _____
5. Traffic control _____

COLLISION/CONDITION DIAGRAM

¹C- concrete; M- macadam; G- gravel; B- brick; S- sand.

²Res- residential; R- rural; I- industrial; B- business; F- freeway or tollway.

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