A STUDY OF SELECTED FACTORS RELATED TO ACCIDENT INVOLVEMENT OF MOTORCYCLES IN INGHAM COUNTY, MICHIGAN, IN 1971

By

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A STUDY OF SELECTED FACTORS RELATED TO ACCIDENT INVOLVEMENT OF MOTORCYCLES IN INGHAM COUNTY, MICHIGAN, IN 1971

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Motorcycling has become increasingly popular for transportation and recreation in this country, and, as a result, its growth has been extremely rapid. The year 1964-65 shows the greatest percentage of increase in the registration of two-wheeled vehicles. By the end of 1971 there were 3,293,400 registered two-wheeled vehicles in the United States. Deaths and injuries from motorcycle accidents more than doubled between 1963 and 1967. This fact is particularly alarming when it is understood that most people riding motorcycles are under the age of twenty-five.

The primary purpose of this study was to determine the strength of relationship between selected variables and the severity of the accident using the medical cost as the index for severity.

The secondary purpose of the study was to seek out and show possible causal factors related to motorcycle accidents.

Fifteen case studies were presented to give a better picture of how the motorcycle accidents were

occurring. These case studies were selected by accident category and were typical of all the other accidents. Along with each case study, a situational diagram of the accident was presented.

The sample population of this study consisted of 100 persons who were involved in motorcycle accidents in Ingham County, Michigan, in 1971. They were randomly selected from a total universe of 323. There were 98 males and 2 females in the sample. The data were gathered between March 15, 1972 and August 15, 1972.

The persons who were randomly selected for this study were sent letters of introduction and were telephoned to set up a personal interview. The interview lasted approximately twenty-five minutes. At the time of the interview, the subjects were assured that the information they gave would be confidential.

The subjects ranged from fifteen to seventy-one years of age. All were residents of the state of Michigan and had varying degrees of educational achievement.

The hypotheses were tested by employing the Pearson Product Moment Correlation Test. An appropriate test of significance table for correlation coefficients was used to determine significance at the appropriate degree of freedom. The .05 level of significance was predetermined to be acceptable in this study.

Statistical analysis of the data revealed:

1. No significance was found when the medical costs of the accidents were correlated with any of the seventeen variables.

The major findings of the secondary purpose of the study were as follows:

1. Seventy per cent of the motorcyclists were between the ages of fifteen and twenty-four years.
2. Forty-eight per cent of the motorcyclists had one year or less of motorcycle riding experience.
3. Ninety-five per cent generally rode their motorcycles during the hours of 12-8 P.M. and, during this time, 70 per cent of the accidents occurred.
4. Ninety-three per cent of the motorcyclists said they rode mostly on Fridays, Saturdays, and Sundays.
5. In 95 per cent of the cases the motorcyclists had been riding for a period of two hours or less prior to the accident.
6. Almost one-half (46%) of the motorcycle accidents occurred in a residential area.
7. Fifty per cent of the motorcycle accidents occurred on a two-lane roadway.
8. Ninety per cent of the accidents occurred on a level roadway.
9. Eighty-two per cent of the accidents occurred on a straight roadway.
10. Sixty-three per cent of the accidents occurred during daylight.

11. Ninety-two per cent of the accidents occurred on a dry road surface.
12. Only seven interviewees reported any drinking just prior to the accident, and only one reported using alcohol and drugs.
13. Fifty-one per cent of the motorcyclists reported only one hour of motorcycle riding instruction, and in 58 per cent of the cases, this instruction was given by friends or a motorcycle dealer.
14. One-fourth of the motorcyclists reported receiving one hour of motorcycle instruction in a driver education program.
15. The motorcyclist in 22 per cent of the cases was charged with a violation; the most frequent violation was failure to yield (7).
16. The motorcyclists were asked to give advice on how to avoid the accident they were involved in and in 50 per cent of the cases they reported to ride more defensively, watching out for automobiles.
17. The motorcyclists were asked to give the major cause of the accident in which they were involved in and in 47 per cent of the cases they reported an automobile either pulled out in front of or turned left in front of them.

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CHAPTER I

THE PROBLEM

The motorcycle first appeared in America in the early 1900's, but it was not until the 1950's that the motorcycle began to emerge as a problem in the American traffic system. In 1956 motorcycle registrations in the United States totaled 425,000. Registrations had increased to 575,000 in 1960, and to 660,000 in 1962. Then, in 1964, the number of registered two-wheeled vehicles jumped to about 984,000 and by the end of 1965 to 1,381,000. The year 1964-65 showed the greatest percentage of increase in registration of two-wheeled vehicles. In December of 1971 there were 3,293,400 registered two-wheeled vehicles in the United States.[1] To show the numerical comparison between motorcycles and automobiles in the United States, the motorcycles are outnumbered approximately thirty-five to one. In the United States there is approximately one motorcycle

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[1]National Safety Council, Accident Facts (Chicago: National Safety Council, 1972), p. 56.

in every ten driveways. In the state of Michigan, motorcycle registrations have increased 93 per cent since 1966.[2]

The foregoing statistics, do not of course, indicate how many people are actually riding these machines, and this will not definitely be known until all states have special motorcycle licensing laws. Estimates range from one person per machine to four or five. There are at least two or three million and this has made motorcycles a serious concern in highway traffic safety in the United States.

The death rate in the United States for motorcycle operators in 1971 was estimated to be about 20 deaths per 100,000,000 miles of motorcycle travel. This compared with a death rate of 4.7 for all motor vehicles which included pedestrian and non-occupant deaths.[3]

In the state of Michigan in 1971 the death rate for motorcycle operators per 100,000,000 miles traveled was 28.9. This compared with a death rate of 4.09 for all motor vehicles;[4] thus, the death rate for motorcycle operators is approximately seven times the death rate for all motor vehicle operators.

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[2]Department of State Police, Michigan Traffic Accident Facts (East Lansing: Department of State Police, 1970), p. 14.

[3]National Safety Council, Accident Facts, p. 56.

[4]Department of State Police, Michigan Traffic Accident Facts.

Motorcycling has become increasingly popular for transportation and recreation in this country and as a result its growth has been extremely rapid. Probably the major reason for the increased popularity of motorcycles is the low cost of purchasing and of maintaining such vehicles. The price range is such that every teenager with a part-time job can afford one. The relatively inexpensive cost of both foreign and American-made cycles has resulted in many parents buying them for their children instead of the greater expense of allowing the teenager use of the family car. For the most part the money spent just on automobile insurance for the teenager would pay for a quality cycle. Because of the cost factor involved, many of the younger persons will purchase the small, lightweight motorcycles.

Other contributing factors concerning the increase in motorcycling range from times of national prosperity to population explosion. It is the younger persons who are purchasing, maintaining, and using the millions of motorcycles on our already crowded roads.

This increase in motorcycle population has brought forth many problems to the traffic situation. Deaths and injuries from motorcycle accidents more than doubled between 1963 and 1967.[5] This fact is particularly alarming

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[5]National Safety Council, Accident Facts.

when it is understood that most people are under the age of twenty-five. The motorcycle in the traffic environment takes on grave dimensions in view of the fact that since 1960 the rate of fatalities has increased at about the same rate as the number of motorcycles.

The death rate and injuries of motorcycle operators has been given considerable publicity by many groups and individuals in recent years. Law enforcement agencies, driver licensing authorities, legislatures, doctors, motorcycle dealers, insurance companies, and parents are just some of the groups who are alarmed at the death rate and disabling injuries that are the results of motorcycle accidents.

Theresa Wallach, a motorcycle dealer and motorcycle riding instructor, seems to think that "most accidents happen on the trip home from the motorcycle dealer's place of business. It is Ms. Wallach's contention that no one should ride a motorcycle in traffic until it becomes as automatic as breathing."[6]

Some states are enacting laws to control the licensing of motorcycle operators, but in reality, motorcycle traffic safety legislation is not keeping up with the tremendous growth in motorcycle registrations. Accident record bureaus are reporting increased numbers

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[6]Janet Clark, "Coexisting with the Car: Handy Tips for Two-Wheel Survival," Detroit Free Press, June 6, 1971.

of accidents. Motor vehicle administrators have been urged to develop special licenses for motorcycle operators and special driver examinations for cyclists.

Although persons who drive trucks, buses, and other commercial vehicles are required to have special operator's license and strict government control is required before one can fly an airplane, a check of the licensing and operating laws for motorcycle operator's license for several states revealed a wide variety of minimum insurance coverage, minimum experience and education, and licensing requirements, even though the machines themselves ranged from small-sized, low-powered models to large, powerful machines. The result is that many operators are insufficiently educated and possess only minimal skills in operating motorcycles.

Every state must now offer a comprehensive driver education program in order to meet the standards set forth by the National Highway Traffic Safety Administration. Unfortunately, thousands of young people buying motorcycles are on their own insofar as learning to operate a motorcycle is concerned. This accounts for the large number of accidents involving motorcycle operators during their first few months of operation.

There would seem to be a need for additional legislation as well as some revision of the old legislation regarding the operation of a motorcycle on public highways.

There is a need to update and expand the licensing procedures for persons who operate motorcycles.

It would also seem that there should be more educational programs for persons who are intending to operate a motorcycle. The programs will hopefully become more evident as this study progresses.

Statement of the Problem

The primary objective of the study was to collect and analyze data which would indicate the strength of relationship between seventeen different variables and the severity of the accident, using medical costs as the index of severity. The variables of concern in this study were as follows:

1. Sex
2. Age
3. Educational Level
4. Motorcycle Riding Experience
5. Time of the Accident
6. Type of Roadway
7. Type of Surface of Roadway
8. Highway Condition
9. Weather Condition
10. Alcohol
11. Drugs
12. Alcohol and Drugs
13. Hours of Motorcycle Riding Instruction

14. Wearing a Helmet
15. Wearing Goggles or Face Shield
16. Wearing Boots
17. Wearing Protective Clothing

The secondary purpose of the study was to seek out and show possible causal factors related to motorcycle accidents.

Importance of the Study

With the accidents and injuries to motorcycle operators increasing each year, every feasible method of prevention should be employed to curtail the rate. And, since traffic accidents are far more common than other types of accidents, the necessity for the development and improvement of preventive measures is imperative.[7] Factors involved in motorcycle accidents should be identified so that intelligent recommendations relating to new legislative and educational needs can be made.

Assumption

It was assumed that all the data collected through the personal interviews are true and factual to the best knowledge of the person answering the questionnaire.

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[7]Caroline E. Preston and Stanley Harris, "Psychology of Drivers in Traffic Accidents," Journal of Applied Psychology, XLIX (1965), 284.

Delimitations

This study is intended to provide information derived from motorcycle accidents labeled "traffic" by the law enforcement agencies of Ingham County and the Michigan State Police. These accidents are those which occurred on a public street or highway, or on the right-of-way of a public street or highway. "Non-traffic" accidents are not included as a part of the study because of the possibility of confusing the data about the two when making interpretations. These accidents should be the subject of a separate study. This study, therefore, represents only a part of the overall motorcycle problem.

This study is confined to motorcycle "traffic" accidents that occurred in Ingham County, Michigan, in the year 1971. In addition, the motorcyclist selected for an interview had to be a resident of the state of Michigan.

Definition of Terms

Motorcycle--A two-wheeled cycle with more than five-brake horsepower.

Traffic Accident or Accident--An accident which includes a motorcycle and is deemed by a law enforcement agency to be a "traffic" accident (as opposed to a "non-traffic" accident).

Registration--All motorcycles that are required by Michigan law to be registered with the Secretary of State's Office.

Accident Report--The UD-10 accident report form which is required to be used by all police officers reporting vehicle accidents in the state of Michigan.

Injuries--Only those injuries caused by motorcycle accidents.

Vehicle--(a) Mechanical: moving parts of the machine; (b) Physical: structure of the machine.

Severity of the Accident--Medical costs of the accident.

Causal Factors--Those things that are relevant to the cause of motorcycle accidents.

Road or Roadway--That portion of a highway which is improved, designed, or ordinarily used for vehicular travel, exclusive of shoulder or berm.[8]

Organization of the Study

In Chapter II a review of the pertinent literature will be presented.

Chapter III comprises the design of the study and the methodology involved in the gathering of data for presentation. The universe is described as well as the sample used for personal interviews.

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[8]J. Stannard Baker and William R. Stebbins, Jr., Dictionary of Highway Traffic (Evanston, Illinois: Traffic Institute, Northwestern University, 1964), p. 196.

Chapter IV includes an analysis of the data derived from personal interviews. The data will be presented in tabular form to depict particular relationships and accident facts.

Chapter V will include the summary, conclusions, recommendations, recommendations for further study, and discussion.

CHAPTER II

REVIEW OF THE LITERATURE

In Chapter I the problem of motorcycle accidents was presented along with the definitions, delimitations, and organization of the study. This chapter will contain a review of literature related to motorcycle accidents. The organization of this chapter is as follows: introduction, popularity of motorcycles, factors of accident involvement of motorcycles, the young male, personality factors, age, motorcycle size and accident involvement, visibility of motorcycles, severity of motorcycle accidents, solutions to the problem, and summary.

The literature revealed many studies related to police accident reports and motorcycles. These studies were of a statistical nature. There were also a number of studies conducted in foreign countries as well as in the United States involving the injuries received by motorcycle riders.

Research dealing with exposure to potential hazards, the guilt of motorcyclists in accidents, a motorcyclist's riding experience, and the attitudes of motorcyclists were

generally available from other countries. With one exception, research in these general areas for the most part has not been conducted in this country. Johnson's research was concerned with case studies of motorcycle accidents in three Illinois counties in 1967.[9]

Popularity of Motorcycles

During the years 1954 to 1966, there was a 338 per cent increase in the number of registered motorcycles in the United States.[10] Many prominent authorities in the traffic safety and motor vehicle field felt that by 1970 there would be approximately 1,000,000 motorcycles in the United States. As of 1972, the number of registrations totaled 3,293,400. This would seem to indicate that the popularity of motorcycles increased at a much faster rate than was anticipated a few years ago. Because of low initial cost and economy of operation, light-weight motorcycles now comprise an increasingly significant portion of the total number of motor vehicles in the cities and suburbs of the entire nation.[11]

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[9]Duane R. Johnson, "A Case Study of Motorcycle Accidents in Three Illinois Counties" (unpublished Ed.D. dissertation, Michigan State University, East Lansing, 1968).

[10]D. W. Clark and John H. Morton, "The Motorcycle Accident: A Growing Problem," Journal of Trauma, II (March, 1971), 230-37.

[11]Anthony L. Ellison, "The Motorcycle Problem" (address given at the Southern Safety Conference, Traffic Enforcement Section, Richmond, Virginia, March 6, 1967).

Prior to 1963, motorcycle registrations had not increased very rapidly. Then in 1963 and following, tremendous increases began to take place each year as more and more people were buying motorcycles.[12] In 1967, Yamaha dealers were told that there were 3 million potential motorcycle purchasers in the United States each year.[13] In Los Angeles County alone it was reported that there was one motorcycle for every 169 persons in 1962, but by 1965 it had increased to one motorcycle for every 73 persons.[14]

Factors of Accident Involvement of Motorcycles

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.

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[12]United States Department of Health, Education and Welfare, Motorcycles in the United States--Popularity, Accidents, Injury Control (Washington, D.C.: Government Printing Office, 1966), p. 6.

[13]Universal Underwriters Insurance Company, "Facts on Cycle Safety that Can Help You Sell" (talk delivered at Yamaha Dealer Schools, Kansas City, Missouri, 1967), p. 1.

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

4. Misconceptions relating to the drivers' knowledge.
5. Inaccurate expectancies concerning the actions of other drivers or pedestrians.
6. Social forces.
7. Common factors in uncommon configurations.[15]

Baker evidently explored more deeply than the typically reported drivers' actions, conditions or even violations. In each accident investigation, Baker found an average of 4.3 contributing factors present.[16]

The motorcycle accident situation is serious, is growing, and is reaching epidemic proportions in the United States. The etiological agent, or causal factor, is the machine itself.[17] In 1967 Duane Johnson conducted a case study analysis of fifty motorcycle accidents in three Illinois counties by interviewing both the cyclist and the driver of the other vehicle when another vehicle was involved. There were thirty-two such cases. In thirty-two cases 25 per cent involved a motorist turning left in front of a motorcyclist. When one vehicle cut another one off, motorists were at fault in 92 per cent of the

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[15]J. Stannard Baker, "Case Studies of Traffic Accidents," Traffic Safety Research Review, V (December, 1961), 16.

[16]Leon 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 (June, 1967), 56.

[17]John J. O'Mara, "Motorcycle Accidents--An Epidemic" (paper read before Highway Safety Research Board, National Academy of Sciences, National Research Council, Washington, D.C., January 18, 1967), p. 88.

cases. One-sixth of the fifty motorcyclists had less than one month's riding experience. The motorcyclists' median driving experience was three years, while that of the motorists was ten years. Motorcyclists had greater accident-violation experience than the motorists did.[18]

Johnson also found that motorcyclists often rode in the middle of their lane where grease on the road made stopping more difficult. They failed to use their front brakes in 25 per cent of the cases and occasionally they panicked. Practically none drove with their headlight on during the daylight hours. Only 4 per cent of the motorcyclists wore safety helmets and injury occurred to 88 per cent of the drivers and to all of their passengers.[19]

The California Highway Patrol surveyed 542 motorcycle accidents for equipment modifications in 1969.[20] The following five modifications made by the operator were surveyed: (1) extended front forks, (2) lowered seat, (3) raised foot rests, (4) irregular handlebars, and (5) no front brakes. It was found that about 1.3 per cent of the accidents were due to these equipment modifications.

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[18]Johnson, "Case Study of Motorcycle Accidents," abstract.

[19]Ibid.

[20]Motorcycle Accident Survey (Sacramento: California Highway Patrol, January, 1970), p. 2.

The data indicated that the modifications tended to increase the accident potential, but the number of cases was too small to be conclusive.

Of the motorcycles surveyed, 7.7 per cent had equipment modifications. Only 3.7 per cent of the motorcycles had only one equipment modification while 4.0 per cent had two or more modifications.[21]

Motorcyclists who also drive automobiles were involved in accidents in Oregon. These motorcyclists had a higher accident and moving violation conviction rate during the five years preceding the accident than a random sample of non-motorcyclist male drivers of the same age. This is shown in Table 1. The motorcyclists were very likely cited for speeding in the last police contact preceding the accident studies.[22]

TABLE 1.--Five-year driving record, Oregon males (1957-1962).[a]

	Accidents		Convictions	
Age	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

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

[21]Ibid.

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

In the state of Washington in 1964, speeding violations made up 43.4 per cent of the violations in motorcycle accidents.[23] In 1965 the speeding violations in motorcycle accidents in Washington had dropped slightly to 40.7 per cent.[24]

In Los Angeles, a highly populated urban area, speeding violations made up 9.2 per cent of the violations in 1965, while improper left turns at intersections were 19.3 per cent, and entering a "through" highway were 10.8 per cent.[25]

When motorcyclists were in an accident with another vehicle, the motorcyclists were less likely to be at fault than the motorists according to three studies. It was found that the blame rested with the motorists: 63.9 per cent in Los Angeles County, 70 per cent in the state of Washington, and more than 60 per cent in Toronto.[26]

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[23]Washington State Patrol, Summary of Motorcycle Accidents Occurring in the Rural Areas of Washington 1964 (Olympia: Washington State Patrol, 1965), p. 1.

[24]Washington State Patrol, Summary of Motorcycle Accidents Occurring in the Rural Areas of Washington 1965 (Olympia: Washington State Patrol, 1966), p. 2.

[25]Los Angeles County, "Survey on Motorcycles," p. 3.

[26]Ibid.; "Meeting the Motorcycle Menace," Journal of American Insurance, XLIV (April, 1967), 24; Stuart Munro, "The Deadliest Vehemence" (a paper on Motorcycle Safety, Ottawa Safety Council, Ottawa, Canada, 1967), p. 11. (Mimeographed.)

A study in New York found that in 46.3 per cent of the accidents in which a vehicle and a motorcycle were involved, one vehicle cut the other off. The other vehicles cut off the motorcyclists 83 per cent of the time.[27] On March 21, 1967, the New York Times reported " . . . car drivers rarely grant the motorcyclists the courtesies of safety extended to the other vehicle."[28]

A motorcycle study conducted by Waller et al., at the University of North Carolina at Chapel Hill during the academic year 1966-67, was concerned with the mileage driven by students at the university.[29] Odometer readings were taken several times during the year. From these odometer readings estimates of daily mileage were made. From these readings and estimates the following conclusions seemed to be true: (1) undergraduate students had a greater proportion of high mileage drivers than graduate students, (2) single students had a higher proportion of high mileage vehicles, (3) undergraduate single students had the greatest proportion of high mileage drivers while graduate married students had the least, (4) drivers of

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[27]Department of Motor Vehicles, Accident Facts 1967 (Albany: Department of Motor Vehicles, 1967), p. 18.

[28]Munro, "Deadliest Vehemence," pp. 23-24.

[29]P. F. Waller, Patricia Z. Barry, and W. S. Rouse, Motorcycles. I. Estimated Mileage and Its Parameters (Chapel Hill: The University of North Carolina Highway Safety Research Center, March, 1968), p. 1.

the lighest weight motorcycles traveled less than drivers with heavier motorcycles, (5) students who lived the greatest distance away from campus were more likely to be high mileage drivers than students who lived closer to campus.[30]

Students who were involved in accidents were different from the group as a whole in that many of them were unmarried. High mileage motorcycle operators were involved in more accidents than the other groups.

The findings of this study indicated that motorcycles may travel between 4,500-7,000 miles per year with the greatest number of miles being accumulated in the summer months. But the accident rate per miles driven goes up during the winter months.[31]

A peculiar fact which came out of this study was that even though motorcycle registrations were going up, the fatality rate remained unchanged. A plausible explanation might be, as the study suggested, that a different clientele were now riding motorcycles. Rather than riders who were seeking thrills, the riders nowadays were more interested in inexpensive transportation. One other explanation could be that automobile drivers were becoming more aware of motorcyclists on the roadway. With this new awareness car drivers tended to look for motorcyclists

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[30] Ibid., p. 2.

[31] Ibid., p. 3.

more. Yet another possible explanation could be that manufacturers and franchisers were assisting the customer in terms of educating them in the proper methods of handling motorcycles.[32]

One could possibly categorize factors in motorcycle accidents into the following: traffic law violations by drivers; actions of drivers; physical and psychological condition of the driver; mechanical condition of the vehicle; and environmental conditions. In the state of Wisconsin in 1965, 25.9 per cent of the motorcycle accidents were due to speeding. Listed in the category of "other" and "not specifically defined" was 59.9 per cent. The remaining 14.2 per cent were caused by failing to yield and by following too closely.[33] The state of New York in the year 1962 reported on the causes of motorcycle accidents and the category of reckless driving was the largest containing 36 per cent of the total. Two of the remaining categories were failure to yield and "other" having 20 and 19 per cent respectively.[34] The accident report data from these two states contained very few of the factors previously mentioned that cause and contribute to motorcycle

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[32] Ibid.

[33] Wisconsin Motor Vehicle Department, "Summary--Motorcycle Safety Conference" (unpublished report of conference, Madison, February 15, 1966), p. 1. (Mimeographed.)

[34] Department of Motor Vehicles, Motorcycle Accidents in New York State in 1962 (Albany: Department of Motor Vehicles, 1963), p. 3.

accidents. The factors involved in motorcycle accidents obviously varied in the two states or there were inconsistencies in the accident reporting. More than likely both of the above situations occurred in many instances.

There were no pertinent data found which would reveal the condition of motorcycles that were involved in accidents. Data did reveal, however, that motorcycles were involved in accidents the same day and hour as any other motor vehicle. Motorcycle accidents were most likely to occur on a clear dry day.[35]

The Young Male

Inferences can be made regarding the age and the riding experience of motorcycle operators. Those motorcycle operators who had less than six months riding experience were reported to have almost twice as many accidents as those operators who had more than six months riding experience.[36]

A motorcycle accident study in California in 1968 by Harano and Peck found that the role of age and experience and traffic convictions seemed to be the most

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[35]National Safety Council, Accident Facts, p. 56.

[36]O'Mara, "Motorcycle Accidents," p. 6; Ontario Department of Transport, Motorcycle Accidents in Toronto, An Analysis (Toronto: Department of Transport, 1965), p. 16.

important finding of the study.[37] The regression and chi-square analyses suggested that lack of skill and inexperience were more important in motorcycle accidents than in accidents involving other vehicles.[38] The data also revealed that a person who can drive a car safely may not always be able to operate a motorcycle safely.[39]

A motorcycle accident study conducted in Toronto, Ontario, found that the operators who had new model motorcycles were involved in accidents almost twice the rate of motorcyclists with old model motorcycles.[40] The study also found that more than one-half of the operators of new motorcycles had not qualified for a regular operator's license.[41] In Wisconsin a study reported nearly one-half of the motorcyclists who were killed had borrowed or rented the motorcycle.[42]

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[37]Richard M. Harano and Raymond C. Peck, The California Motorcycle Study: Driver and Accident Characteristics (California: California State Department of Motor Vehicles, Division of Administration, July, 1968), p. 22.

[38]Ibid. [39]Ibid.

[40]Ontario Department of Transport, Motorcycle Accidents in Toronto, p. 7.

[41]Ibid., p. 10.

[42]Universal Underwriters Insurance Comapny, "Facts on Cycle Safety," p. 3.

Licensing procedures for motorcycle operators varied greatly from state to state and in the Canadian provinces.[43] This fact was determined by an opinion survey conducted by the American Association of Motor Vehicle Administrators. Some states required special motorcycle endorsements whereas others required special testing procedures.

In Oregon, a person must take his regular driver's license examination for a four-wheeled vehicle and then he must complete an exam for the motorcycle endorsement.

Persons in Maine sixteen years of age or older who have valid operator's license can apply for a permit to operate two-wheeled vehicles and must appear for a road test within one year. Hawaii, New York, and Vermont all required special examinations and special licenses for motorcycle operators. Also, in New York a person must not only supply a motorcycle, but in addition, the applicant must provide a passenger car and a licensed driver to transport the examiner for the road test.

In Manitoba, legislation is being considered that would provide for a thirty-day instruction permit for motorcycle operators including a special license. British Columbia presently requires a special examination and a

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[43]"Motorcycling Licensing Procedures Vary Opinion Survey Reveals," AAMVA Bulletin (June, 1966), 4.

special license. The motorcyclist is also required to wear a safety helmet.[44]

Motorcycle accident patients in two Minneapolis, Minnesota hospitals reported 70 per cent of them had rented or borrowed the motorcycle and that 20 per cent of them were taking their first or second ride.

The role of inexperience in motorcycle crashes was investigated by Barry at the University of North Carolina Highway Safety Research Center in 1970. The crashes involving motorcycle owners were compared with crashes involving borrowers.[45] The sample for this study consisted of 1,230 reported motorcycle crashes and 22.8 per cent of the crashes involved borrowed motorcycles. In two-vehicle crashes borrowers were found to be going slower than owners, and borrowers were cited with a violation more often than were owners of motorcycles.[46]

Barry's study found that borrowers in single-vehicle crashes were more frequently reported to have crashed while attempting to negotiate a turn than were owners.[47] The borrowers' crashes were not significantly different from owners' crashes with respect to severity.

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[44] Ibid., p. 4.

[45] Patricia Z. Barry, The Role of Inexperience in Motorcycle Crashes (Chapel Hill: The University of North Carolina Highway Safety Research Center, April, 1970), p. 1.

[46] Ibid.

[47] Ibid., p. 25.

Also there were no differences found between the groups regarding road or weather conditions or accident locations.[48] Motorcycle lending seemed to be more prevalent among the younger motorcycle operators.

The lack of knowledge and/or skill may account for the borrowers' higher frequency of driver error compared with owners. The borrowers of motorcycles in two-vehicle crashes at night made up 33 per cent, while the owners made up only 21 per cent. This would tend to suggest that the complex situation at night exceeded the capability of the inexperienced operator.[49]

The results of this study suggested that inexperience greatly increased the hazard of motorcycle riding.[50]

Australian Foldvary investigated nearly one thousand motorcycle accidents involving another motor vehicle and compared several variables: blame or guilt as determined by police; age; experience with the vehicle; and the type of operator (automobile or motorcycle). Foldvary's conclusions were that the only variables that were independently statistically significant were age and the experience of the operator. Blame or guilt was neither a significant variable within itself nor in any combination of other variables. Foldvary also showed that the interaction of experience, age, and the type of operator

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[48] Ibid. [49] Ibid., p. 26. [50] Ibid.

were statistically significant. Whether motorcyclist or motorists, if the operator was young and inexperienced, he was likely to be involved in motorcycle accidents.[51] Klein stated that disproportionate accident experience occurs in Europe at higher age levels than in the United States, but that the average licensing age in each case brings about the motor vehicle accident problem.[52]

In a study conducted at the University of North Carolina by Waller et al., students attending the university who owned either motorcycles or automobiles were compared. Some of the findings indicated that motorcycle operators were less likely to be in graduate or professional school, less likely to be married, and more likely to be from out of state than were automobile owners.[53] When grades were compared, there were no differences between the motorcycle and automobile owners. But when grades were compared with driving records, both automobile and motorcycle students showed significant

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[51]J. N. Hanks and L. A. Foldvary, "Analysis of Age and Experience of Drivers Involved in Accidents," Australian Road Research, II, No. 4 (1965), 60.

[52]David Klein, "A Reappraisal of the Violation and Accident Data on Teen-Aged Drivers," Traffic Quarterly, XX (October, 1966), 508.

[53]Patricia F. Waller, D. W. Reinfurt, C. B. Reifler, and G. G. Koch, Motorcycles versus Automobiles: How Their Owners Differ (Chapel Hill: University of North Carolina Highway Safety Research Center, June, 1969), p. 25.

relationships. Students with the poorer driving records also tended to have poorer grades. It was the feeling of the researchers that the poorer grades and driving records could result from greater exposure; that is, the more time spent driving the vehicle the more likely a person would be involved in an accident or receive a traffic citation and the less time for studying.[54]

Biesheuvel and Barnes, in a study of motorcycle accidents conducted in South Africa, reported that with the exception of speeding, motorcyclists' faults in accidents had no consistent bearing upon age by motorcyclists under thirty-five years of age. Biesheuvel and Barnes also stated that they believed the higher involvement of young motorcycle operators was a degree of intensity of those faults found in the older motorcycle operators.[55] They found motorists most likely to make poor right turns (like a left turn in the United States) without regard for caution. They also observed that carelessness, inattention, and the refusal of courtesies on the road were prominent factors in motorcycle accidents.[56]

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[54] Ibid.

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

[56] Ibid., p. 12.

The University of North Carolina Highway Safety Research Center conducted a study of 366 motorcycle accidents in North Carolina during the first half of 1966.[57] It was found that many of the accidents occurred because the car driver and the motorcycle operator were both unfamiliar with the intricacies of a blend of these vehicles on the highway. In a greater number of cases, when a car and a motorcycle crashed, the car driver was held to be in violation of the law if a citation was issued. Several other studies also found this to be the case. The increasing number of accidents, injuries, and deaths of motorcycle operators calls for intensive action to counter this problem. A number of possible actions could be taken to try to correct this situation. For example, crash helmets and a special license for motorcycle operators should be required and public information programs directed at four-wheeled vehicle owners who too often fail to look for and see motorcycles on our roadways should be developed.[58]

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[57] Motorcycle Accidents in North Carolina (Chapel Hill: University of North Carolina Highway Safety Research Center, February, 1967), pp. 1-5.

[58] Ibid.

Personality Factors

Jeffcoate and Garwood found that no data existed to separate the effects of youthfulness and inexperience in motorcycle accidents in 1956.[59]

Young people may use the automobile as an equalizer, Klein stated, when unfulfilled needs exist with respect to athletic prowess, recognition by adults, and grades. Klein also stated that frustrations may lead to aggressive behavior in automobile usage.[60]

Turfboer 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. Turfboer also stated that people need to get their problems out in the open rather than keep them pent up inside where they would more than likely explode. Persons should also be able to recognize the feelings that would likely result in dangerous driving behavior.[61]

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[59]G. O. Jeffcoate and F. Garwood, "A Review of Information on Motorcycle Accidents with Special Reference to Age of Motorcyclists" (Crowthorne, England: Road Research Laboratory, 1956), p. 5. (Mimeographed.)

[60]Klein, "Violation and Accident Data on Teen-Aged Drivers," p. 509.

[61]Robert Turfboer, "Do People Really Drive as They Live?," Traffic Quarterly, XXI (January, 1967), 101, 103, 105, 108.

Samuel Durbin reported on what an automobile means to a driver: "To the adolescent it may mean freedom and escape, both real and symbolic, from parental control and supervision." Durbin stated further:

> The automobile for many people is a symbol of sex, speed, wealth, and power and convenience. And the 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.[62]

Klein noted that when parental reluctance existed prior to a youngster's purchase of a motorcycle, psychological problems frequently took place following his accident involvement.[63]

Deutsch found that lower class children had higher accident rates, but their environment also appeared to be more hazardous. A fatalistic attitude predominated among their class and more independence was granted them by parents, mainly through neglect.[64] Even though overcontrolled and overprotected, children may live a restructed life with respect to exposure to hazards.[65]

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[62]Samuel S. Durbin, "Emotions and Traffic Accidents--A Psychologist Looks at the Problem of Highway Safety," Traffic Safety Research Review, V (June, 1961), 7, 8.

[63]O'Mara, "Motorcycle Accidents," p. 8.

[64]Herbert H. Jacobs et al., Behavioral Approaches to Accident Research (New York: Association for the Aid to Crippled Children, 1961), p. 95.

[65]Ibid., p. 100.

Klein stated 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 who have 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."[66]

In talking about 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 uncertainity of any hazard with zero risk, (3) those who believe there is no hazard, and (4) those who deliberately appraise the hazard. In all four groups Fox noted a belief of invulnerability.[67]

A survey of the attitudes of motorcyclists who had been involved in an accident showed that they had a lower sense of social responsibility than the non-accident subjects. Those in the group that were involved in accidents had unfavorable attitudes toward safety measures and traffic control and had poor attitudes toward other

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[66]Klein, "Violation and Accident Data on Teen-Aged Drivers," pp. 509, 510.

[67]Jacobs et al., Accident Research, pp. 52-53.

road users upon which they tended to project their own lack of discipline. Biesheuvel and Barnes concluded, "In brief, character defect, particularly in respect of social consciousness, is at the root of the motorcycle accident problem."[68] At the beginning of 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 toward accidents is propagated. Biesheuvel and Barnes also stated, "There is a general belief that youthful exuberance, irresponsibility, and love of speed of motorcyclists are the principal causes."[69]

To show that a more favorable motorcycle accident experience can be obtained, a statistic released by the Los Angeles Police Department in 1966, proved that police on motorcycles had an accident rate of 17.9 per 100,000,000 miles traveled, while the patrol car accident rate was 27.9 per 100,000,000 miles for the same year.[70]

At the conclusion of a 1965 motorcycle accident study in Canada, Brezina stated:

> Because it has not been possible to discover any strong action characteristic possessed by the high-rate group, there is no specific behavioural

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[68]Biesheuvel and Barnes, "A Study of Motorcycle Accidents," p. 14.

[69]Ibid., p. 4.

[70]Paul Dietzel, "Can Motorcycling Be Safe?," Westways (December, 1966), reprint.

> problem to attack. Any improvement in accident experience must result from a general improvement in the driving attitude of this group of motorcyclists.[71]

Age

Soaring accident rates in the late 1950's of motorscooters brought about a public outcry for something to be done to curb the accident rate. Some states, as a result of rising accident rates, enacted licensing laws which would permit fourteen- and fifteen-year-olds to operate two-wheeled motor vehicles under five horsepower. Many officials even demanded that motorscooters be completely banned.[72]

In South Africa, Biesheuvel and Barnes found very little public interest involving the four hundred youths under twenty years of age that were killed in motor vehicle accidents in 1947. But there were 100 polio victims that same year and the people became outraged over that.[73]

The state of Washington discovered the median age for deaths from motorcycle accidents was twenty-two years, but for all other motor vehicles it was thirty-three years

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[71]Ontario Department of Transport, Motorcycle Accidents in Toronto, p. 15.

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

[73]Biesheuvel and Barnes, "A Study of Motorcycle Accidents," p. 3.

of age. New York reported in 1962 that 34 per cent of all motor vehicle accidents occurred to drivers aged twenty-nine and under. But this age group accounted for 52 per cent of the total number of motorcycle accidents. In 1966 in Los Angeles County, 42 per cent of the motorcycle accident victims were teenagers while 76 per cent of the motorcycle accident victims were under twenty-six years of age.[74] A study conducted in Kansas in 1966 noted that persons between the ages of sixteen and twenty-four years of age accounted for approximately 60 per cent of the motorcycle accidents.[75] Klein argued that since time and mileage exposures are not accurately known in most motor vehicle accidents, age may not be as important a criterion as it often appears.[76]

Motorcycle Size and Accident Involvement

In a study conducted in England, Munden noted that large motorcycles were involved in more severe accidents than small motorcycles. A major finding of Munden's

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[74]Alfred Crancer, Motorcycle Fatality Study, 1965 and 1966 Data (Olympia: Washington Department of Motor Vehicles, 1967), p. 2; Los Angeles County, "Survey on Motorcycles," p. 4; "Two-Wheeled Trouble," Journal of American Insurance, XL (September, 1964), 23.

[75]State Highway Commission, Summary of Motor Vehicle Accidents Involving Motorcycles, 1966 (Topeka, Kansas: State Highway Commission, 1967), p. 3.

[76]Klein, "Violation and Accident Data on Teen-Aged Drivers," p. 504.

study was that operators under twenty-five years of age with motorcycles over 350 cc were involved in 20 per cent of the fatal and serious accidents but made up only 5 per cent of the registrations.[77] Munden did not determine if his figures were a result of motorcycle size alone.

Visibility of Motorcycles

No studies were found that compared or involved the color of motorcycles, but in Sweden a study determined that black automobiles were involved in 22.2 per cent of the accidents though their registrations made up only 4.4 per cent of the registered automobiles. Pink cars made up 6.2 per cent of the registered vehicles and were involved in only 2.4 per cent of the accidents. This study also found that people are inclined to overestimate the distance from a dark car and underestimate the distance of a pink car. Black cars seemed to move slower than they actually were and pink cars seemingly moved faster than they actually were moving.[78]

O'Mara pointed out that motorcycles have a small profile and are, therefore, difficult for drivers to see

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[77]J. M. Munden, "The Variation of Motorcycle Accident Rates with Age of Riders and Size of Machine," International Road Safety and Traffic Review, XII (Winter, 1964), 14.

[78]George Embree, "Color of Car Might Influence Crash Rate," Detroit Free Press (Michigan), September 18, 1964.

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."[79]

Severity of Motorcycle Accidents

A study in England revealed that a motorcycle was no more likely to become involved in an accident, on a registration basis, than an automobile. However, on a mileage basis, a motorcycle was twice as likely to be involved in an accident as an automobile based on data obtained from 1948 through 1952. If a person were to plan a trip by motorcycle, he could expect to be injured at a rate twenty times as great as an automobile. He would also be forty times as likely to be killed on a motorcycle as he would be in an automobile.[80]

Pike made a study of 579 motorcycle accidents involving army personnel in England in 1949.[81] He found that head injuries accounted for most of the deaths and for 25 per cent of the serious injuries, but that they accounted for only a small portion of the "slightly

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[79]Munro, "Deadliest Vehemence," pp. 23, 24.

[80]G. O. Jeffcoate, Relative Accident Rates for Different Types of Vehicles Involved in Pedestrian Accidents in Built-up Areas on Week Days (Crawthorne, England: Road Research Laboratory, July, 1957), p. 2.

[81]Major D. F. Bayly Pike, Accidents Resulting in Injuries to Army Motorcycles (London: Her Majesty's Stationery Office, 1949), p. 14.

injured" cases. Consequently, he stated, the mandatory use of crash helmets probably saved many lives. Pike also found that injuries to the legs were the most common features of the accidents. Injuries to the legs were found to be twice as frequent as injuries to the upper limbs.[82] One interesting discovery Pike made was that injuries occurred much more frequently to the right side of the body than to the left side.[83]

As can be seen in Table 2, Pike, in his motorcycle accident study, came up with a number of causative factors that occur in motorcycle accidents.

Motorcycles, by their very nature, are small and could possibly be compared to small automobiles by stretching the imagination somewhat. But then a motorcycle is much less stable than a small automobile. A study in California found that small cars were involved in accidents at almost twice the rate as were larger cars. Research was done in Maine that revealed when small cars were involved in collisions with large cars, the ratio of persons killed was 5.5:1.[84]

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[82] Ibid., p. 15.

[83] Ibid., p. 14.

[84] Universal Underwriters Insurance Company, "Facts on Cycle Safety," p. 2.

TABLE 2.--Frequency with which certain causative factors occur in motorcycle accidents.[a]

Causative Factor	Frequency of Factor In:			Total	Frequency (%)
	Fatal Accidents	Serious Accidents	Slight Accidents		
Excessive Speed	3	31	53	87	15.0
Bad Road Surface:					
Temporary	0	13	43	56	9.7
Permanent	0	6	20	26	4.5
Inexperience	3	23	51	77	13.3
Improper Passing	3	15	47	65	11.2
Vision Obstruction	1	16	32	49	8.5
Mechanical Defect	1	9	33	43	7.4
Animal in Road	0	5	13	18	3.1
Number of Accidents	16	167	396	579	

[a]Major D. F. Bayly Pike, Accidents Resulting in Injuries to Army Motorcyclists (London: Her Majesty's Stationery Office, 1949), p. 13.

A study of motorcycle accidents in the Ottawa area was done by Campbell et al. in 1967.[85] From the sample of 363 accidents, 229 persons were killed or injured, and of the injured 71.7 per cent were hospitalized. The motorcycle accidents in the Ottawa area were subject to seasonal influences and the eighteen-year-old male operator was predominantly involved.[86] The motorcycle operators were relatively inexperienced and pedestrians and other vehicle operators were to blame in many of the motorcycle accidents. The risk of injury or death appeared to be higher in the Ottawa area than in Canada as a whole. Throughout Canada the risk of death is 40 per cent greater on a motorcycle than it is with other vehicles, and the risk of injury appears to be 120 per cent greater than in all other motor vehicles.[87]

Even though deaths have been noted in motorcycle accidents, it appears that personal injuries are a very common occurrence. Of the motorcycle accidents reported it appears that personal injuries occur in 75 per cent to 95 per cent of the accidents. It should be noted that the lack of protection is one of the most significant factors in motorcycle accident injuries. A Massachusetts study

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[85] E. O. Campbell, M. E. Macbeth, and S. W. Ryan, Motorcycle Accidents Ottawa Area 1967 (Ottawa: Traffic Injury Research Foundation of Canada, 1967), p. 7.

[86] Ibid.

[87] Ibid.

in 1953 found that the collision of two motor vehicles costs $381, an automobile with a fixed object costs $414, and an automobile with a pedestrian was $572.[88] Insurance companies have long noted the severity of motorcycle accidents.[89] Head injuries have frequently caused death to motorcycle riders, and, as a result, many states have passed laws requiring persons on motorcycles to wear helmets. Up to three-fourths of the persons killed riding motorcycles had severe head injuries. Ellison reported that helmet use in Australia and England reduced the number of deaths by 25 per cent to 50 per cent.[90] But even when helmets are worn, this does nothing to remedy the problem of mangled arms and legs that all too often occur in a motorcycle accident.

Motorcycles are involved in collisions with other vehicles at a very high rate according to state summaries of motorcycle accidents.[91]

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[88]"The Economic Costs of Motor Vehicle Accidents of Different Types," Public Roads, XXX (June, 1958), 42.

[89]"Meeting the Motorcycle Menace," p. 23.

[90]Ellison, The Motorcycle Problem, p. 23.

[91]Department of Motor Vehicles, Accident Facts, p. 18; Department of Public Works and Buildings, The Motorcycle in Traffic Accidents, Illinois 1966 (Springfield, Illinois: Department of Public Works and Buildings, 1967), p. 20; Los Angeles County, "Survey on Motorcycles," p. 2; Michigan State Police, Michigan Motorcycle and Motor Scooter Data, 1962-1966 (East Lansing: Michigan State Police, 1967), p. 2; Washington State Police, Summary of Motorcycle Accidents 1965, p. 1.

During the years 1962-1966 motorcycle registrations in the state of Michigan increased 179 per cent but fatalities from motorcycle accidents increased 247 per cent during this same period of time.[92] Ingham County's motorcycle accident experience for 1970 was 191 but in 1971, it had climbed to 323. This represented a 69 per cent increase in accidents during the one year period. Yet, during this one year period, there was only one fatality reported as a result of a motorcycle accident. Munro reported that Canada had a 45 per cent increase in registrations of motorcycles and an 81.4 per cent increase in fatal accidents involving motorcycles in the year 1966.[93] The registration of motorcycles and the number of motorcycle accidents have increased at about the same rate, but many jurisdictions have had a more rapid rise in fatal motorcycle accidents than in registration of motorcycles.[94]

Motorcycles on the average do not travel as many miles as do automobiles. It looks as though motorcycles are involved in approximately 50 per cent less accidents on a registration basis than automobiles.[95] But when

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[92]Michigan State Police, Motorcycle and Motor Scooter Data, p. 1.

[93]Munro, "Deadliest Vehemence," p. 1.

[94]National Safety Council, Accident Facts, p. 56.

[95]Department of Motor Vehicles, A Review of Motor-Cycle Problems in New York State (Albany: Department of Motor Vehicles, 1966), p. 2.

fatal accidents are considered, motorcycles do not compare favorably with automobiles on a registration basis. For example, in the state of New York in 1962, there were 19.0 deaths per 10,000 registered motorcycles as compared to 4.3 deaths for the same number of registered automobiles.[96] In Mississippi during the year 1965 10.0 deaths occurred per 10,000 registered motorcycles while only 6.2 deaths occurred for automobiles.[97] For the entire nation in the year 1962 there were 13.0 deaths per 10,000 registered motorcycles while there were only 5.1 deaths per 10,000 registered automobiles.[98]

Solutions to the Problem

The chairman of the Trauma Committee of the Academy of Medicine of Cleveland, Dr. Robert Walz 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.[99]

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[96] Ibid., p. 1.

[97] Dana B. Brammer, A Look at the Motorcycle Problem, Public Administration Survey, School of Business and Government, Vol. XIV (University: University of Mississippi, January, 1967), p. 2.

[98] "Two-Wheeled Trouble," p. 22.

[99] Universal Underwriters Insurance Company, "Facts on Cycle Safety," p. 2.

In Illinois a study reported that in fatal motorcycle accidents no single corrective action could be found to apply to the accidents.[100] Ditzel, in Canada, pointed out that with rising registrations and accidents of motorcycles, the state should take action to protect its young people.[101]

Many official agencies and groups of individuals have called for some corrective action on the motorcycle accident problem. They have suggested some or all of the following measures: driver education for motorcyclists; face protection; inspection of the motorcycle; protective headgear; safety equipment on the motorcycle; and special licenses for motorcycle operators.[102]

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[100]Francis S. Lorenz, "Fatal Motorcycle Accidents" (unpublished report delivered to the Governor's Official Traffic Safety Coordinating Committee, Springfield, Illinois, November 16, 1966), p. 2.

[101]Ditzel, "Can Motorcycling Be Safe?"

[102]"Air Force Holds Seminar on Two-Wheeler Accidents," Traffic Safety, LXVII (February, 1967), 19; Biesheuvel and Barnes, "A Study of Motorcycle Accidents," p. 16; Walter E. Davidson, "What Motorcycle-Motorscooter Industry is Doing to Promote Safe Operation," Traffic Digest and Review, XV (January, 1967), 14-16; Leroy Dunn, "Teach Them How to Ride," Safety, III (March-April, 1967), 17; Beth Majid, "Danger Rides Two Wheels," Parents Magazine, XXXVIII (Sepgember, 1963), 684; U.S. Department of Commerce, Draft Highway Safety Program Standard No. 4.4.3 --Motorcycle Safety (Washington, D.C.: National Highway Safety Bureau, February, 1967), p. 2; U.S. Department of Health, Education and Welfare, "Exploratory Meeting on Motorcycle Safety Education" (Washington, 1966), pp. 5-8. (Mimeographed.)

"We are fed up with trying to patch up the bodies of young kids unnecessarily injured . . . " stated Dr. Robert H. Kennedy, a member of the American College of Surgeons. Dr. Kennedy recommended an extensive attack on the motorcycle accident problem. He also recommended that medical seminars be set up for doctors, nurses, and ambulance attendants for the purpose of treating motorcycle accident victims.[103]

In Great Britain Smeed pointed out that he believed motor vehicle injuries would be reduced by 34 per cent if all motorcycles were replaced by four-wheeled vehicles. He also stated that he did not believe that the idea would be very well received in Great Britain.[104]

Summary

The review of literature shows that many things have been written about the various aspects of motorcycle accidents. State police agencies have accumulated tremendous amounts of motorcycle accident data, but most research into motorcycle accident data up until the mid-1960's was done in foreign countries. The in-depth study of motorcycle accidents was found to be sparse. Only one

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[103]"Safety Group Demands Safer Conditions for Motorcycle Use," Medical Tribune and Medical News, VII (November 30, 1966), 1.

[104]R. J. Smeed, "Methods Available to Reduce the Numbers of Road Casualities," International Road Safety and Traffic Review, XIII (Autumn, 1964), 10.

study in the United States followed the in-depth approach, that being a case study analysis of motorcycle accidents in three Illinois counties.

The increase in the popularity of motorcycles began about 1963 and has risen steadily since that time. There are approximately 3,293,400 registered motorcycles in the United States at the present time. Foreign manufacturers of motorcycles have made it easier for many more people to own and operate motorcycles because of the decreased cost. Motorcycle accident increases have kept pace with increased motorcycle registrations, but the death rate from motorcycle accidents has increased at a more rapid pace than has motorcycle registrations. Motorcycle accident rates compare favorably with the rates of four-wheeled vehicles using the registrations as the basis for comparison. However, when mileage traveled is used as the basis for comparison, motorcycles compared unfavorably with four-wheeled vehicles. Studies of motorcycle accidents have shown that wearing safety helmets have reduced deaths and accident severity, especially head injuries. Therefore, many states now are requiring their use when operating a motorcycle.

Several motorcycle accident studies have shown that there are combinations of causal factors that lead up to a motorcycle accident. If a motorist were involved in an accident with a motorcyclist, the motorist was most

often found to be at fault. The two leading causal factors between motorist and motorcycle were the motorist turning left in front of and pulling into the path of an oncoming motorcycle.

Many studies pointed out that motorcyclists, who were inexperienced, were involved in almost twice as many accidents as the more experienced motorcycle rider. Also, most studies that were found pointed out that the young male motorcyclist had the greatest accident involvement. There were little applicable data available that pointed out effects of youthfulness and inexperience.

One study pointed out that generally there were no differences between youth that rode motorcycles and those that did not. Another study revealed that persons involved in motorcycle accidents had less social consciousness about them than persons who were not involved in motorcycle accidents. This study also concluded that youthful exuberance and no sense of responsibility were the major causes of motorcycle accidents. The researchers further stated that motorcyclists would have to change their driving attitudes in order to reduce motorcycle accidents. Another study reported the motorcyclist who borrowed a motorcycle was much more likely to have an accident than a person riding his own motorcycle. One report stated that young people use automobiles to satisfy unmet needs and desires, however, there was no data found supporting this in relation to motorcycles. Some studies

did report that the "love of speed" was a causal factor in some motorcycle accidents.

Many people who had worked with motorcycle data believed that accident reports contained insufficient data to be of much value when studying motorcycle accidents.

There were a number of suggestions and recommendations to help remedy the motorcycle accident problem. Some suggested that the following be required: (1) special operator's licenses; (2) protective riding gear; (3) vehicle inspection; (4) driver education for motorcyclists; and (5) a ban on motorcycles from the highways. One study suggested that major design changes be made on motorcycles so they will be safer, but that would eliminate the unique quality that many people are looking for when purchasing a motorcycle. Another publication pointed out the wide range of licensing laws for motorcyclists among the various states. Many safety groups made suggestions that studies be made to determine the major causes of motorcycle accidents and then take appropriate measures to correct them so the growing problem of motorcycle accidents will be reduced.

A review of related literature was presented in this chapter. Chapter III will contain the design and methodology of this study.

CHAPTER III

DESIGN AND METHODOLOGY OF THE STUDY

The review of literature was presented in the preceding chapter. In this chapter the design and methodology of the study is presented. Included are the research questions to be answered, sample selection, development of the instrument, procedure for collecting the data, treatment of the data, and summary.

Research Questions to be Answered

The primary objective of the study was to collect and analyze data which would indicate the strength of relationship between seventeen different variables and the severity of the accident, using medical costs as the index of severity. The variables of concern in this study were as follows:

1. Sex
2. Age
3. Educational Level
4. Motorcycle Riding Experience
5. Time of the Accident
6. Type of Roadway

7. Type of Surface of Roadway
8. Highway Condition
9. Weather Condition
10. Alcohol
11. Drugs
12. Alcohol and Drugs
13. Hours of Motorcycle Riding Instruction
14. Wearing a Helmet
15. Wearing Goggles or Face Shield
16. Wearing Boots
17. Wearing Protective Clothing

The secondary purpose of the study was to seek out and show possible causal factors related to motorcycle accidents.

Sample Selection

In preparation for drawing the sample, each law enforcement agency that investigated a motorcycle accident to be used in the study was personally contacted. The purpose of this was to get permission from the agency for the Michigan State Police to release the accident reports. A list of the participating agencies may be found in Appendix A. The accident reports were obtained from the Safety and Traffic Division of the Michigan State Police located in the Frandor Shopping Center in Lansing. The accident reports were made available to obtain the names and addresses of persons involved in motorcycle accidents in

Ingham County in 1971 so that personal contacts could be made. The researcher found that there were 323 motorcycle accidents in Ingham County in 1971.

The copies of the motorcycle accident reports were numbered consecutively from 1 to 323. A table of random numbers was employed to designate those persons to be interviewed.[105] The random number that corresponded with the assigned number of the accident report of the motorcyclist was determined to be the interviewee.

By consulting persons qualified in statistical research, it was determined that a sample of 100 out of the total population of 323 would be representative. It was resolved that the data obtained from this sample size would provide reliable information for the study. A systematic probability sample of 130 persons who were involved in motorcycle accidents in Ingham County in 1971 was drawn so that each person had an equal chance of being selected. The additional accidents were chosen in the event that the persons involved in the originally selected accidents either did not wish to be interviewed, were from outside the state of Michigan, had moved away, or after three attempts to contact him failed. A total of 109 of the original 130 selections were used as seven persons could not be contacted, one did not wish to be interviewed,

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[105]Wilfrid J. Dixon and Frank J. Massey, Jr., Introduction to Statistical Analysis (2nd ed.; New York: McGraw-Hill Book Company, Inc., 1957), pp. 366-70.

and one was deceased, but not as the result of the motorcycle accident. A total of 100 persons were interviewed for this research.

Development of the Instrument

A personal interview technique was employed as the methodology for gathering the data because of the higher validity associated with this method as compared to other methods. Further, it was possible to know when the respondent did not understand a question and did, within limits, allow for a repeating or rephrasing of the question. Most important, the interview permitted probing into the context of, and reasons for, answers to the four open-ended questions presented in the interview questionnaire.

An interview questionnaire was developed by the researcher.[106] Four major areas were included in the instrument: (1) the motorcycle operator, (2) environment in which the motorcycle was ridden, (3) experience of the rider with motorcycles, and (4) educational needs of the operator as it related to motorcycle operation. The personal interview questionnaire appears in Appendix B.

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[106]Duane R. Johnson, "A Case Study of Motorcycle Accidents in Three Illinois Counties" (unpublished Ed.D. dissertation, Michigan State University, East Lansing, 1968), Appendices.

Procedure for Collecting the Data

The names and addresses of the persons who were involved in motorcycle accidents in Ingham County, Michigan, in 1971 were obtained.

The persons, who had been randomly selected for inclusion in this study, were written a letter of introduction by this researcher. They were informed that they would be contacted by telephone to set up an interview data that would be mutually convenient for them and the interviewer. A copy of this letter may be found in Appendix C.

The interviewees were told that the information they volunteered would be held in strictest confidence and would be used for educational purposes only. The data gathered from the interviewees would be used as group data --not singled out individually. The researcher informed the interviewees that the interview was entirely voluntary. Three attempts were made to interview the originally designated persons before contacting an alternate respondent from the randomly chosen group.

The Pearson Product Moment Correlation (r) was used to determine the strength of relationships among items one through seventeen identified in the section on Research Questions to be Answered.

A table was developed to illustrate the strength of the relationship existing.

Treatment of the Data

Frequency distributions and or percentages were developed from the possible causal factors of the motorcycle accidents.

Frequency distributions and or percentages were developed for the following:

1. Sex of the operator
2. Age of the operator
3. Education of the operator
4. Occupation of the operator
5. Month the accident occurred
6. Day of the month the accident occurred
7. Day of the week the accident occurred
8. Medical costs of the accident
9. Motorcycle riding experience
10. Hours of riding per week of motorcyclist
11. Does the motorcyclist ride everyday
12. Time of the day the motorcyclist generally rides
13. Time of the accident
14. Purpose of the motorcycle
15. Day of the week when riding most likely occurs
16. Length of time riding when the accident occurred
17. Kind of locality where the accident occurred
18. Motorcyclist generally riding in his home county
19. First time in the area where the accident occurred
20. Occurrences of riding on the road where the accident occurred

21. Type of roadway
22. Type of road surface
23. Highway condition
24. Vertical contour of the roadway
25. Horizontal contour of the roadway
26. Light conditions
27. Weather conditions
28. Condition of the road surface
29. Riding with head light on
30. Reduced visibility at the time of the accident
31. Lack of signs where the accident occurred
32. Distractions at the time the accident occurred
33. Action taken to reduce the severity of the accident
34. Motorcyclist upset or worried just prior to the accident
35. Trip origination
36. Trip destination
37. Riding differently after the accident
38. Anything mechanically wrong with the motorcycle
39. Drinking prior to the accident
40. Type of alcohol consumed
41. Use of drugs prior to the accident
42. What drugs were taken
43. Use of alcohol and drugs prior to the accident
44. Number of hours of motorcycle riding instruction
45. Type of motorcycle riding instruction
46. Type of motorcycle riding instructor

47. Completion of driver education program
48. Number of hours of motorcycle instruction in a driver education program
49. Familiarity with the motorcycle regulation in Michigan
50. Did the motorcyclist have insurance
51. Was the motorcyclist wearing a helmet
52. Was the motorcyclist wearing goggles or a face shield
53. Was the motorcyclist wearing boots
54. Was the motorcyclist wearing protective clothing
55. Motorcyclist took a special operator's examination
56. Motorcycle owned by the interviewee
57. Was the motorcyclist charged with a violation in connection with the accident
58. The violation the motorcyclist was charged with
59. Thoughts of the motorcyclist just before the accident occurred
60. Advice of motorcyclist to prevent the accident
61. Causes of the accident--as stated by the interviewee

To give further insight into the data, at least one accident in each category was treated as a case study. Each case study will, hopefully, give more insight into the causal factors of the accident.

For the purpose of determining the number of case studies, the motorcycle accidents were grouped in accident categories. There were ten distinctive categories and

various numbers of accidents within each category. This information may be found in Table 3.

TABLE 3.--Determining the case studies found in this research.

Accident Categories	Number of Accidents	Number of Case Studies
1. Car pulled in front of motorcycle	24	2
2. Car turned left in front of motorcycle	19	2
3. Rear-end collision	13	2
4. Motorcycle ran off the roadway	12	2
5. Car turned into motorcycle	8	1
6. Motorcycle overturning in roadway	7	2
7. Motorcycle hit object in roadway	6	1
8. Motorcycle pulled in front of car	6	1
9. Motorcycle hit parked car	3	1
10. Cycle turned into car	2	1
Total	100	15

Also included in the case study will be a situational diagram depicting the scene of the accident. This includes symbols, identifying persons, vehicles, and other objects that will aid in clarifying the accident scene.

The data were presented in each case study as follows:

1. Type of Accident
2. Environmental Conditions--Roadway
    a. Type
    b. Surface
    c. Character
    d. Condition
3. Kind of Locality
4. Time
5. Light Conditions
6. Weather Conditions
7. Traffic Conditions
8. Vehicle Information
    a. Make, model, year
    b. Condition
9. Driver Data
    a. Sex
    b. Age
    c. Driving experience
    d. Violation in connection with the accident
10. Narrative Account of the Accident
11. Situational Diagram of the Accident

Summary

In this chapter the research questions to be answered, sample selection, method of selection, development of the instrument, and treatment of the data were presented.

In the following chapter the analysis of the data may be found.

CHAPTER IV

ANALYSIS OF THE DATA

The design and methodology was presented in the preceding chapter. In this chapter, an analysis of the data is presented. The chapter was organized in the following manner: (1) data citing the intercorrelations of the study variables, (2) data relative to the possible causal factors of motorcycle accidents, and (3) the case studies.

Data Citing the Intercorrelations of the Study Variables

The major purpose of this study was to determine the strength of relationship between certain variables and the severity of motorcycle accidents as determined by the medical costs. Seventeen variables were compared to the medical costs of the accidents.

These data were analyzed using the CDC 6500 computer at Michigan State University. Correlation coefficients (r) were computed and tested for significance, utilizing the appropriate t-test. Fisher's test of significance

table for correlation coefficients was used to determine significance at the appropriate degree of freedom.[107]

The .05 level of significance was predetermined to be acceptable in this study.

Seventeen research variables were formulated and systematically analyzed as indicated below:

Variable 1: Sex

Variable 2: Age

Variable 3: Educational Level

Variable 4: Motorcycle Riding Experience

Variable 5: Time of the Accident

Variable 6: Type of Roadway

Variable 7: Type of Surface of Roadway

Variable 8: Highway Condition

Variable 9: Weather Condition

Variable 10: Alcohol

Variable 11: Drugs

Variable 12: Alcohol and Drugs

Variable 13: Hours of Motorcycle Riding Instruction

Variable 14: Wearing a Helmet

Variable 15: Wearing Goggles or Face Shield

Variable 16: Wearing Boots

Variable 17: Wearing Protective Clothing

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[107]R. A. Fisher and F. Yates, Statistical Tables for Biological, Agricultural, and Medical Research (Edinburgh: Oliver and Boyd, Ltd.), p. 301.

The data in Table 4 indicates that there was no significant relationship between the severity of the accident and any of the other study variables. (Possible explanations for these findings are presented in Chapter V under "Discussion."

TABLE 4.--Intercorrelations of medical costs of the accident and other study variables.

Variable	r	Probability
Sex	-.0586	p > .05
Age	-.0210	p > .05
Educational Level	-.1129	p > .05
Motorcycle Riding Experience	-.1177	p > .05
Time of the Accident	.0081	p > .05
Type of Roadway	.0077	p > .05
Type of Surface of Roadway	-.0273	p > .05
Highway Condition	.0000	p > .05
Weather Condition	-.0462	p > .05
Alcohol	-.0551	p > .05
Drugs	.0353	p > .05
Alcohol and Drugs	.0353	p > .05
Hours of Motorcycle Riding Instruction	.0532	p > .05
Wearing a Helmet	-.0440	p > .05
Wearing Goggles or Face Shield	-.0853	p > .05
Wearing Boots	.0651	p > .05
Wearing Protective Clothing	.1058	p > .05

Note: r value needed to show significance at the .05 level is .1950.

Data Relative to the Possible Causal Factors of Motorcycle Accidents

Sex of the Persons Involved in Motorcycle Accidents

Presented in Table 5 is the sex of the persons involved in the motorcycle accidents. This table reveals that 98 males and 2 females were involved.

TABLE 5.--Sex of the persons involved in motorcycle accidents.

Sex	Number	Percent
Male	98	98
Female	2	2
Total	100	100

Age of the Persons Involved in Motorcycle Accidents

Presented in Table 6 are the ages of the persons involved in the motorcycle accidents. This table indicates that the ages ranged from 15 to 71 years. The 20-24 age group were involved in the greatest percentage (45%) of the accidents. It may also be noted that, when comparing the age groups, the 15-24 year olds accounted for 70 per cent of the motorcycle accidents used in this study. This fact would seem to agree with most of the studies cited in the Review of Literature. Eighty-six per cent of the involved drivers were under 30 years of age. The mean age of the motorcycle riders was 24.01 years.

TABLE 6.--Age of motorcyclists.

Age	Number	Percent
15-19	25	25
20-24	45	45
25-29	16	16
30-40	9	9
41-50	3	3
51-60	1	1
over 60	1	1
Total	100	100

Note: Mean age for motorcyclists is 24.01 years.

Educational Level and Occupation of Motorcyclists

Educational data revealed that almost half of the motorcyclists had at least a high school education. There was one, however, who had a Ph.D. degree. The educational level of the motorcyclists would tend to be above average because of the large number of students who were involved in the accidents. The mean educational level of the motorcyclists was 13.24 years. Over one-third of the motorcyclists studied were students. Of those working, the largest group was non-skilled with 24 per cent. These facts are shown in Table 7.

TABLE 7.--Educational level and occupation of motorcyclists.

Educational Level			Occupation		
Years of Education Completed	Number	Percent	Occupation	Number	Percent
9	1	1	Professional*	10	10
10	1	1	Semi-professional	7	7
11	3	3	Skilled worker	17	17
12	49	49	Non-skilled	24	24
13	8	8	Student	36	36
14	9	9	Unemployed	6	6
15	16	16			
16	10	10			
17	2	2			
20	1	1			
Total	100	100		100	100

*Key: Professional: Doctor, lawyer, teacher
Semi-Professional: Barber, beautician, secretary, Service station owner, salesman
Skilled Worker: Foreman, electrician, plumber, mechanic
Non-skilled Worker: Custodian, service station attendant
Student: Person attending high school or college
Unemployed: Persons not working at the present time

Month in Which the Accident Occurred

There were only two months of the year, January and December, in which no accident occurred. The month of May had the largest number of accidents with eighteen. The seven-month period from April until October had 92 per cent of the accidents. These facts are revealed in Table 8.

TABLE 8.--Month the motorcycle accident occurred.

Month	Number	Percent
February	1	1
March	1	1
April	15	15
May	18	18
June	11	11
July	11	11
August	15	15
September	11	11
October	11	11
November	6	6
Total	100	100

Day of the Month the Accident Occurred

Using a calendar month of thirty-one days, there was only one day of the month on which an accident did

not occur. It was the twenty-ninth day. The accident frequencies were fairly well distributed over the month with the thirteenth day having the largest number (18). The data described above may be found in Table 9.

TABLE 9.--Day of the month the accident occurred.

Day of the Month	Number	Percent
0-05	20	20
6-10	11	11
11-15	25	25
16-20	15	15
21-25	13	13
26-31	16	16
Total	100	100

Day of the Week the Accident Occurred

The day of the week the accident occurred was almost evenly distributed over the seven-day period; even though 47 per cent of the accidents occurred on the days of Friday, Saturday, and Sunday. This is a rather startling fact when 93 per cent of the motorcyclists said they did most of their riding on the week-ends. The breakdown of accidents occurring during the week may be found in Table 10.

TABLE 10.--Day of the week the accident occurred.

Day of the Week	Number	Percent
Sunday	9	9
Monday	11	11
Tuesday	19	19
Wednesday	12	12
Thursday	11	11
Friday	22	22
Saturday	16	16
Total	100	100

Medical Costs of the Motorcycle Accident

The medical costs of the motorcycle accidents in this study ranged from $0 to $6,500. The mean of the costs of the accident was $241. There were twenty-eight accidents in which there was no medical cost involved. Table 11 shows the medical costs of the motorcycle accidents.

TABLE 11.--Medical costs of the motorcycle accidents.

Cost of the Accident in Dollars	Number	Percent
$ 000	28	28
1-100	32	32
101-200	13	13
201-500	17	17
501-1,000	7	7
1,001-2,000	2	2
over 2,000	1	1
Total	100	100

Note: Mean medical cost of the motorcycle accident is $241.

Experience in Riding a Motorcycle

The motorcyclists interviewed were found to be more experienced in riding a motorcycle than were found in other studies. Many had a tremendous amount of motorcycle riding experience. One interviewee had a total of 300 months which equals 25 years of riding experience. Only three persons interviewed had one month's riding experience at the time of the accident. The mean number of months of riding experience for motorcyclists used in this study was 31.64 months. This mean is high when one considers that 61 per cent of the riders had 18 months of experience or less. This skewing of the mean is caused

primarily by the one individual who had 300 months of riding experience. These facts are presented in Table 12.

TABLE 12.--Riding experience of motorcyclists in months.

Riding Experience in Months	Number	Percent
0-06	22	22
7-12	26	26
13-18	13	13
19-24	6	6
25-30	7	7
31-36	7	7
over 36	19	19
Total	100	100

Note: Mean riding experience in months is 31.64.

Hours of Riding per Week of Motorcyclists

Motorcyclists interviewed had a mean number of hours of riding per week of 3.12 hours. The frequencies and percentages in Table 13 show that the number of hours of riding per week is quite evenly distributed with the greatest frequency between 6-10 hours per week and the smallest frequency from 0-5 hours per week.

TABLE 13.--Hours of riding per week of motorcyclists.

Hours	Number	Percent
0-05	13	13
6-10	25	25
11-15	22	22
16-20	17	17
Over 20	23	23
Total	100	100

Note: Mean hours of riding per week is 3.12.

Does the Motorcyclist Ride Everyday

Table 14 shows the frequencies of motorcyclists riding everyday. The table indicates an almost even distribution (51% to 49%) between those who rode everyday and those who did not.

TABLE 14.--Does the motorcyclist ride everyday.

Everyday	Number	Percent
Yes	51	51
No	49	49
Total	100	100

Time of Day the Motorcyclist Generally Rides

When asked what time of day the interviewees generally rode their motorcycles, 78 per cent said that

they rode from 4-8 P.M. in the afternoon. No motorcyclist rode between 12-8 A.M. and only 2 per cent and 3 per cent, respectively, rode between 8-12 P.M. and 8-12 A.M. Table 15 shows these facts.

TABLE 15.--Time of day the motorcyclist generally rides.

Time	Number	Percent
12-4 A.M.	0	0
4-8 A.M.	0	0
8-12 Noon	3	3
12-4 P.M.	17	17
4-8 P.M.	78	78
8-12 Midnight	2	2
Total	100	100

Time of the Accident

The interviewees' questionnaires revealed that 70 per cent of the accidents occurred between the hours of 12-8 P.M. This is also the period of time of greatest use, as 95 per cent of the interviewees stated that they generally rode their motorcycles during these hours (see Table 15). The time the accident occurred appears in Table 16.

TABLE 16.--Time of the accident.

Time	Number	Percent
12-4 A.M.	4	4
4-8 A.M.	2	2
8-12 Noon	7	7
12-4 P.M.	35	35
4-8 P.M.	35	35
8-12 Midnight	17	17
Total	100	100

Purpose of the Motorcycle

The motorcyclists used their motorcycles for recreational purposes 87 per cent of the time. The motorcycles were used for racing and work the remaining 13 per cent of the time. These facts are depicted in Table 17.

TABLE 17.--Purpose of the motorcycle.

Purpose	Number	Percent
Recreation	87	87
Racing	2	2
Work	11	11
Total	100	100

Day of the Week When Riding Most Likely Occurs

Ninety-three per cent of the motorcyclists said they rode mostly on Fridays, Saturdays, and Sundays. This is consistent with their responses on purpose of the motorcycle when 87 per cent said they used their motorcycles for recreational purposes. Table 18 illustrates the responses of motorcyclists when asked on what day of the week they were most likely to ride their motorcycles.

TABLE 18.--Day of the week when riding most likely occurs.

Day	Number	Percent
Sunday	46	46
Monday	3	3
Tuesday	0	0
Wednesday	2	2
Thursday	2	2
Friday	9	9
Saturday	38	38
Total	100	100

Length of Time Riding the Motorcycle When the Accident Occurred

The motorcyclists in 95 per cent of the cases had been riding for a period of less than two hours when the accident occurred. No one had been riding longer than six hours. These data are presented in Table 19.

TABLE 19.--Length of time riding the motorcycle when the accident occurred.

Hours	Number	Percent
0-2	95	95
3-4	4	4
5-6	1	1
6-8	0	0
Over 8	0	0
Total	100	100

Kind of Locality Where the Accident Occurred

Almost one-half (46%) of the motorcycle accidents occurred in a residential area. However, 40 per cent of the accidents occurred in industrial and business areas. Very few happened in rural areas (9%) or near school (5%). This information is found in Table 20.

TABLE 20.--Kind of locality where the accident occurred.

Kind of Locality	Number	Percent
Industrial	11	11
Shopping or Business	29	29
School	5	5
Residential	46	46
Rural	9	9
Total	100	100

Motorcyclist Generally Riding in His Home County

Table 21 shows that in only 2 per cent of the cases the interviewees did not generally ride in their home county.

TABLE 21.--Motorcyclist generally riding in his home county.

Riding in Home County	Number	Percent
Yes	98	98
No	2	2
Total	100	100

First Time in the Area Where the Accident Occurred

Table 22 revealed that in 11 per cent of the cases it was the first time for motorcyclists in the area where the accident occurred.

TABLE 22.--First time in the area where the accident occurred.

First Time in Area	Number	Percent
Yes	11	11
No	89	89
Total	100	100

Occurrences of Riding on the Road Where the Accident Occurred

The motorcyclists indicated that they normally rode on the road where the accident occurred at least once a week in 77 per cent of the cases. Only 9 per cent said they had never ridden on the road where the accident occurred. These facts and figures are illustrated in Table 23.

TABLE 23.--Occurrences of riding on the road where the accident occurred.

Occurrences of Riding	Number	Percent
Everyday	17	17
Twice a week	38	38
Once a week	22	22
Once a month	7	7
Every few months	7	7
Never	9	9
Total	100	100

Type of Roadway

The type of roadway on which the accident occurred may be found in Table 24. As can be seen in this table, 50 per cent of the accidents occurred on two-lane roadways. Another 31 per cent occurred on four-lane roadways and 8 per cent occurred on one-way streets. Only 4 per cent occurred on divided and limited access roadways.

TABLE 24.--Type of roadway.

Type of Roadway	Number	Percent
Unpaved--any width	1	1
One-way street	8	8
One driving lane	3	3
Two driving lanes	50	50
Three driving lanes	3	3
Four driving lanes	31	31
Divided roadway	3	3
Limited access	1	1
Total	100	100

Type of Road Surface

The type of road surface on which the accident occurred was asphalt in 89 per cent of the accidents studied. Nine per cent of the accidents occurred on a concrete roadway and the remaining 2 per cent occurred on a graveled roadway. This information can be found in Table 25.

TABLE 25.--Type of road surface.

Type of Road Surface	Number	Percent
Asphalt	89	89
Concrete	9	9
Gravel	2	2
Dirt	0	0
Total	100	100

Vertical Contour of the Roadway

When looking at the vertical contour of the roadway on which the accidents occurred, one sees that in 90 per cent of the cases the roadway was level. An additional 8 per cent were on a slight grade. These facts are found in Table 26.

TABLE 26.--Vertical contour of the roadway.

Vertical Contour	Number	Percent
Level	90	90
Slight grade	8	8
Steep grade	1	1
Hill crest	1	1
Dip	0	0
Total	100	100

Horizontal Contour of the Roadway

Presented in Table 27 are the data relative to the horizontal contour of the roadway. This table shows that 82 per cent of the accidents studied occurred on a straight roadway. Eleven per cent were on a slight curve and 7 per cent were on a sharp curve.

TABLE 27.--Horizontal contour of the roadway.

Horizontal Contour	Number	Percent
Straight	82	82
Slight curve	11	11
Sharp curve	7	7
Other	0	0
Total	100	100

Highway Condition

When asked the condition of the highway at the accident location, no respondent reported the condition to be crowned, with chuck holes, or a "washboard" surface. Table 28 shows this information.

TABLE 28.--Highway condition.

Highway Condition	Number	Percent
Crowned road	0	0
Chuck holes	0	0
"Washboard"	0	0
Other	100	100
Total	100	100

Light Conditions

Table 29 shows the light conditions for all accidents. This table reveals that the majority, 63 per cent, of the accidents occurred during daylight. Over a fourth,

27 per cent, happened at night and 9 per cent happened at dusk. Only 1 per cent occurred at dawn.

TABLE 29.--Light conditions.

Light Conditions	Number	Percent
Daylight	63	63
Darkness	27	27
Dawn	1	1
Dusk	9	9
Total	100	100

Weather Conditions

Eighty-three per cent of the motorcycle accidents occurred during clear weather. Cloudy and rain conditions occurred in 12 and 5 per cent, respectively, of the cases. The respondents did not report any other conditions. This information is presented in Table 30.

TABLE 30.--Weather conditions.

Weather Conditions	Number	Percent
Clear	83	83
Cloudy	12	12
Rain	5	5
Snow	0	0
Fog	0	0
Other	0	0
Total	100	100

Condition of the Road Surface

The condition of the road surface at the time of the accident was dry in 92 per cent of the cases. Wet conditions prevailed in 6 per cent of the cases and no accident occurred when the pavement was snowy or icy. Two per cent of the motorcyclists reported the condition of the road surface as "other." In one case there was gravel on the road surface and in the other case there was sand. These facts are found in Table 31.

TABLE 31.--Condition of the road surface.

Road Surface Condition	Number	Percent
Dry	92	92
Wet	6	6
Snowy or icy	0	0
Other	2	2
Total	100	100

Riding with Headlight On

Table 32 shows the responses when the interviewees were asked if they were riding with their headlights on at the time of the accident. Forty-one per cent were and 59 per cent were not.

TABLE 32.--Riding with headlight on.

Headlight on	Number	Percent
Yes	41	41
No	59	59
Total	100	100

Reduced Visibility at the Time of the Accident

Presented in Table 33 are the responses of the interviewees when asked if their visibility was reduced at the time of the accident. Nine per cent answered affirmatively and the remaining 91 per cent indicated visibility was not reduced.

TABLE 33.--Reduced visibility at the time of the accident.

Reduced Visibility	Number	Percent
Yes	9	9
No	91	91
Total	100	100

Lack of Signs Where the Accident Occurred

Table 34 shows that in only 4 per cent of the cases was there a lack of signs where the accident occurred. The other ninety-six said that this was not the case.

TABLE 34.--Lack of signs where the accident occurred.

Lack of Signs	Number	Percent
Yes	4	4
No	96	96
Total	100	100

Distractions at the Time the Accident Occurred

Table 35 shows that 87 per cent of the interviewees did not indicate any distractions at the time of the accident. The other 13 per cent said there was some degree of distraction just before the accident occurred.

TABLE 35.--Distractions at the time the accident occurred.

Distractions	Number	Percent
Yes	13	13
No	87	87
Total	100	100

Action Taken to Reduce the Severity of the Accident

Table 36 shows the responses of the interviewees when asked if they took any action to reduce the severity of the accident. Fifty-four per cent said they did and 46 per cent indicated they did not. The kinds of actions which could have been taken to reduce the severity of the accident were as follows: (1) swerving to the right or to

the left, (2) braking hard, (3) laying the motorcycle down, and (4) jumping off the motorcycle.

TABLE 36.--Action taken to reduce the severity of the accident.

Action Taken	Number	Percent
Yes	54	54
No	46	46
Total	100	100

Motorcyclist Upset or Worried Just Prior to the Accident

Presented in Table 37 are the responses of the interviewees when asked if they were upset or worried just prior to the accident. In only 2 per cent of the cases was the motorcyclist upset or worried.

TABLE 37.--Motorcyclist upset or worried just prior to the accident.

Upset or Worried	Number	Percent
Yes	2	2
No	98	98
Total	100	100

Trip Origination

Table 38 indicates the origination of the trip just before the accident occurred. One-half of the

interviewees indicated that they were leaving home just prior to the accident.

TABLE 38.--Trip origination.

Trip Origination	Number	Percent
Work	5	5
Home	50	50
Other	45	45
Total	100	100

Trip Destination

Two-thirds of the interviewees indicated they were going places other than home or work when the accident occurred. This is revealed in Table 39.

TABLE 39.--Trip destination.

Trip Destination	Number	Percent
Work	8	8
Home	26	26
Other	66	66
Total	100	100

Motorcyclist Riding Differently After the Accident

Presented in Table 40 are the responses to the question whether the motorcyclist rode differently after

the accident. This table indicates that 60 per cent of the motorcyclists said they were not riding any differently after the accident than before.

TABLE 40.--Riding differently after the accident.

Riding Differently	Number	Percent
Yes	40	40
No	60	60
Total	100	100

Anything Mechanically Wrong with the Motorcycle

Table 41 shows that only 4 per cent of the interviewees reported there was something mechanically wrong with the motorcycle just prior to the accident.

TABLE 41.--Anything mechanically wrong with the motorcycle.

Mechanically Wrong	Number	Percent
Yes	4	4
No	96	96
Total	100	100

Drinking Prior to the Accident

Table 42 indicates if the motorcyclist had been drinking prior to the accident. The table shows that six of the seven persons drinking had been drinking beer.

The seventh person had been drinking whiskey. Ninety-three had not been drinking.

TABLE 42.--Drinking prior to the accident.

What Drinking	Number	Percent
Beer	6	6
Wine	0	0
Whiskey	1	1
Other	0	0
Not drinking	93	93
Total	100	100

What Drugs Were Taken

Only one interviewee reported using any drugs prior to the motorcycle accident. In this particular case, the interviewee had smoked marijuana. Ninety-nine had not taken any drugs prior to the accident. This information may be seen in Table 43.

TABLE 43.--What drugs were taken.

Drugs Taken	Number	Percent
None	99	99
Amphetamines	0	0
Barbituates	0	0
Tranquilizers	0	0
Hallucinogens	0	0
Marijuana	1	1
Other	0	0
Total	100	100

Use of Alcohol and Drugs Prior to the Accident

Presented in Table 44 is the use of alcohol and drugs prior to the accident. When asked if both alcohol and drugs were used prior to the accident, one respondent replied affirmatively. Apparently the one interviewee, who responded to using drugs as indicated in Table 43, also had used alcohol. The interviewees were previously asked about the use of alcohol or of drugs. Medical research has shown that the use of alcohol and drugs simultaneously multiplies the effects; therefore, the interviewees were asked if they had used the combination of alcohol and drugs just prior to the accident.

TABLE 44.--Use of alcohol and drugs prior to the accident.

Use of Alcohol and Drugs	Number	Percent
Yes	1	1
No	99	99
Total	100	100

Number of Hours of Motorcycle Riding Instruction

The number of hours of motorcycle riding instruction received by the interviewees may be found in Table 45. Thirty-one per cent of the interviewees received no riding instruction at all, and 51 per cent received only

one hour. The remaining 18 per cent received more than one hour.

TABLE 45.--Hours of motorcycle riding instruction.

Hours of Riding Instruction	Number	Percent
None	31	31
1	51	51
2	11	11
3	0	0
4	0	0
5	1	1
6	1	1
Over 6	5	5
Total	100	100

Type of Motorcycle Riding Instruction

The type of motorcycle riding instruction received by the interviewees is found in Table 46. Sixty-one per cent received verbal instruction, while only 7 per cent received behind-the-wheel instruction.

TABLE 46.--Type of motorcycle riding instruction.

Type of Riding Instruction	Number	Percent
Verbal	61	61
Behind-the-wheel	7	7
Not applicable	1	1
None	31	31
Total	100	100

Type of Motorcycle Riding Instructor

Table 47 shows the type of instructor or the agency from whom the interviewees obtained their motorcycle riding instruction. The table shows that most of the instruction being given came from friends (36%) and from the motorcycle dealers (22%). Thirty-one per cent did not receive instruction.

TABLE 47.--Type of motorcycle riding instructor.

Type of Instructor	Number	Percent
Driver Education Program	3	3
Local Safety Council	1	1
Dealer	22	22
Parent	6	6
Friend	36	36
Not available	1	1
None	31	31
Total	100	100

Completion of a Driver Education Program

Table 48 presents the responses on whether or not the motorcyclist completed a driver education program. The table shows that motorcyclists in 87 per cent of the cases had completed an approved course in driver education.

TABLE 48.--Completion of a driver education program.

Driver Education Program	Number	Percent
Yes	87	87
No	13	13
Total	100	100

The Number of Hours of Motorcycle Instruction in the Driver Education Program

The interviewees reported in 67 per cent of the cases that there was no motorcycle riding instruction contained in the driver education program. Twenty-five per cent of the interviewees reported that they received one hour of motorcycle instruction in a driver education program. Table 49 shows these facts.

TABLE 49.--Number of hours of motorcycle instruction in the driver education program.

Hours of Instruction	Number	Percent
0	67	67
1	25	25
2	8	8
3	0	0
4	0	0
5	0	0
Over 5	0	0
Total	100	100

Familiarity with Motorcycle Regulations in Michigan

Table 50 shows that in 85 per cent of the cases the interviewees indicated that they were familiar with the motorcycle regulations in the state of Michigan.

TABLE 50.--Familiarity with motorcycle regulations in Michigan.

Familiarity with Regulations	Number	Percent
Yes	85	85
No	15	15
Total	100	100

Motorcycle Insured

Table 51 shows that there were only six interviewees who reported that their motorcycles were not insured at the time of the accident.

TABLE 51.--Motorcycle insured.

Insured	Number	Percent
Yes	94	94
No	6	6
Total	100	100

Motorcyclist Wearing Protective Gear at the Time of the Accident

Table 52 shows the responses of the interviewees to whether or not they wore protective gear at the time of the accident. Ninety-eight per cent of the interviewees reported that they were wearing a helmet at the time of the accident. Only 36 per cent of the interviewees reported wearing goggles or a face shield, only 23 per cent wore boots, and only 21 per cent reported wearing protective clothing.

TABLE 52.--Motorcyclist wearing protective gear at the time of the accident.

Protective Gear	Response	Number	Percent
Protective Helmet	Yes	98	98
	No	2	2
	Total	100	100
Goggles or Face Shield	Yes	36	36
	No	64	64
	Total	100	100
Boots	Yes	23	23
	No	77	77
	Total	100	100
Protective Clothing	Yes	21	21
	No	79	79
	Total	100	100

Motorcyclist Took a Special Operator's Examination

Table 53 shows that in 68 per cent of the cases the interviewees took a special examination to operate a motorcycle.

TABLE 53.--Motorcyclist took a special operator's examination.

Special Examination	Number	Percent
Yes	68	68
No	32	32
Total	100	100

Motorcycle Owned by the Interviewee

Table 54 shows that in 87 per cent of the cases the motorcycle was owned by the interviewee.

TABLE 54.--Motorcycle owned by the interviewee.

Ownership	Number	Percent
Yes	87	87
No	13	13
Total	100	100

Thought Just Before the Accident Occurred

The interviewees were asked to give their thoughts just before the accident occurred. Table 55 shows the results of their statements. Thirty-two per cent of the interviewees either did not remember or were thinking of nothing in particular. Twelve per cent were thinking of going home. Nine per cent were thinking of just riding the motorcycle and 8 per cent were just trying to ride.

TABLE 55.--Thought just before the accident occurred.

Thought	Number	Percent
Nothing in particular	16	16
Don't remember	16	16
Going home	12	12
Just riding	9	9
Trying to ride the bike	8	8
About the weather conditions	5	5
Girlfriend riding with me	4	4
Going to work	4	4
My passenger and I were talking	4	4
Concentrating on the traffic	4	4
Going shopping	3	3
Riding--making a left turn	3	3
Going to visit friends	2	2
Getting something to eat	2	2
Going to class	2	2
The looks of the other driver	1	1
Another motorcycle	1	1
Trying to place in a motorcycle race	1	1
My father	1	1
No answer	2	2
Total	100	100

Violation the Motorcyclist Was Charged with in Connection with the Accident

The most frequent violation the motorcyclists were charged with was the failure to yield the right-of-way. Table 56 shows the breakdown of the violations. Seventy-eight per cent of the motorcyclists were not charged with a violation.

TABLE 56.--Violation the motorcyclist was charged with in connection with the accident.

Violation	Number	Percent
None	78	78
Speeding	5	5
Failure to Yield	7	7
Disobeying Traffic Signal	0	0
No Operator's License	3	3
No Insurance	3	3
Other	4	4
Total	100	100

Advice of Motorcyclist to Prevent the Accident

The interviewees were asked to give their advice to other motorcyclists on how to prevent this type of accident. Table 57 shows that 50 per cent, the most frequest response, said they would advise other motorcyclists to ride more defensively--watching out for automobiles. The motorcyclists also gave a total of eighteen other different suggestions which are found in Table 57.

TABLE 57.--Advice of motorcyclists to prevent the accident.

Advice	Number	Percent
Ride defensively, watching out for automobiles	50	50
Pay attention to the road at all times	7	7
When there is a lot of traffic, slow down	5	5
Ride the motorcycle at a speed where you can control it	4	4
Ride with headlight on during the day	4	4
Be familiar with the motorcycle	3	3
Don't follow cars too closely	3	3
Slow down in unfamiliar environment	3	3
Slow down in rain	3	3
Keep the motorcycle in good condition	3	3
Be sure to look both ways before pulling into traffic	2	2
Don't ride in traffic	2	2
Never pull off the road into loose gravel or sand	2	2
Don't "show off" on the motorcycle	1	1
Ride in the left side of the lane so other drivers can see you	1	1
Know how to dismount the motorcycle to prevent injury	1	1
Be very careful when accelerating	1	1
Boycott Motorcycle Club events (unsafe practices advocated)	1	1
When riding by a farm, make sure there are no animals out by the road where they might get into the roadway	1	1
Don't know	1	1
None	2	2
Total	100	100

Causes of the Motorcycle Accident As Stated by the Interviewee

As can be seen in Table 58, there were numerous causes of the motorcycle accidents. However, 28 per cent of the interviewees stated that cars pulled out in front of them. Also, 19 per cent of the accidents were caused by cars turning left in front of the motorcycles. These facts, as well as many others, are found in Table 58.

TABLE 58.--Causes of the motorcycle accident as stated by the interviewee.

Cause	Number	Percent
Car pulled out in front of me	28	28
Car turned left in front of me	19	19
Going too fast	11	11
Accelerated too fast	5	5
Looking down and hit a large rock	2	2
Weaving in the lane and hit a passing car	1	1
Front fork loose and began bouncing and lost control	2	2
Unfamiliar with the road	1	1
Unfamiliar with the motorcycle	1	1
Pulling out of a driveway into the path of a car	1	1
Cars stopped in front of me and I hit them in the rear	3	3
Car turned into me	2	2
I hit a rock and the rear tire blew out	1	1
I turned left into the side of a car	1	1
I pulled out in front of a car at an intersection	1	1
Car cut me off in a lane of traffic	1	1
Improper backing of a car	3	3
Car hit me from the rear	2	2
Truck hit me from the rear	1	1
I released the clutch too fast	1	1
I had trouble controlling the motorcycle--inexperience	1	1
Inadequate road signs	1	1
Skidded in loose gravel	2	2
Sand on the road surface	1	1
I changed lanes and hit a car in the rear	1	1

TABLE 58.--Continued.

Cause	Number	Percent
I looked away and hit the curb	2	2
I was turning a curve and looked away	1	1
I went over an open sewer top	1	1
A youth threw a large ball at me	1	1
A cow ran into the roadway and I hit the cow	1	1
I can't remember	1	1
Total	100	100

Case Studies

Presented in this section are fifteen case studies. These case studies were determined by the accident categories found in Table 3.

The case studies that were presented were typical of all motorcycle accidents in this study. It was hoped that the case studies would give further insight into the data related to these motorcycle accidents. In reference to the use of these case studies, traffic safety educators, when teaching motorcycle rider education, could utilize these studies in the classroom. In presenting these case studies, the educators would be able to point out the conditions under which motorcycle accidents happen and the most common hazards to prospective motorcycle riders.

Included in each case study is a situational diagram illustrating the scene of the accident. This diagram includes signs, symbols, identifying persons, vehicles,

and other objects that aid in clarifying the accident scene.

Data presented in each case study were as follows:

1. Type of Accident
2. Environmental Conditions--Roadway
    a. Type
    b. Surface
    c. Character
    d. Condition
3. Kind of Locality
4. Time
5. Light Conditions
6. Weather Conditions
7. Traffic Conditions
8. Vehicle Information
    a. Make
    b. Model
    c. Year
    d. Condition
9. Driver Data
    a. Sex
    b. Age
    c. Driving Experience
    d. Violation in connection with the accident
10. Narrative Account of the Accident
11. Situational Diagram of the Accident

Case Number 1

1. Type of Accident: Car pulled in front of motorcycle

2. Environmental Conditions--Roadway
   a. Type: 1 lane
   b. Surface: dry
   c. Character: straight and level
   d. Condition: good

3. Kind of Locality: School

4. Time: 10:35 A.M., April 15

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Heavy

8. Vehicle Information
   a. Make: Harley-Davidson
   b. Model: Sportster
   c. Year: 1969
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 26
   c. Riding Experience: 10 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.
      Note: The driver of the car was charged with failure to yield the right-of-way.

10. Narrative Account of the Accident:
    Dan, who was working the morning of the accident, left work to go home to pick up some of his work equipment. While traveling through a school area on his way back to work, a car pulled out in front of him. The impact of this collision caused Dan and the motorcycle to swerve to the right, hitting a car parked on the right side of the road. Because both were traveling at a very low rate of speed, Dan was not injured in this accident. Dan was wearing a protective helmet and face shield, but was wearing no protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 1).

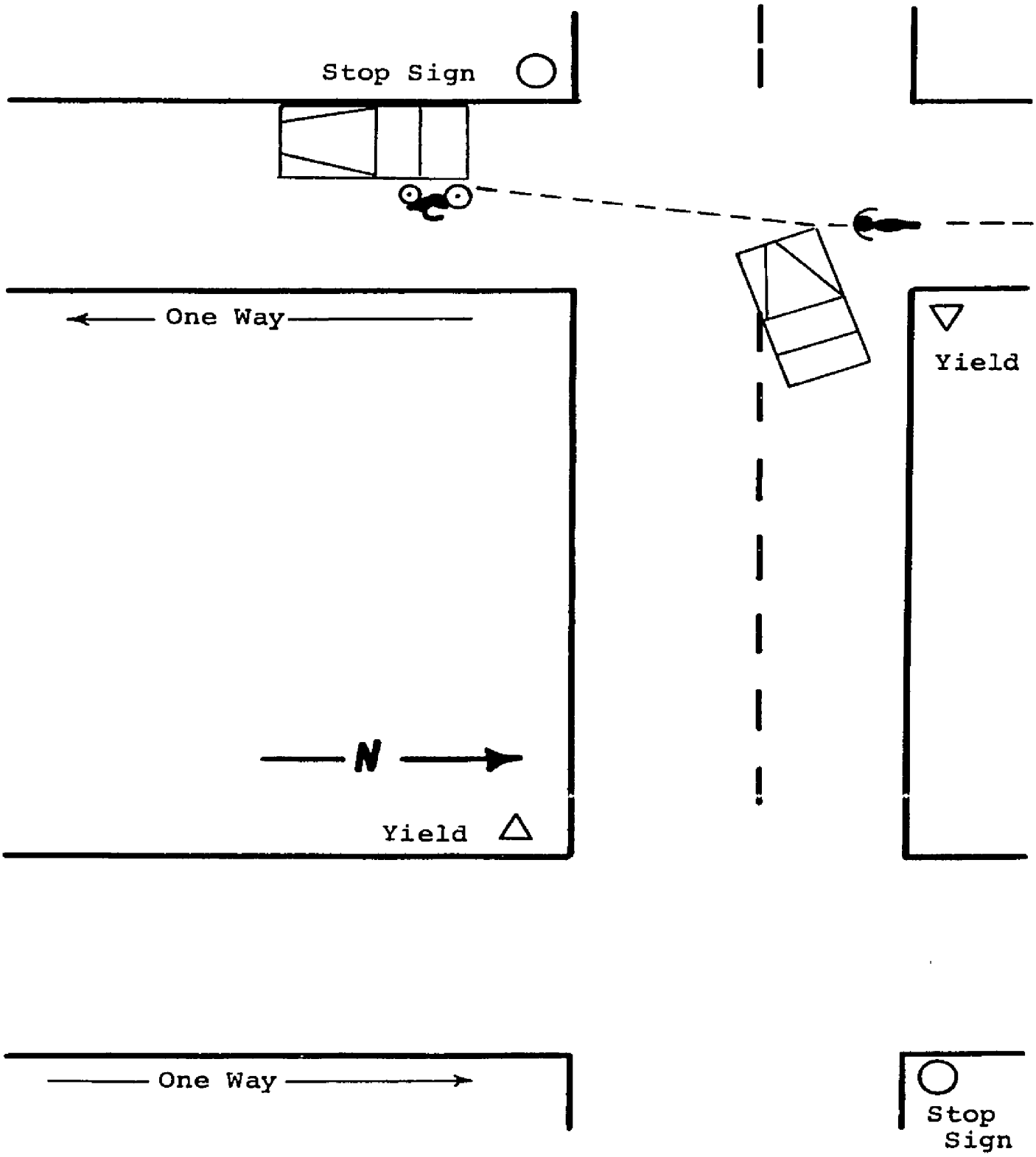

FIGURE 1.--Car Pulled in Front of Motorcycle.

Case Number 2

1. Type of Accident: Car pulled in front of motorcycle

2. Environmental Conditions--Roadway
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Residential

4. Time: 2:35 P.M., April 9

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Moderate

8. Vehicle Information:
   a. Make: Triumph
   b. Model: 500
   c. Year: 1969
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 19
   c. Riding Experience: 2 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.
      Note: Other driver was charged with failure to yield right-of-way.

10. Narrative Account of the Accident:
Larry had been out in the country riding his motorcycle and was returning home when the accident occurred. He was riding down a two-lane street when a car pulled up from a side street. Larry did not have enough time or space to avoid hitting the other car. As is the case of many other motorcyclists, Larry received some cuts and bruises from the accident but was not hurt seriously. However, the accident could have been more serious; Larry hit his head on the pavement, but he was wearing a protective helmet. Larry was also wearing a face shield but was wearing no protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 2).

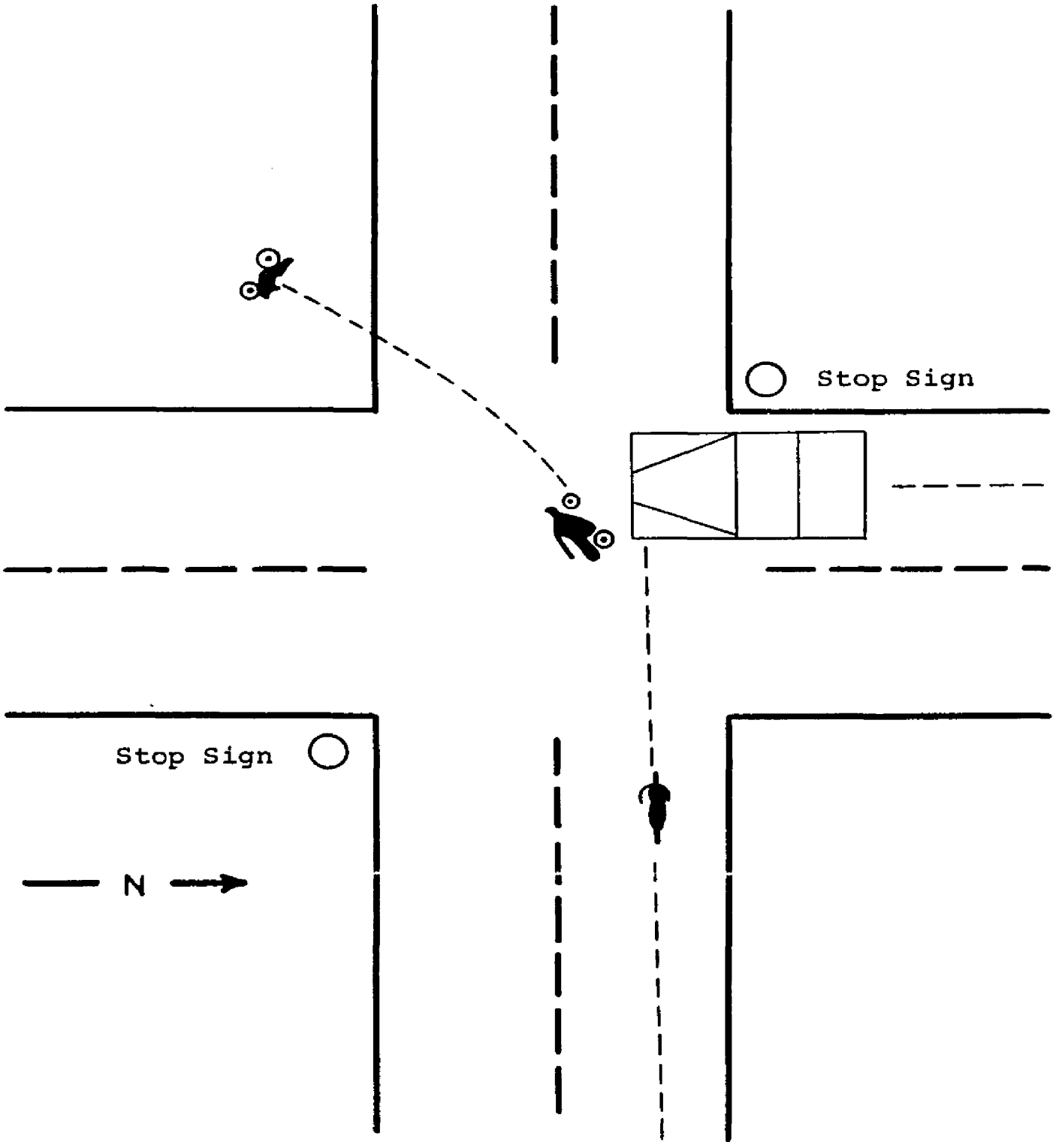

FIGURE 2.--Car Pulled in Front of Motorcycle.

Case Number 3

1. Type of Accident: Motorcycle pulled in front of car

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Residential

4. Time: 4:20 P.M., September 11

5. Light Conditions: Daylight

6. Weather Conditions: Cloudy

7. Traffic Conditions: Moderate

8. Vehicle Information:
   a. Make: Suzuki
   b. Model: 125
   c. Year: 1970
   d. Condition: Excellent

9. Driver Data:
   a. Sex: Male
   b. Age: 18
   c. Riding Experience: 3 months
   d. Violation in Connection with the Accident: Failure to yield right-of-way

10. Narrative Account of the Accident:
Tom had been over to a friend's house late one afternoon and was starting home. However, he did not get very far. He pulled out of a driveway in front of an oncoming car. Tom received some serious cuts, bruises, and internal injuries. He was wearing a protective helmet and boots, but was not wearing protective clothing.

11. Situational Diagram of the Accident (see Figure 3).

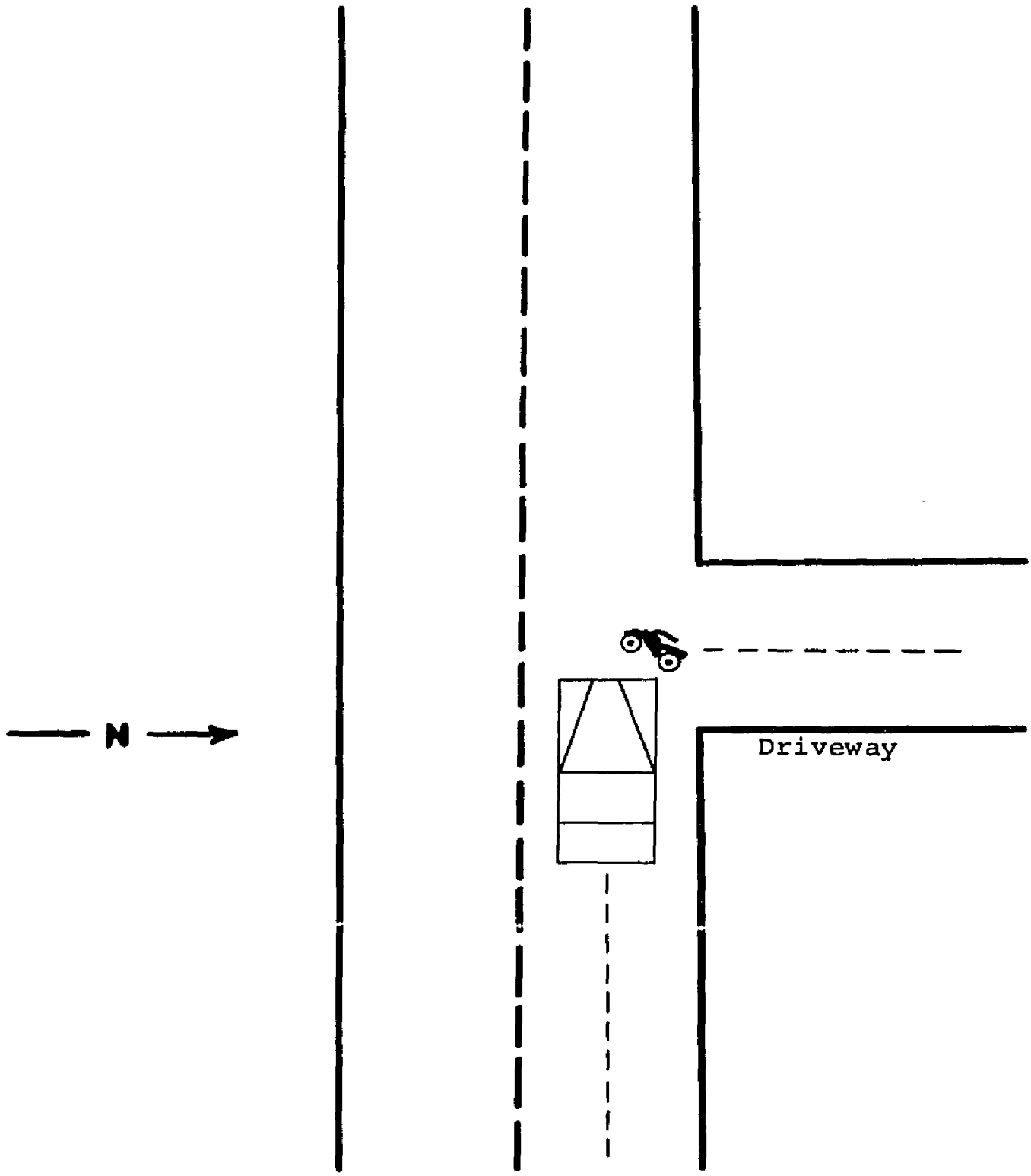

FIGURE 3.--Motorcycle Pulled in Front of Car.

Case Number 4

1. Type of Accident: Car turned left in front of motorcycle.

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Residential

4. Time: 6:05 P.M., April 7

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Triumph
   b. Model: 650
   c. Year: 1968
   d. Condition: Fair

9. Driver Data:
   a. Sex: Male
   b. Age: 22
   c. Riding Experience: 8 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.
      Note: The driver of the car was charged with failure to yield right-of-way.

10. Narrative Account of the Accident:
David was going to visit some friends the afternoon of the accident. He was riding in a residential area not far from his destination when an old man turned left in front of him. He stated that the other driver apparently did not see him when the driver of the car began to make a left turn. David said that he was going too fast to avoid hitting the other car. When David saw that a collision was unavoidable, he slowed down as much as possible and swerved to the right. Fortunately, this action could be responsible for David not having any injuries as a result of the accident. David was wearing a protective helmet but no other protective clothing.

11. Situational Diagram of the Accident (see Figure 4).

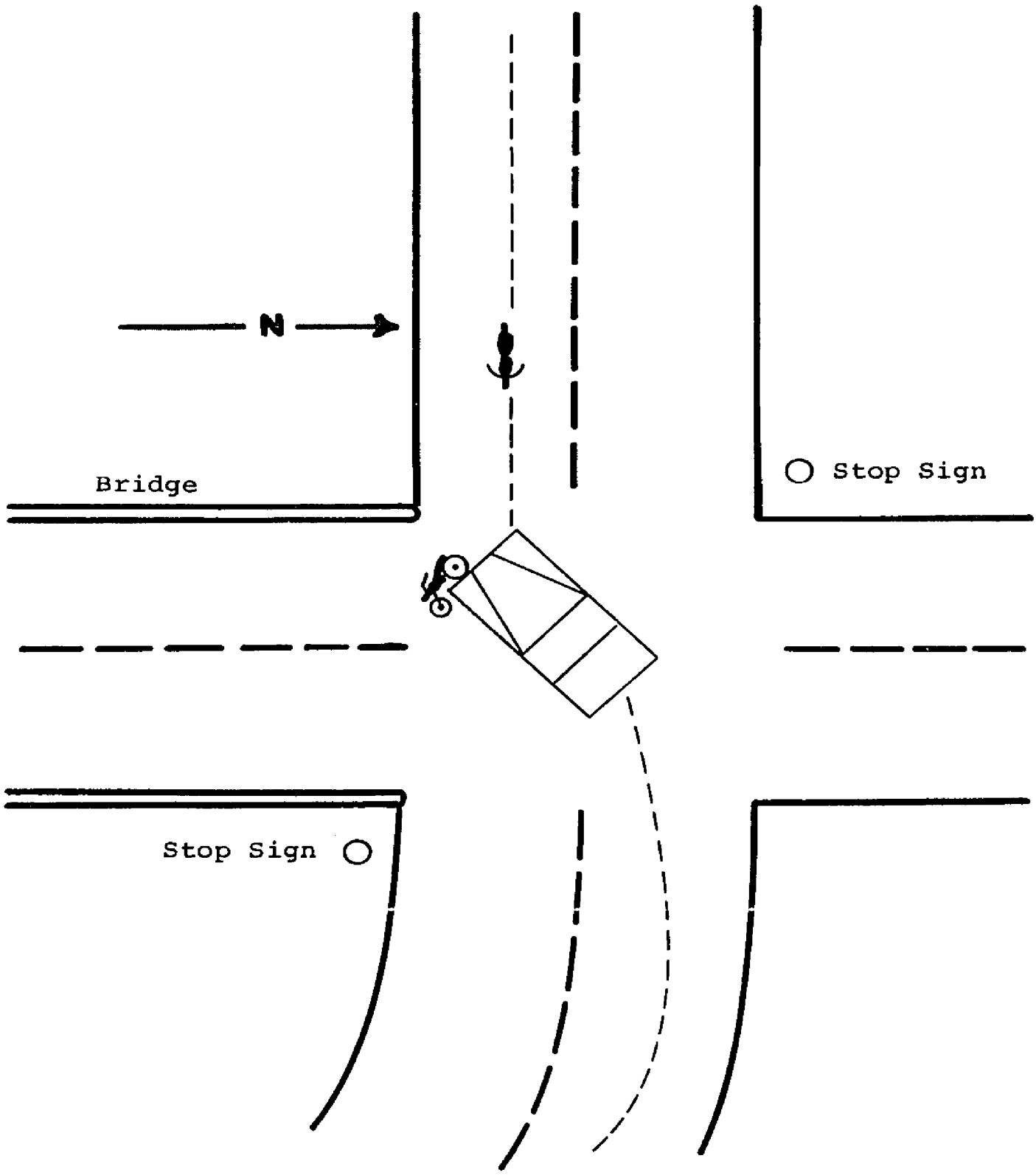

FIGURE 4.--Car Turned Left in Front of Motorcycle.

Case Number 5

1. Type of Accident: Car turned left in front of motorcycle.

2. Environmental Conditions--Roadway:
   a. Type: 4-lane
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Shopping or Business

4. Time: 4:20 P.M., August 5

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Heavy

8. Vehicle Information:
   a. Make: Yamaha
   b. Model: 175
   c. Year: 1971
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 25
   c. Riding Experience: 3 months
   d. Violation in Connection with the Accident: No violation in connection with the accident. Note: The driver of the car was charged with failure to yield the right-of-way.

10. Narrative Account of the Accident:
Charles had been shopping with some friends and decided to go to an ice cream shop about 2 miles away for some ice cream. While on his way to the ice cream shop, the driver of a car, who apparently did not see him, turned left in front of him going into a driveway. Charles was traveling in the far right lane going approximately 35 mph. He said he had paid no particular attention to the car until it began to turn in front of him. Charles received severe cuts and bruises on both right limbs as well as broken bones in both right limbs. He also sustained some damage to the rib cage. Charles was wearing a protective helmet and boots. However, he did not have on a protective face shield or protective clothing.

11. Situational Diagram of the Accident (see Figure 5).

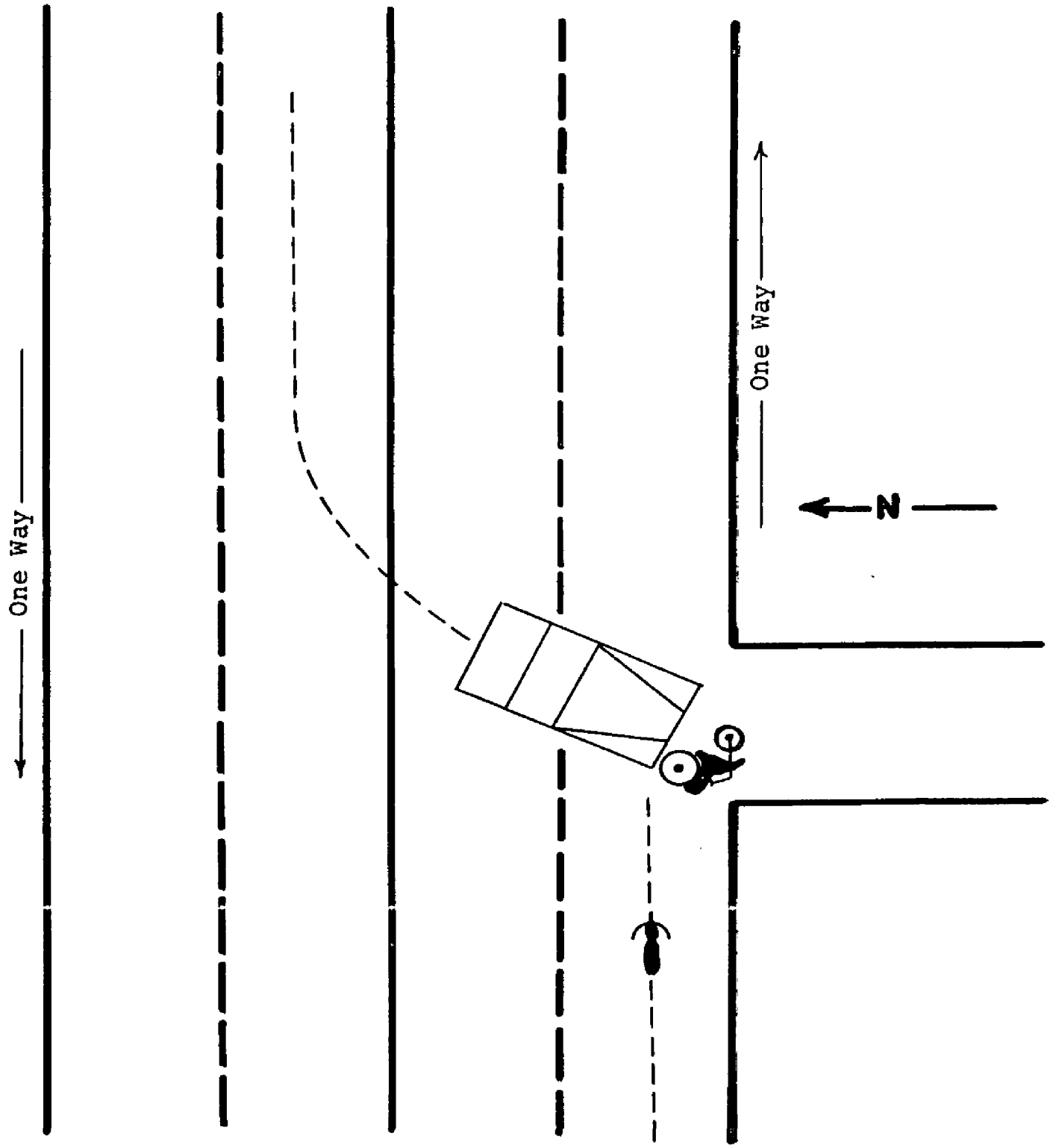

FIGURE 5.--Car Turned Left in Front of Motorcycle

Case Number 6

1. Type of Accident: Car turned into motorcycle

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Shopping or business

4. Time: 10:55 P.M., June 22

5. Light Conditions: Dark with street lights

6. Weather Conditions: Clear

7. Traffic Conditions: Moderate

8. Vehicle Information:
   a. Make: Honda
   b. Model: 350
   c. Year: 1969
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 21
   c. Riding Experience: 5 months
   d. Violation in Connection with the Accident: No violation in connection with the accident.

10. Narrative Account of the Accident:
Tom was out riding his motorcycle late one evening. He was going no place in particular and was enjoying the ride very much. He was riding very near the right edge of the roadway. Tom noticed a car that was straddling the line and taking up two lanes. Then, at the next intersection, Tom decided to pass on the right side. At that moment the driver of the car turned right and hit him as he was passing. The driver of the car had a vision obstruction and did not see the passing motorcycle. As a result of the accident, Tom received numerous cuts and bruises along with a broken knee cap. Tom was wearing a protective helmet but was not wearing any other protective equipment.

11. Situational Diagram of the Accident (see Figure 6).

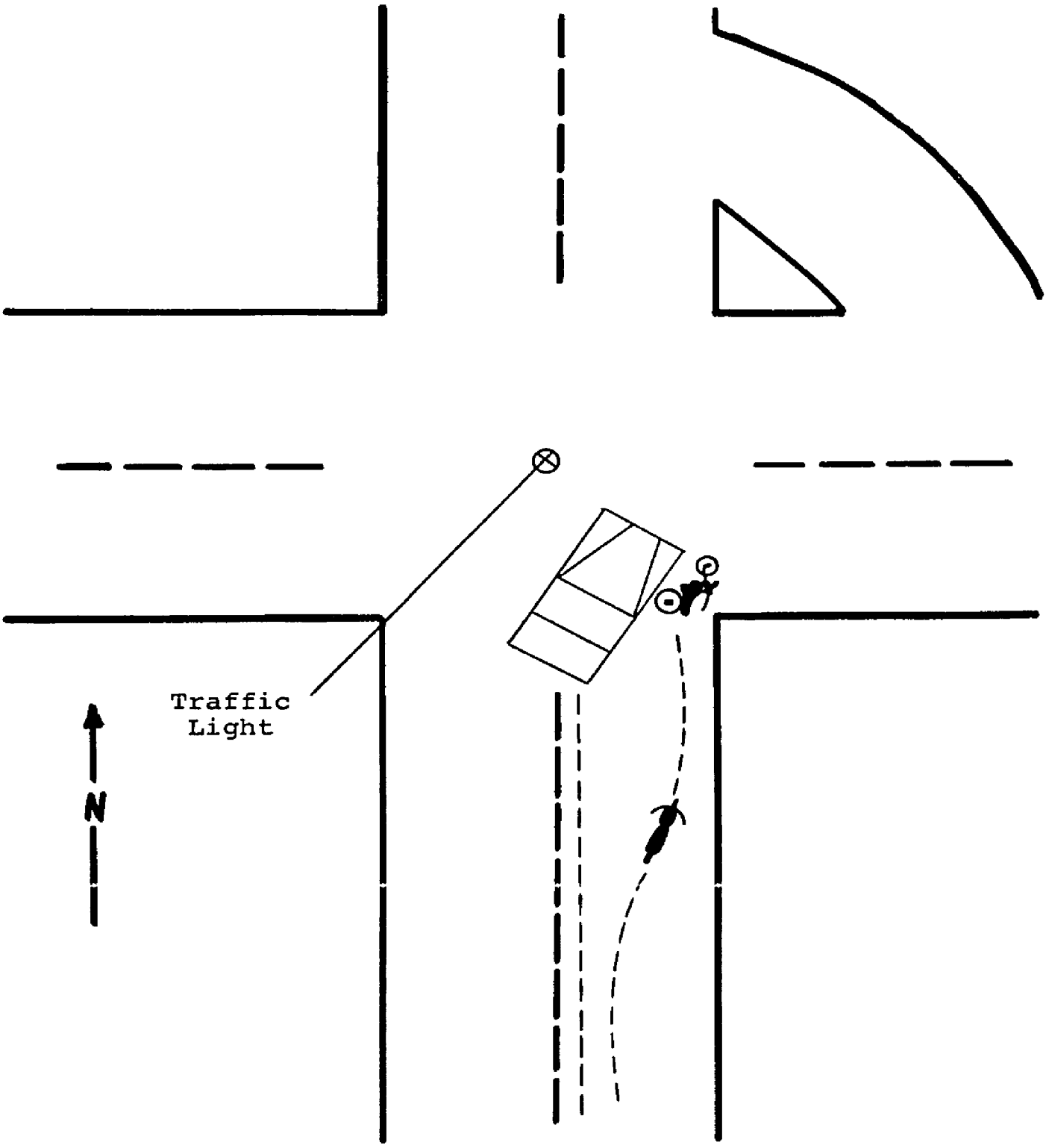

FIGURE 6.--Car Turned Into Motorcycle.

Case Number 7

1. Type of Accident: Cycle turned into car

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Rural

4. Time: 10:50 A.M., September 3

5. Light Conditions: Daylight

6. Weather Conditions: Cloudy

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Honda
   b. Model: 90
   c. Year: 1970
   d. Condition: Excellent

9. Driver Data:
   a. Sex: Male
   b. Age: 18
   c. Riding Experience: 2 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.

10. Narrative Account of the Accident:
Tim had only ridden his motorcycle very few times and was not completely familiar with it at the time of the accident. On the morning of the accident Tim had ridden his motorcycle out to a very lightly traveled road to get some additional riding experience. As he was traveling down the highway at approximately 10 mph, he was having difficulty controlling his motorcycle. He then realized a car was coming up behind him, so he decided to pull into the open field just to the left of the highway. Tim failed to perceive the car that was passing him until it was too late. He turned left into the passing car. Fortunately for Tim the car had slowed down and he received only a minor bruise as a result of the accident. Tim was wearing a protective helmet and a face shield but no protective clothing.

11. Situational Diagram of the Accident (see Figure 7).

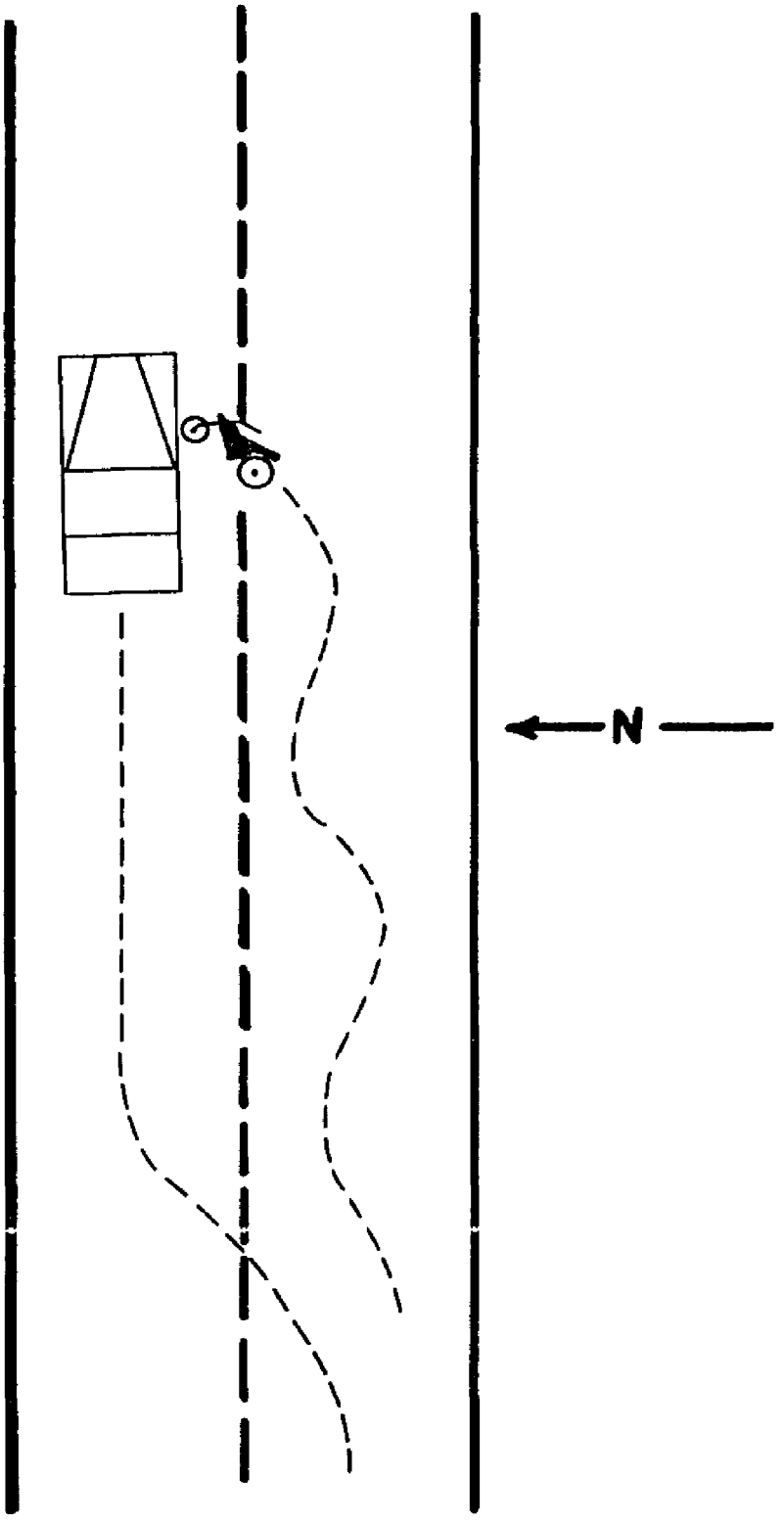

FIGURE 7.--Cycle Turned Into Car.

Case Number 8

1. Type of Accident: Ran off roadway

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Sharp curve and level
   d. Condition: Good

3. Kind of Locality: Rural

4. Time: 10:37 P.M., July 17

5. Light Conditions: Dark

6. Weather Conditions: Dry

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Honda
   b. Model: 500
   c. Year: 1970
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 30
   c. Riding Experience: 14 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.

10. Narrative Account of the Accident:
Richard was riding his motorcycle late one night in an unfamiliar area. He came upon a very sharp curve to the left and saw that he could not make the sharp curve. Richard then moved to the shoulder and tried to stop but hit some loose gravel and skidded over into a private yard. Richard received multiple bruises and some internal injuries. He was wearing a protective helmet and face shield but no protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 8).

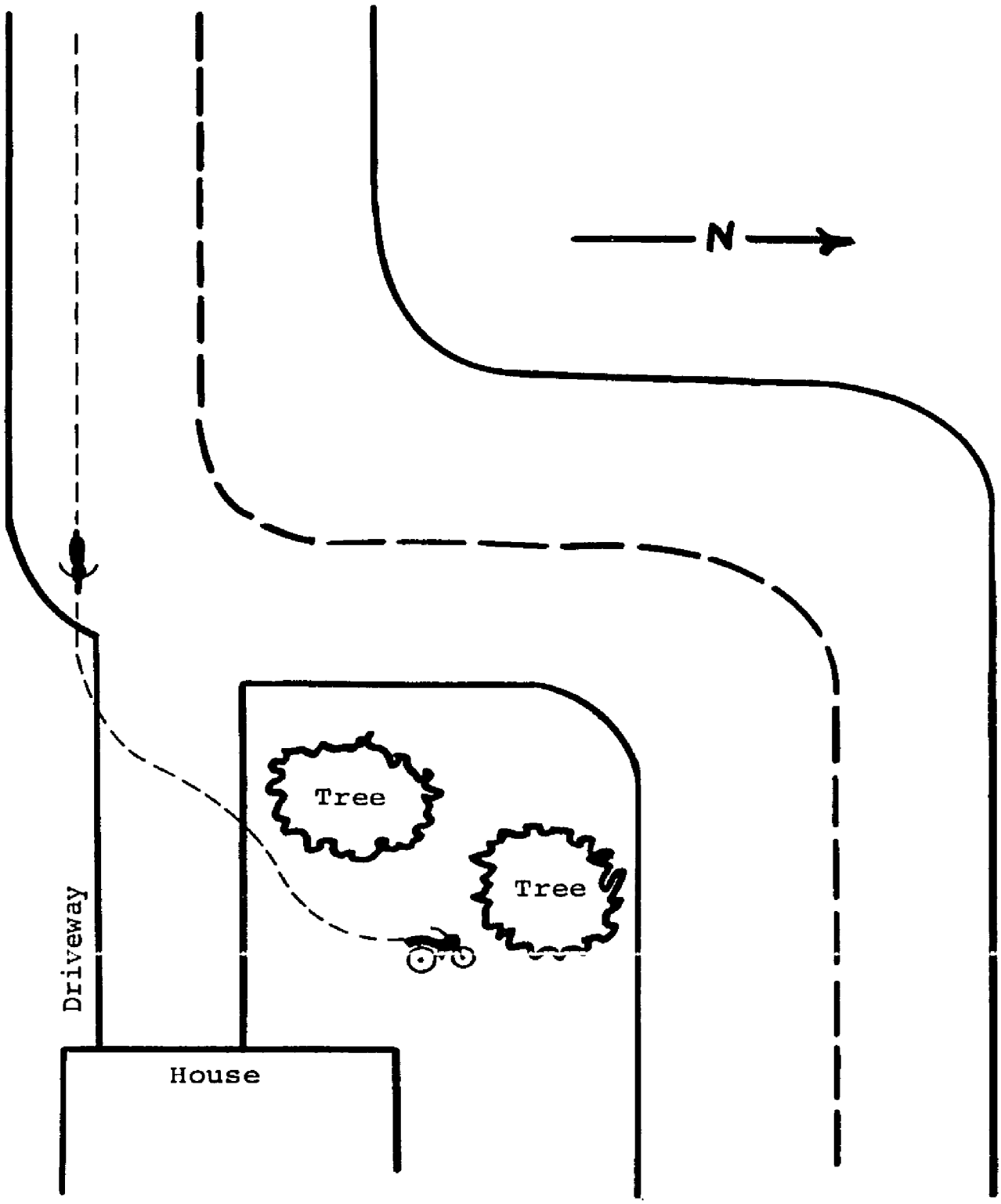

FIGURE 8.--Ran Off Roadway

Case Number 9

1. Type of Accident: Ran off roadway

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Sharp curve to right and level
   d. Condition: Good

3. Kind of Locality: Rural

4. Time: 12:40 P.M., April 20

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Very light

8. Vehicle Information:
   a. Make: Honda
   b. Model: 750
   c. Year: 1970
   d. Condition: Fair

9. Driver Data:
   a. Sex: Male
   b. Age: 21
   c. Riding Experience: 8 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.

10. Narrative Account of the Accident:
Glen was out in an unfamiliar rural area riding his motorcycle the day the accident occurred. He was riding his motorcycle faster than he should have been in this area. He came upon a sharp curve and, because of his limited riding experience, could not slow down enough to negotiate the curve. By not making the curve, he ran off the roadway and crashed into a guardrail along side the roadway. He received multiple cuts, bruises, a broken leg, and a mild concussion. Glen was wearing a protective helmet, but it must be noted here that the helmet he was wearing was cracked down the seams where it had been molded together. Glen was not wearing any other protective equipment.

11. Situational Diagram of the Accident (see Figure 9).

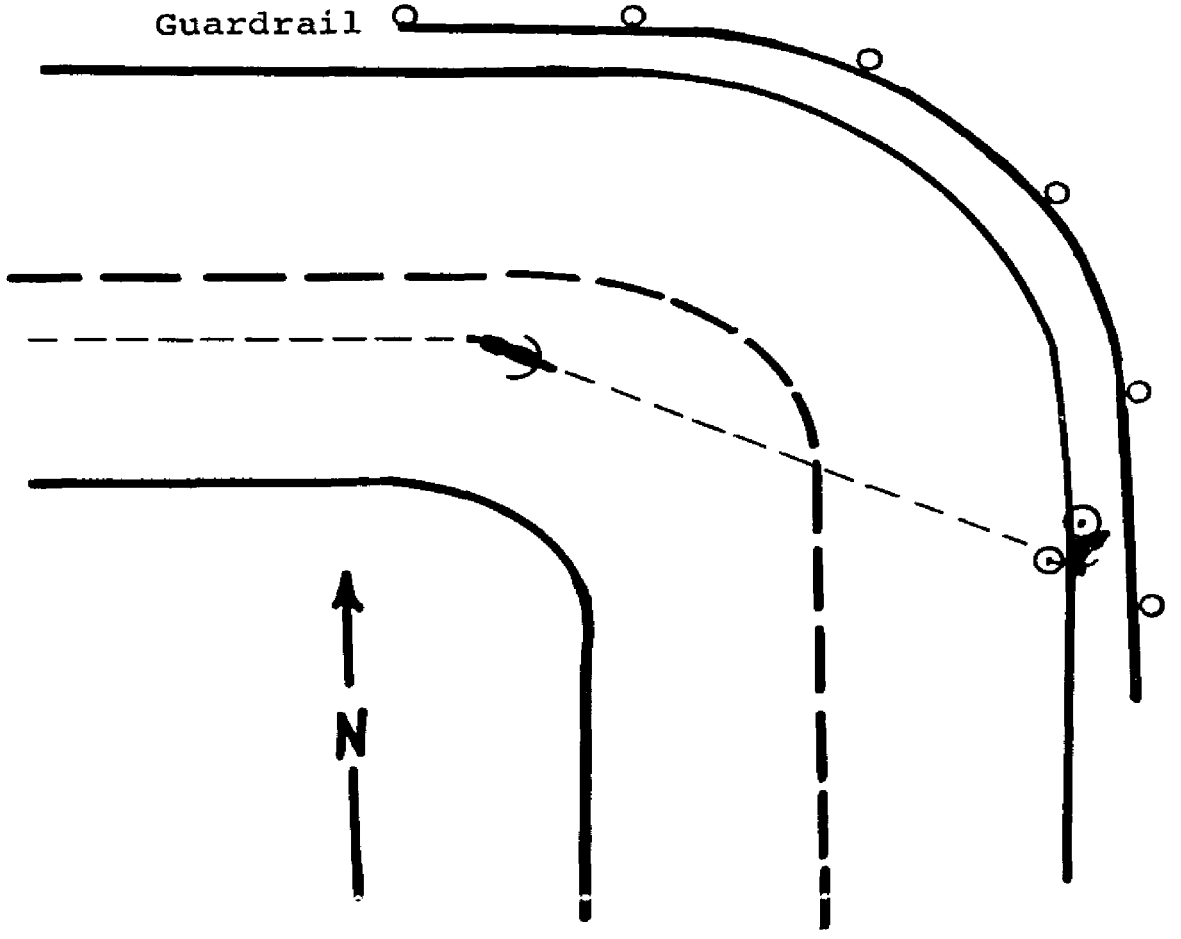

FIGURE 9.--Ran Off Roadway.

Case Number 10

1. Type of Accident: Over-turning in roadway

2. Environmental Conditions--Roadway:
   a. Type: 2 limited access
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Industrial

4. Time: 1:00 P.M., July 10

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Triumph
   b. Model: Scrambler
   c. Year: 1969
   d. Condition: Fair

9. Driver Data:
   a. Sex: Male
   b. Age: 24
   c. Riding Experience: 16 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.

10. Narrative Account of the Accident:
Robert, a student, had some time between classes; he decided to ride his motorcycle for about an hour. He had been riding for approximately 20 minutes when he decided to get on an expressway. About 5 minutes after entering the expressway, his motorcycle began vibrating and bouncing from left to right. He tried to control the motorcycle but could not and subsequently overturned in the roadway. After the motorcycle overturned, the cycle and Robert skidded down the pavement approximately 100 feet. Robert did not know that the front fork of his motorcycle was loose and therefore could have caused the accident. Robert received multiple cuts and bruises as a result of the accident. Robert did not sustain any head injuries. He was wearing a protective helmet; however, he was not wearing any protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 10).

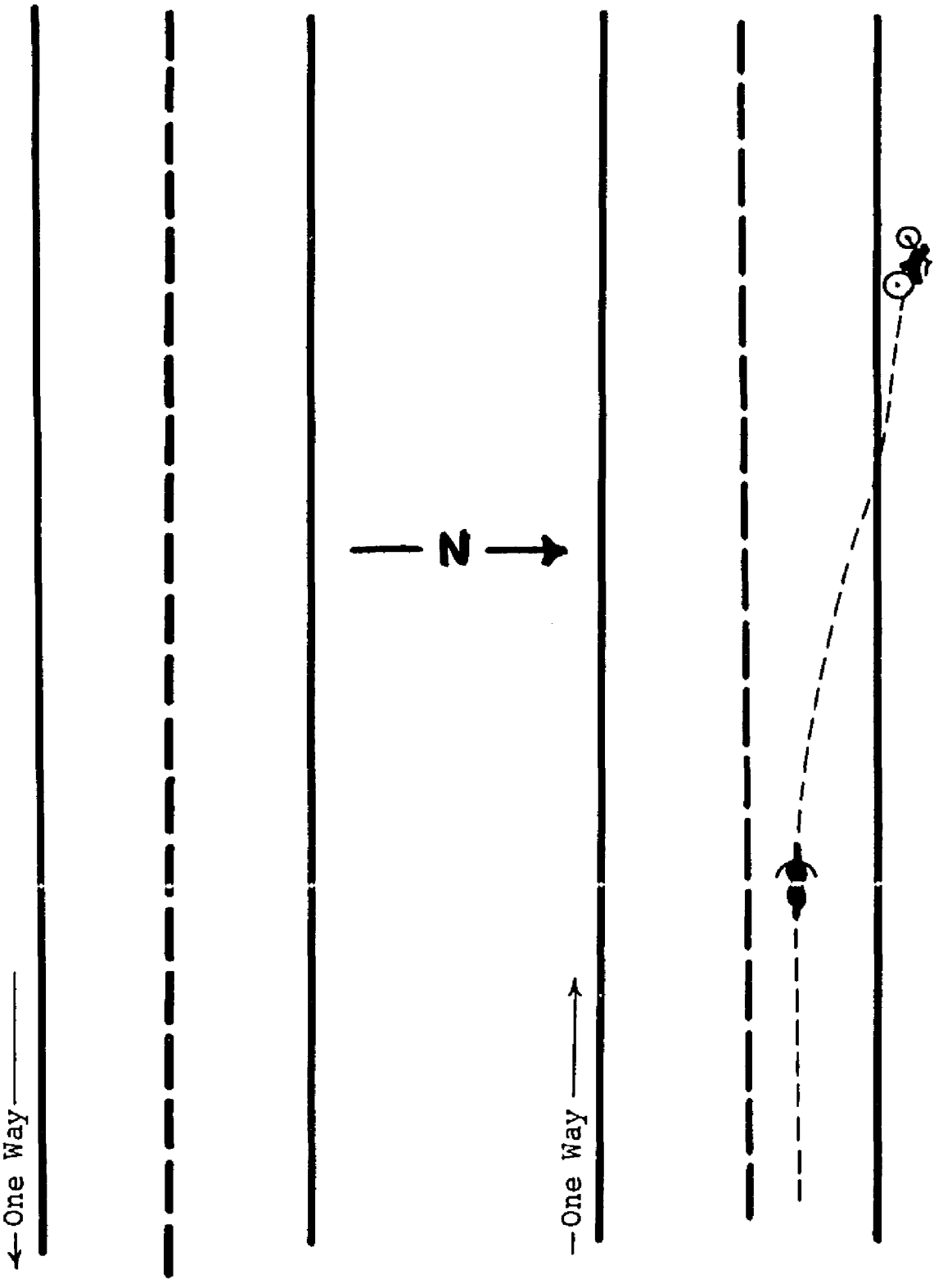

FIGURE 10.--Over-turning in Roadway.

Case Number 11

1. Type of Accident: Over-turning in roadway

2. Environmental Conditions--Roadway:
   a. Type: 4 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Industrial

4. Time: 3:30 P.M., May 15

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Heavy

8. Vehicle Information:
   a. Make: Honda
   b. Model: 350
   c. Year: 1971
   d. Condition: Excellent

9. Driver Data:
   a. Sex: Male
   b. Age: 21
   c. Riding Experience: 20 months
   d. Violation in Connection with the Accident: Violation connected with the accident.

10. Narrative Account of the Accident:
Roger had been across town to visit some friends. He left his friends' house and was on his way home. At the time he was on his way home the traffic in that particular area was extremely heavy. Roger was traveling about 35 mph when the car in front of him suddenly stopped for traffic ahead. Roger was traveling so fast that he could not stop in time to avoid hitting the vehicle in the rear. He applied his brakes and the cycle went into a skid and over-turned in the roadway. He did not hit the other vehicle, but his cycle continued on for approximately 200 feet before coming to a stop. Roger was wearing a protective helmet and boots and was not seriously injured. However, he did receive some cuts and bruises. Roger said that he could have avoided the accident had he not been traveling quite so fast.

11. Situational Diagram of the Accident (see Figure 11).

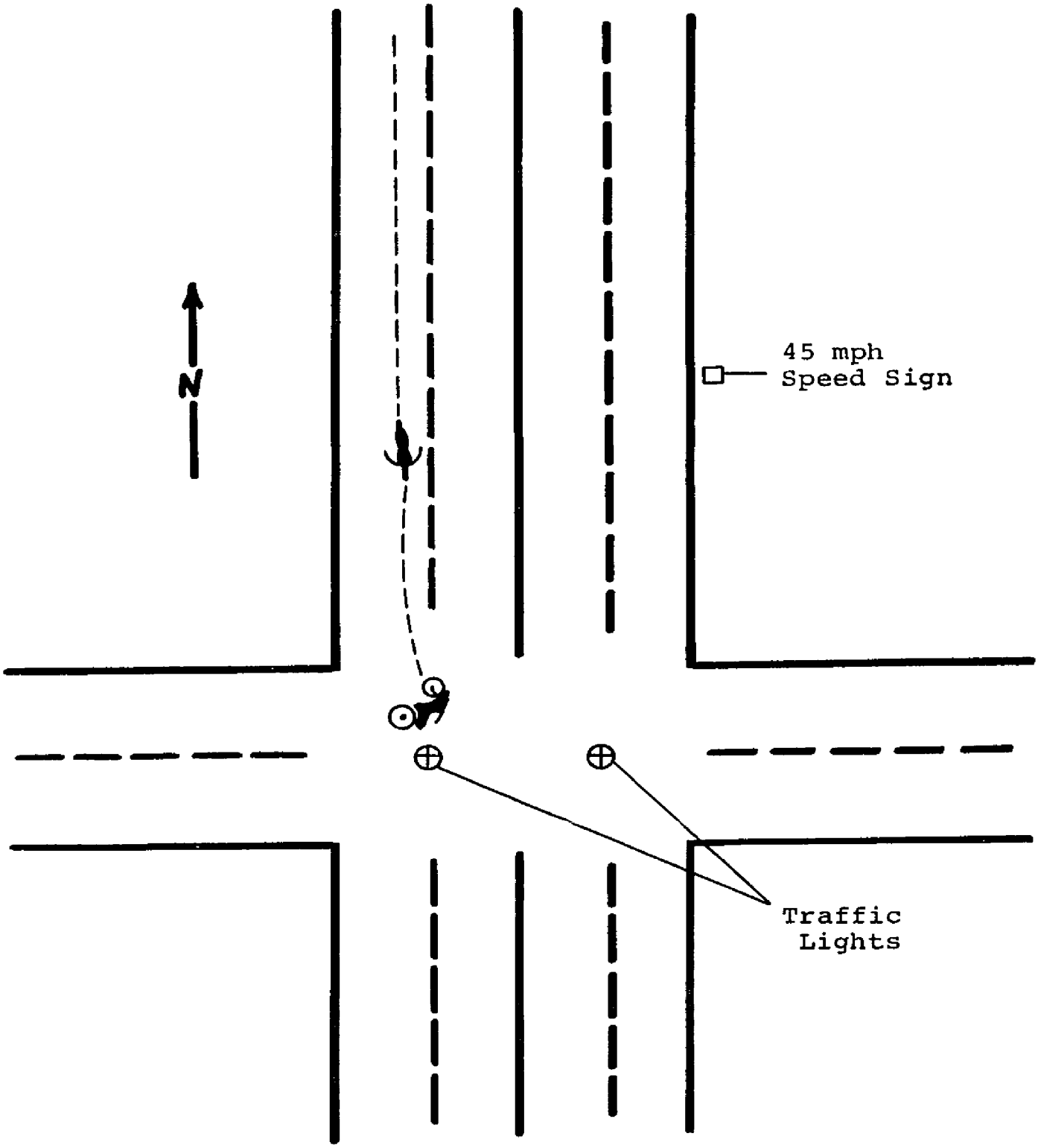

FIGURE 11.--Over-turning in Roadway.

Case Number 12

1. Type of Accident: Cycle hit object in roadway

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Residential

4. Time: 6:55 P.M., August 2

5. Light Conditions: Clear

6. Weather Conditions: Dry

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Kawasaki
   b. Model: 300
   c. Year: 1969
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 14
   c. Riding Experience: 1 month
   d. Violation in Connection with the Accident:
      No violation in connection with the accident.

10. Narrative Account of the Accident:
Even though he did not have an operator's license, Jerry was out in the late afternoon learning to ride his motorcycle. Jerry was traveling on the north shoulder of a two-lane road when he hit a large rock. This caused the motorcycle to skid on the pavement one way while Jerry skidded on the pavement the other way. Jerry received multiple cuts, bruises, and slight internal injuries. He was wearing a protective helmet, but if he had not been wearing a helmet, there would have been a good possibility that he would have received serious head injuries. Jerry was not wearing any protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 12).

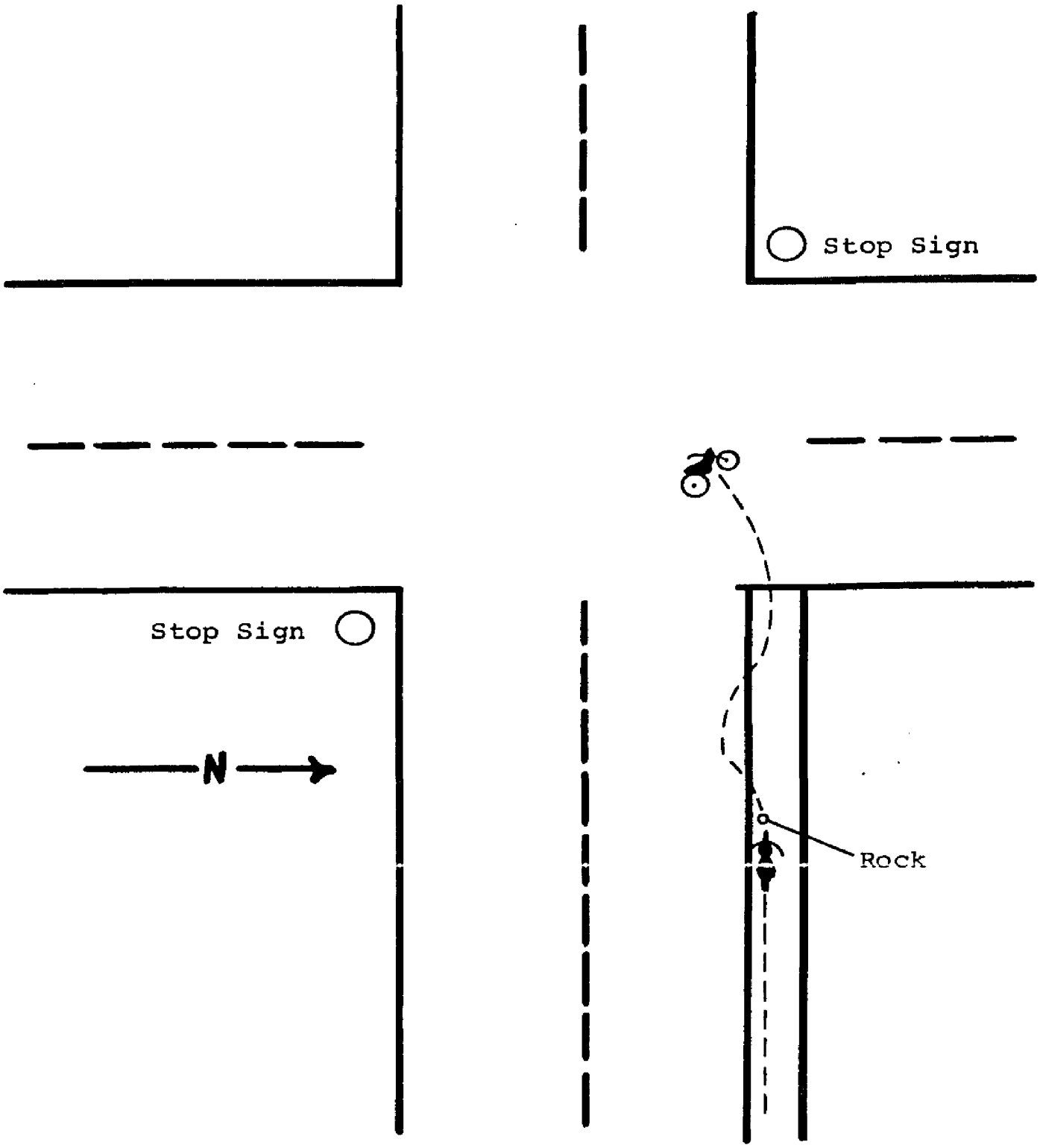

FIGURE 12.--Cycle Hit Object in Roadway

Case Number 13

1. Type of Accident: Rear-end collision

2. Environmental Conditions--Roadway:
   a. Type: 3 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Shopping or business

4. Time: 2:09 P.M., May 14

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Heavy

8. Vehicle Information:
   a. Make: Yamaha
   b. Model: 150
   c. Year: 1970
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 19
   c. Riding Experience: 9 months
   d. Violation in Connection with the Accident:
      No violation in connection with the accident

10. Narrative Account of the Accident:
John left home one afternoon to visit some friends across town. While on the way over, he was enjoying the thrill of riding and not paying particular attention to the traffic situation. Suddenly two cars stopped in front of John to pick up hitchhikers. John could not stop in time to avoid hitting the car from the rear. Since John was not traveling at a high rate of speed, there was very minor vehicle damage and personal injury. However, John did have one or two bumps and bruises. John was wearing a protective helmet and face shield, but neither protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 13).

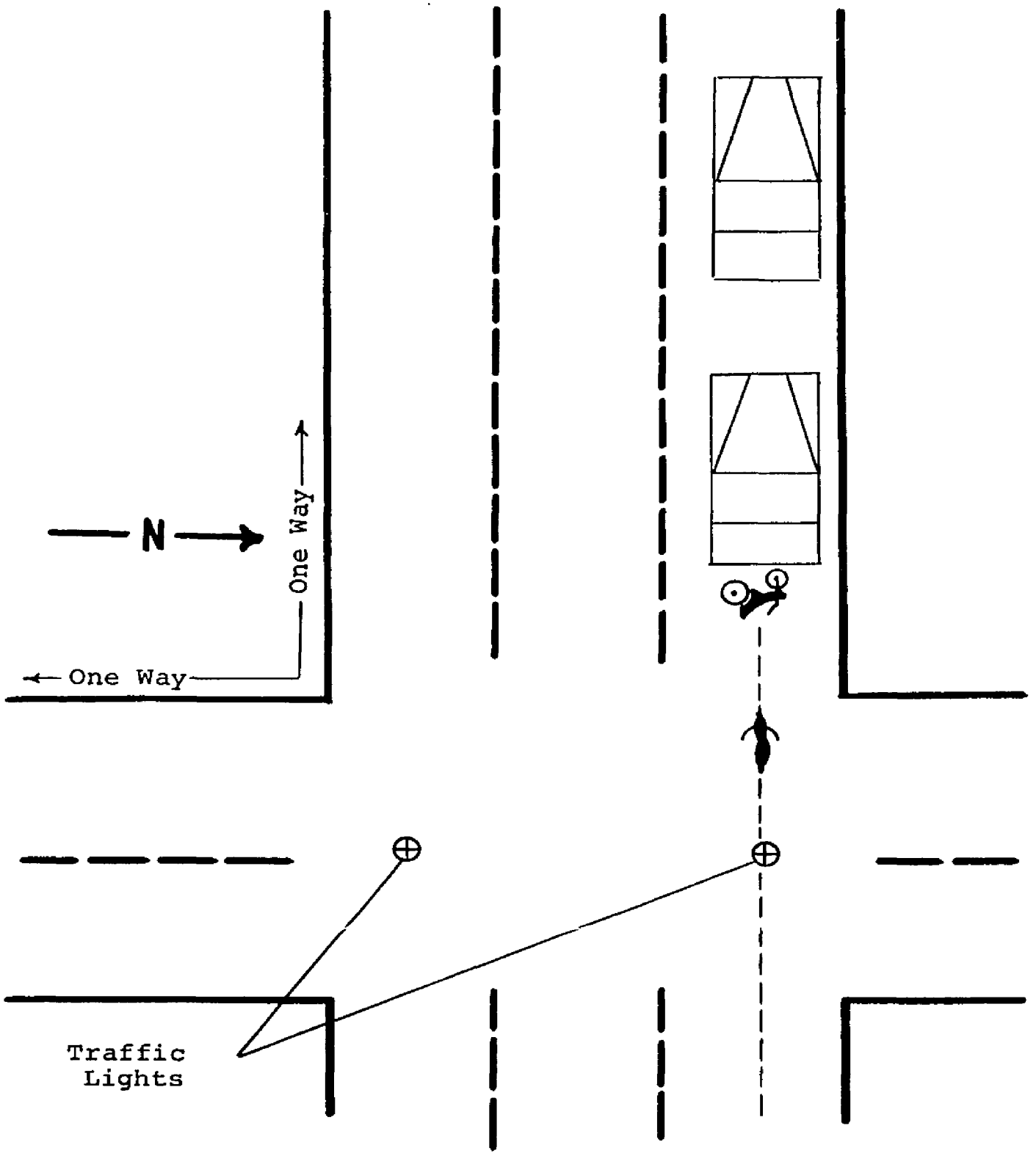

FIGURE 13.--Rear-end Collision.

Case Number 14

1. Type of Accident: Motorcycle hit car from rear

2. Environmental Conditions--Roadway:
   a. Type: 4 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Residential

4. Time: 10:15 A.M., July 22

5. Light Conditions: Daylight

6. Weather Conditions: Cloudy

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Honda
   b. Model: 350
   c. Year: 1971
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 34
   c. Riding Experience: 24 months
   d. Violation in Connection with the Accident: Failure to stop.

10. Narrative Account of the Accident:
James left his home on the way to do some shopping. He was traveling about 50 miles per hour when the car in front of him began slowing down to turn to the right. James saw that he could not stop in time to avoid hitting the car in the rear. He then laid his motorcycle down and jumped off sustaining multiple cuts and bruises. His motorcycle continued on and struck the automobile from the rear. James was wearing a protective helmet but no protective clothing or boots.

11. Situational Diagram of the Accident (see Figure 14).

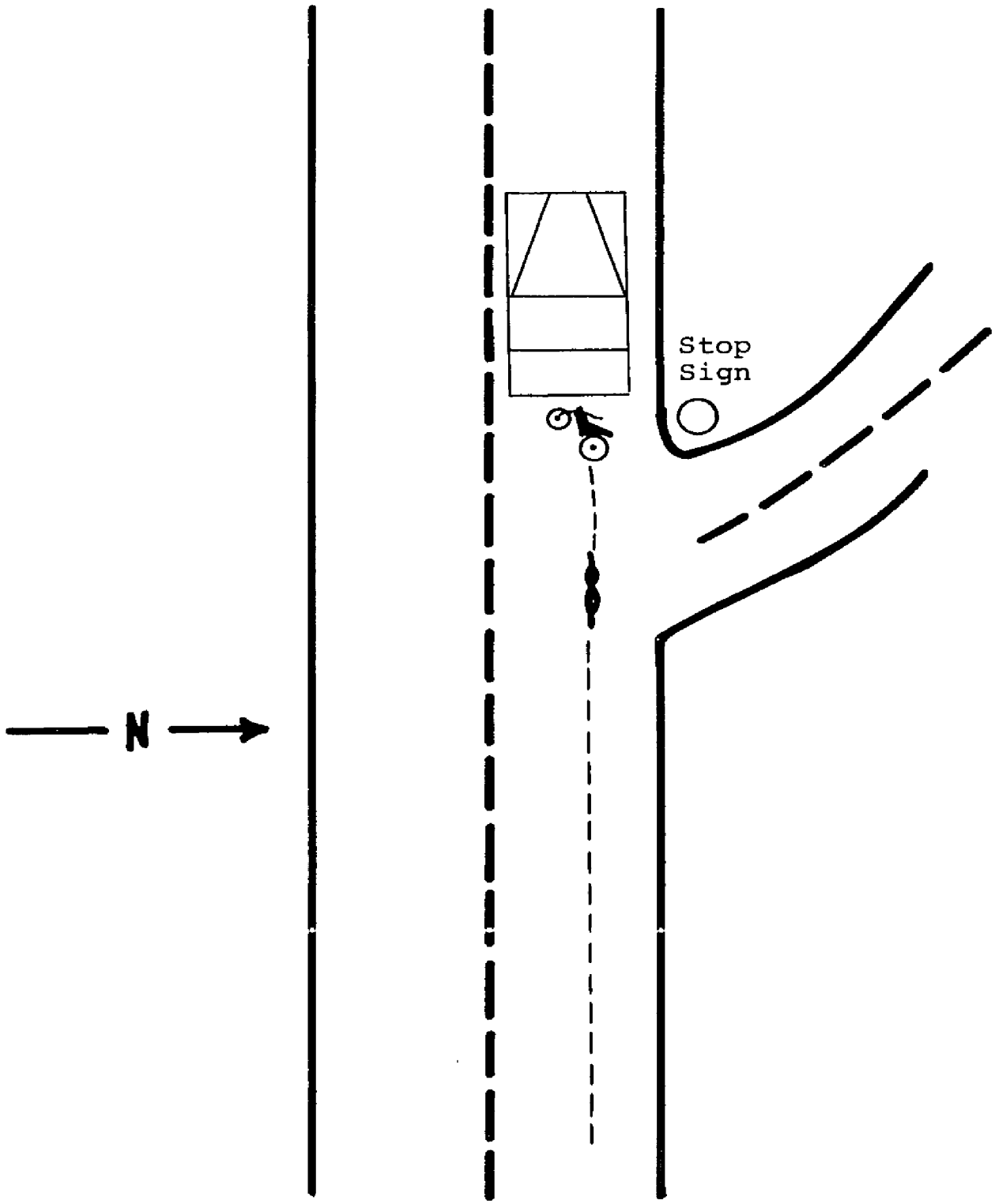

FIGURE 14.--Motorcycle Hit Car from Rear.

Case Number 15

1. Type of Accident: Cycle hit parked car

2. Environmental Conditions--Roadway:
   a. Type: 2 lanes
   b. Surface: Dry
   c. Character: Straight and level
   d. Condition: Good

3. Kind of Locality: Residential

4. Time: 4:50 P.M., July 7

5. Light Conditions: Daylight

6. Weather Conditions: Clear

7. Traffic Conditions: Light

8. Vehicle Information:
   a. Make: Honda
   b. Model: 250
   c. Year: 1968
   d. Condition: Good

9. Driver Data:
   a. Sex: Male
   b. Age: 42
   c. Riding Experience: 12 months
   d. Violation in Connection with the Accident: No violation in connection with the accident.

10. Narrative Account of the Accident:
Robert was riding his motorcycle late one afternoon after work. He was going no place in particular and had been riding for approximately 30 minutes. While going down the street, he lost control of his motorcycle for no apparent reason and hit a parked car. Robert received only a minor bruise from this accident since he was traveling at a very low rate of speed. He was wearing a protective helmet but no proteceive clothing or boots.

11. Situational Diagram of the Accident (see Figure 15).

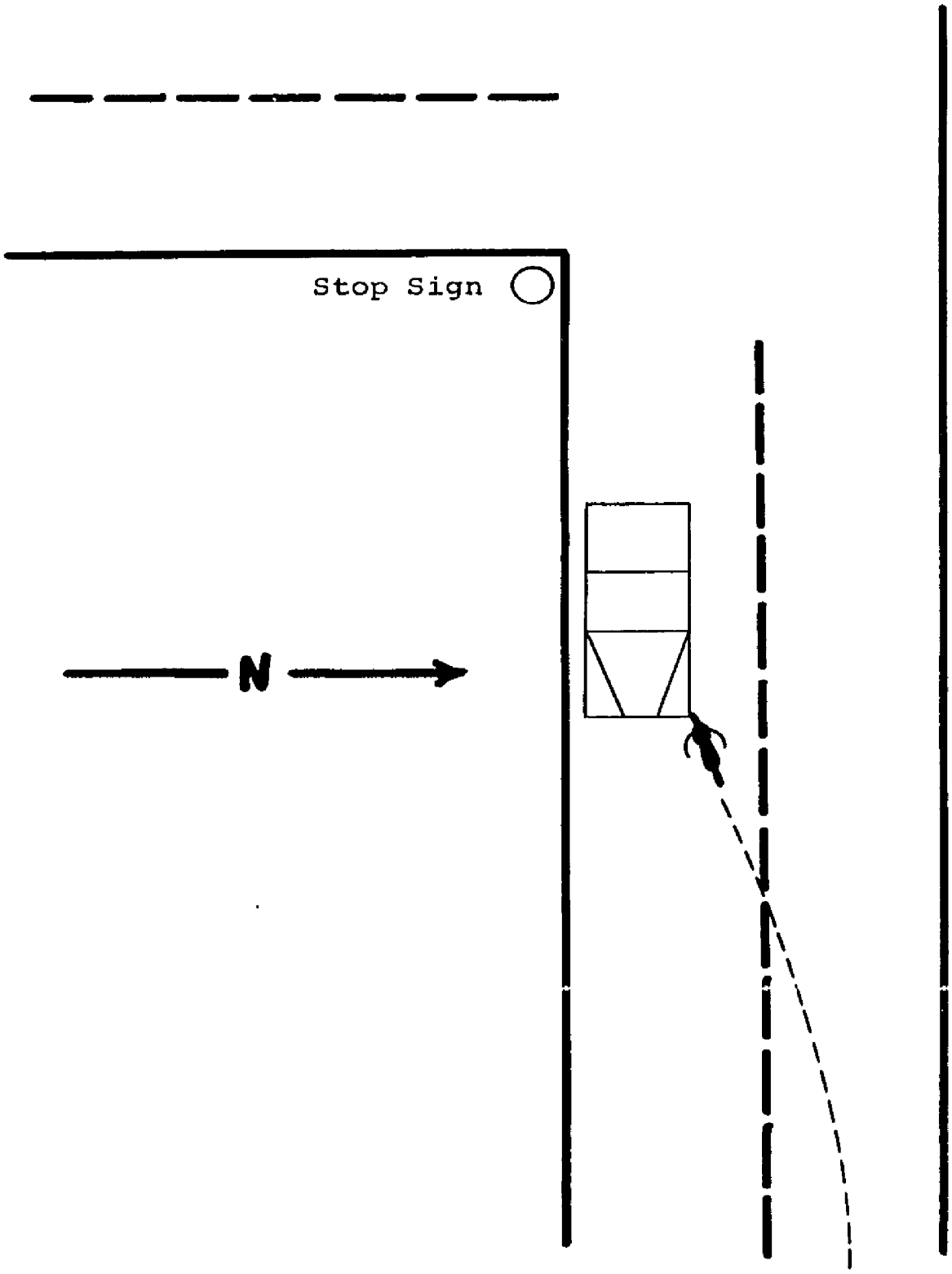

FIGURE 15.--Cycle Hit Parked Car.

Summary

An analysis of the data was presented in Chapter IV. Chapter V will contain the Summary, Conclusions, Implications, Recommendations for Further Research, and a Discussion.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

The preceding chapter contained an analysis of the data. In this chapter may be found the summary, conclusions, implications, recommendations for further study, and a discussion.

Summary

The primary purpose of this study was to determine the strength of relationship between selected variables and the severity of the motorcycle accidents. The medical cost of the motorcycle accident was used as the criterion to determine the severity of the motorcycle accident. Seventeen variables were compared to the medical cost of the accident.

The secondary purpose of the study was to seek out and show possible causal factors related to motorcycle accidents. To give further insight into the possible causal factors of motorcycle accidents, fifteen case studies were developed. In addition to the case studies, a situational diagram of each accident was presented.

The sample population of this study consisted of 100 persons who were involved in motorcycle accidents in Ingham County, Michigan in 1971. They were randomly selected from a total universe of 323. There were 98 males and 2 females in the sample. The data were gathered between March 15, 1972 and August 15, 1972.

The subjects ranged from fifteen to seventy-one years of age. All were residents of the state of Michigan and had varying degrees of educational achievement ranging from the ninth grade to a Ph.D. degree. Sixty per cent of the persons interviewed were either students or non-skilled workers.

The persons who were randomly selected for this study were sent letters of introduction and were telephoned to set up a personal interview. The interview lasted approximately twenty-five minutes.

The hypotheses were tested by employing the Pearson Product Moment Correlation Test. The .05 level of significance was predetermined to be acceptable in this study. Fifteen case studies were presented to give a better picture of how the motorcycle accidents were occurring. These were selected by accident category and were typical of all the other accidents.

The major findings of this investigation were as follows:

1. No significance was found when the medical costs of the accidents were correlated with any of the seventeen variables.
2. Seventy per cent of the motorcyclists were between the ages of fifteen and twenty-four.
3. Forty-eight per cent of the motorcyclists in this study had one year or less of motorcycle riding experience.
4. One-fourth of the motorcyclists rode their motorcycles six to ten hours per week.
5. Ninety-five per cent generally rode their motorcycles during the hours of 12-8 P.M. and, during this time, 70 per cent of the accidents occurred.
6. The motorcyclists used their motorcycles for recreational purposes 87 per cent of the time.
7. Ninety-three per cent of the motorcyclists said they rode mostly on Fridays, Saturdays, and Sundays.
8. In 95 per cent of the cases the motorcyclists had been riding for a period of two hours or less.
9. Almost one-half (46%) of the motorcycle accidents occurred in a residential area.
10. Fifty per cent of the motorcycle accidents occurred on a two-lane roadway.

11. Ninety per cent of the accidents occurred on a level roadway.

12. Eighty-two per cent of the accidents occurred on a straight roadway.

13. Sixty-three per cent of the accidents occurred during daylight.

14. Ninety-two per cent of the accidents occurred on a dry road surface.

15. The motorcyclists reported in 87 per cent of the cases that there were no distractions just prior to the accident.

16. Only seven interviewees reported any drinking just prior to the accident, and only one reported using alcohol and drugs.

17. Fifty-one per cent of the motorcyclists reported only one hour of motorcycle riding instruction and, in 58 per cent of the cases, this instruction was given by friends or a motorcycle dealer.

18. One-fourth of the motorcyclists reported receiving one hour of motorcycle instruction in a driver education program.

19. Ninety-eight per cent of the motorcyclists reported wearing a helmet at the time of the accident.

20. Only 36 per cent of the motorcyclists reported wearing goggles or a face shield at the time of the accident.

21. The motorcyclists in 23 per cent of the cases were wearing boots at the time of the accident.

22. Only 21 per cent of the motorcyclists reported wearing any protective clothing at the time of the accident.

23. The motorcyclists in 22 per cent of the cases were charged with a violation; the most frequent violation was failure to yield (7).

24. The motorcyclists were asked to give advice on how to avoid the accident in which they were involved and in 50 per cent of the cases they reported to ride more defensively, watching out for automobiles.

25. The motorcyclists were asked to give the major cause of the accident in which they were involved and in 47 per cent of the cases they reported that an automobile either pulled out in front of them or turned left in front of them.

Conclusions

The following are the conclusions based upon the findings of this investigation:

1. Motorcyclists are not seen by motorists in the traffic system.
2. Motorsists are not aware of motorcyclists in the traffic system.
3. Motorcycle accidents occur under ideal road and weather conditions.
4. Motorcyclists are not sufficiently trained to ride a motorcycle.
5. Some motorcyclists were riding without being fully familiar with the controls of a motorcycle.
6. The majority of the motorcyclists do not protect themselves from injury in an accident other than wearing a helmet.
7. The use of alcohol and drugs were not significant factors in motorcycle accidents.

Implications

There are several implications from this study for motorcyclists as well as for legislative authorities and traffic safety educators. The motorcycle and motorcyclist must be made more visible in the traffic system. To accomplish this the motorcyclist must be taught to wear brightly colored protective clothing. The motorcyclist must also be taught to ride with the headlight on at all times; this most certainly will make him clearly visible.

The motorcyclist must also be taught to ride in the left portion of the traffic lane so that he will be more clearly visible to motorists. The motorcyclist must wear more protective gear other than a helmet.

There is a definite need for more formal motorcycle rider education. The state department of education as well as local boards of education need to explore the possibilities of setting up classes in motorcycle riding instruction for young people and adults. There could possibly be a problem, though, of getting qualified personnel to conduct these classes. Traffic safety educators need to include motorcycle safety education in their driver education classes. These would include high school and college students and adults as well.

There are also implications for legislative authorities in regard to the licensing procedures for motorcycle operators. Licensing for motorcycle operators must be mandatory. The licensing procedure for motorcyclists must be up-graded to ascertain whether or not the motorcyclists have adequate knowledge of motorcycles and whether they are familiar with the controls on the motorcycle. The licensing procedure must also test basic skills in riding the motorcycle such as shifting, accelerating, and turning.

In addition to the educational and legislative implications, there are implications for public information

campaigns. Through public media the public must be informed that motorcyclists ride more during ideal weather conditions. This means motorists need to be more aware of motorcyclists under ideal weather conditions. Motorists also must be made aware of the general presence of motorcyclists in the traffic system. It seems that motorists simply do not see motorcyclists. Traffic safety educators can also aid in this area by stressing the presence of motorcyclists to their respective classes.

Recommendations for Further Study

1. A parallel study should be done on non-traffic motorcycle accidents.
2. A study of various kinds of safety equipment on motorcycles and how these might be improved by design or relocation to make the motorcycle safer.
3. Manufacturers of motorcycles should undertake a study to make motorcycles more visible for motorists.
4. A similar study should be undertaken using a different criterion for the severity of the motorcycle accident.
5. Similar studies should be undertaken in different geographical areas.

Discussion

The research design of this study was different from most other studies of motorcycle accidents. Many of the other studies were of a statistical nature and had a larger sample size. The other studies with the exception of one did not use the case study approach. This study used statistical analysis, frequencies, percentages, and the case study approach. The statistical section of this study used the medical cost of the motorcycle accident as the index for severity. It was thought that even though there might be very little property damage an accident victim could be injured most severely. This would be indicated by the medical costs of the accident.

The findings of this study seemed to differ from those of other studies. Some of the other studies found the variables of age and riding experience to be significant. This study did not find these to be significant. The sample size of this study seemed to cause problems because of its size. Some of the variables did not generate enough respondents to be reliable. For example, the variable of sex had only two females. The variable of motorcycle riding experience was distorted by a few of the respondents because they had many years of riding experience. In addition, the variable of alcohol and drugs provided only a small number of respondents.

If the study was to be redone, there would be some things that would be changed. The sample size would be larger and the mail-out questionnaire format would be used. The personal interviews, which were too time-consuming, did not allow for a very large sample size. There were also problems in setting up the interviews. In addition, there would be some other variables that should be considered. The size of the motorcycle, the type of motorcycle--one for riding on the street or one for riding on a trail--and the color of clothing the motorcyclist was wearing should be considered. When the motorcyclist was involved in an accident with a four-wheeled vehicle, the driver of the other vehicle should be questioned also to try to determine the cause of the accident.

Traffic safety educators can do much to aid the motorists in being aware of the two-wheeled vehicle on the roadway. In driver education classes the students must be made aware of the motorcycles in traffic. Visual aids used in driver education should point out that motorcyclists are highway users. By studying previous accidents, traffic safety educators can point out the hazards involved with the mixing of automobiles and motorcycles on the roadway. By disseminating information to the public through the mass media, traffic safety educators can inform the public about the dangers of mixing automobiles and motorcycles on the roadway. The public must

also be informed that the motorcycle has the same rights and privileges as any other vehicle using the roadway.

There should be some designated off-road areas for unrestricted motorcycle use so that the motorcyclists would have a relatively safe place to ride. It seems now that the public highway is very hazardous for motorcyclists. In the cities of Lansing and East Lansing there should be specially designated traffic lanes for motorcyclists to use. These lanes should be clearly marked with yellow warning signs and be to the far right-hand side of the roadway.

It would seem that a large portion of the motorcycle accident problem would be solved if only the motorists and motorcyclists would learn to coexist in our traffic system.

BIBLIOGRAPHY

BIBLIOGRAPHY

"Air Force Holds Seminar on Two-Wheeler Accidents." Traffic Safety, LXVII (February, 1967), 19.

American Association of Motor Vehicle Administrators (AAMVA). Motorcycle Regulation Needs and Suggested Legislation. Washington, D.C.: AAMVA, 1967.

Arizona Highway Department. Arizona's Traffic Accident Summary for 1968. Arizona: Highway Department, 1969.

Baker, J. Stannard. "Case Studies of Traffic Accidents." Traffic Safety Research Review, V (December, 1961), 16.

Baker, J. Stannard, and Stebbins, William R., Jr. Dictionary of Highway Traffic. Evanston, Illinois: Traffic Institute, Northwestern University, 1964.

Barry, Patricia Z. The Role of Inexperience in Motorcycle Crashes. Chapel Hill, N.C.: Highway Safety Research Center, 1970.

Berry, W. T., Jr. "The Motorcycle in Today's Traffic." National Safety Congress Transactions, XXIV (1967), 16-19.

Biesheuvel, S., and Barnes, P. M. "A Study of Motorcycle Accidents; An Analysis of Their Incidence and of the Factors that Influence Their Occurrence." South African Journal of Science (January, 1958), 3-16.

Bothwell, P. W. "The Problem of Motorcycle Accidents." Practitioner, CLXXXVIII (April, 1962), 474-88.

Boyd, Alan S. "National Highway Safety." Police Chief, XXXV (December, 1968), 41-43.

Brammer, Dana B. A Look at the Motorcycle Problem. Public Administration Survey, School of Business and Government. Vol. XIV. University: University of Mississippi, January, 1967.

Campbell, E. O.; Macbeth, M. E.; and Ryan, S. W. Motorcycle Accidents Ottawa Area 1967. Ottawa: Traffic Injury Research Foundation of Canada, 1967.

Clark, D. W., and Morton, J. H. "The Motorcycle Accident: A Growing Problem." Journal of Trauma, II, No. 3 (March, 1971), 230-37.

Clark, Janet. "Coexisting with the Car: Handy Tips for Two-Wheel Survival." Detroit Free Press, June 6, 1971.

Connecticut State Motor Vehicle Department. Facts 1968. Connecticut: State Motor Vehicle Department, 1969.

Coppin, R. The Incidence of Accidents and Violations Among Motorcycle Drivers in California. Sacramento: California State Department of Motor Vehicles, 1967.

County of Monroe Sheriff's Department. Annual Report 1968 County of Monroe, New York. New York: County of Monroe Sheriff's Department, 1969.

Crancer, Alfred. Motorcycle Fatality Study, 1965 and 1966 Data. Olympia: Washington Department of Motor Vehicles, 1967.

Dark, H. E. "Your Youngster and the Motorcycle." Today's Health Magazine, XLV, No. 5 (May, 1967), 21-24.

Davidson, Walter E. "What the Motorcycle-Motorscooter Industry Is Doing to Promote Safe Operation." Traffic Digest and Review, XV, No. 1 (January, 1967), 14-16.

Dellehunt, R. C. Causative Factors and Corrective Needs in 148 Injured Motorcyclists. Chicago: American Medical Association Committee on Medical Aspects of Automotive Safety, 1970.

Department of Motor Vehicles. A Review of Motorcycle Problems in New York State. Albany: Department of Motor Vehicles, 1966.

_____. Accident Facts 1967. Albany: Department of Motor Vehicles, 1967.

Department of Motor Vehicles. Motorcycle Accidents in New York State in 1962. Albany: Department of Motor Vehicles, 1963.

Department of Public Works and Buildings. The Motorcycle in Traffic Accidents, Illinois 1966. Springfield: Department of Public Works and Buildings, 1967.

Department of State Police. Michigan Traffic Accident Facts. East Lansing: Department of State Police, 1970.

Dietzel, Paul. "Can Motorcycling Be Safe?" Westways (December, 1966). Reprint.

Dixon, Wilfrid, and Massey, Frank J., Jr. Introduction to Statistical Analysis. Second edition. New York: McGraw-Hill Book Company, Inc., 1957.

Dunlap and Associates, Inc. Driver Education and Training Final Report. 1968.

Dunn, Leroy W. "Motorcycle Driving Should Be Taught in Driver Education Courses." Traffic Safety, LXVIII (July, 1968), 26-27.

_____. "Teach Them to Ride." Safety, III, No. 2 (March-April, 1967), 16-19.

Durbin, Samuel S. "Emotions and Traffic Accidents--A Psychologist Looks at the Problem of Highway Safety." Traffic Safety Research Review, V (June, 1961), 7, 8.

Ellison, Anthony L. "The Motorcycle Problem." Address given at the Southern Safety Conference, Traffic Enforcement Section, Richmond, Virginia, March 6, 1967.

Embree, George. "Color of Car Might Influence Crash Rate." Detroit Free Press, September 18, 1964.

"Et Cetera, Et Cetera, Et Cetera." Family Safety (Winter, 1968), 2-31.

Fisher, R. A., and Yates, F. Statistical Tables for Biological, Agricultural, and Medical Research. Edinburgh: Oliver and Boyd, Ltd.

Gissane, W., and Bull, J. "A Study of 183 Road Deaths in and Around Birmingham in 1960." British Medical Journal, I (June 17, 1961), 1716-20.

Goldstein, Leon M. "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 (June, 1967), 56.

Hakkinen, S. Young Age Groups in Traffic. Helsinki, Finland: Institute of Occupational Health, 1966.

Hanks, J. N., and Folduary, L. A. "Analysis of Age and Experience of Drivers Involved in Accidents." Australian Road Research, II, No. 4 (1965), 53-66.

Harano, Richard M., and Peck, Raymond C. The California Motorcycle Study: Driver and Accident Characteristics. California: California State Department of Motor Vehicles, Division of Administration, July, 1968.

Hawaii Department of Transportation. Hawaii Major Traffic Accidents Summary and Analysis. Hawaii: Department of Transportation, 1969.

Illinois Department of Public Works and Buildings. Illinois Motor Vehicle Traffic Accident Facts 1969. Springfield: Department of Public Works and Buildings, 1969.

Illinois State Division of Highways. The Motorcycle in Traffic Accidents, Illinois 1966. Springfield: Illinois State Division of Highways, Bureau of Traffic, May, 1967.

International Association for Accident and Traffic Medicine. Proceedings of the Second Congress. N.P.: The Association, 1966.

"Invisible Man." Air Force Driver (April, 1969), 10-15.

Jacobs, Herbert H., et al. Behavioral Approaches to Accident Research. New York: Association for the Aid to Crippled Children, 1961.

Jeffcoate, G. O. Relative Accident Rates for Different Types of Vehicles Involved in Pedestrian Accidents in Built-up Areas on Week Days. Crowthorne, England: Road Research Laboratory, July, 1957.

Jeffcoate, G. O., and Garwood, F. "A Review of Information on Motorcycle Accidents with Special Reference to Age of Motorcyclists." Crowthorne, England: Road Research Laboratory, 1956. Mimeographed.

Johnson, Duane R. "A Case Study of Motorcycle Accidents in Three Illinois Counties." Unpublished Ed.D. Dissertation, Michigan State University, East Lansing, 1968.

Kaestner, Noel F. Motorcycle Accident Study, January 1 to July 31, 1963. Salem, Oregon: Department of Motor Vehicles, 1963.

Klein, David. "A Reappraisal of the Violation and Accident Data on Teen-Aged Drivers." Traffic Quarterly, XX (October, 1966), 508.

Lehmann, K. "Research into Causes of Road Accidents." Australian Road Research, I, No. 4 (1962), 46-47.

Lincoln, Nebraska Police Department. Annual Report 1967, Lincoln, Nebraska. Lincoln: Police Department, 1967.

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

Los Angeles County. "A Survey on Motorcycles Involved in Traffic Accidents." Unpublished report. Los Angeles, 1965.

Majid, Beth. "Danger Rides Two Wheels." Parents Magazine, XXXVIII (September, 1963), 684.

Margroff, D. A Motorcycle Accident Study. Sacramento: California Highway Patrol, January, 1968.

McDole, T. L. Motorcycles: Random Particles in the Traffic Stream. Ann Arbor: Highway Safety Research Institute, Systems Analysis Group, December, 1970.

"Meeting the Motorcycle Menace." Journal of American Insurance, XLIV (April, 1967), 24.

Michigan State Police. Michigan Motorcycle and Motor Scooter Data, 1962-1966. East Lansing: Michigan State Police, 1967.

Miller, D. M. Driving in the Two-Wheeled World. California: American Honda Motor Company, Inc., 1968.

Ministry of Transport. Report of the Working Party on the Training of Learner Motor Cyclists. London: Ministry of Transport, 1965.

"Motor Vehicle Safety Study 108: Lamps Reflection Devices, Passenger Vehicles." Federal Register (February 15, 1968), 2993-94.

Motorcycle Accident Facts. Olympia: Washington State Patrol, 1967.

Motorcycle Accident Survey. Sacramento: California Highway Patrol, 1970.

Motorcycle Accidents in North Carolina. Chapel Hill: University of North Carolina Highway Safety Research Center, February, 1967.

Motorcycle Accidents in Washington, 1964. Olympia: Washington State Patrol Accident Records Division, 1964.

"Motorcycling Licensing Procedures Vary Opinion Survey Reveals." AAMVA Bulletin (June, 1966), 4.

"Motorcycling's Hidden Hazzards." Motorcyclist (January, 1969), 35-37.

Munden, J. M. "The Variation of Motorcycle Accident Rates with Age of Rider and Size and Age of Machine." International Road Safety and Traffic Review, XII, No. 1 (1964), 12-16.

Munro, Stuart. "The Deadliest Vehemence." Paper on Motorcycle Safety, Ottawa Safety Council. Ottawa, Canada, 1967. Mimeographed.

National Safety Council. Accident Facts. Chicago: National Safety Council, 1972.

"New Legislative Safety Measures Signed as Death Toll Rises in Wisconsin." Wisconsin Traffic Safety Reporter (January, 1968), 1-2.

New South Wales Road Safety Council. Annual Report, Road Safety Council of New South Wales, 1967-68. New South Wales: Road Safety Council, 1968.

New York State Department of Motor Vehicles. Accident Facts 1967 and Trends and Changes in the First Six Months of 1968. New York: State Department of Motor Vehicles, 1968.

New York State Joint Legislative Committee. New York State Joint Legislative Committee on Motor Vehicle Traffic and Highway Safety 1967-68. New York State: Joint Legislative Committee, 1968.

North Dakota State Highway Department. North Dakota Traffic Accident Facts and Statistical Report 1968. North Dakota: State Highway Department, 1969.

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

Ontario Department of Transport. Motorcycle Accidents in Toronto, An Analysis. Toronto: Department of Transport, 1965.

_____. Ontario Highway Traffic Collisions, 1968. Ontario: Department of Transport, 1969.

Pennsylvania Department of Highways. Traffic Accident Statistical Summary of Pennsylvania 1968. Pennsylvania: Department of Highways, 1969.

Pike, D. F. B. Accidents Resulting in Injuries to Army Motorcyclists. London: Her Majesty's Stationery Office, 1949.

"Problems Raised by the Development of Two-Wheeled Traffic. Question 3. Theme II: All Purpose Roads and Streets." International Study Week in Traffic Engineering. N.P.: Fourth, World Touring and Automobile Organization, 1958.

Preston, Caroline E., and Harris, Stanley. "Psychology of Drivers in Traffic Accidents." Journal of Applied Psychology, XLIX (1965), 284.

Public Health Service. Motorcycles in the United States: Popularity, Accidents, Injury Control. Cincinnati, Ohio: Public Health Service, Injury Control Program, 1967.

Quint, J. V. Motorcycle Accident Fatalities Increasing. New York: Metropolitan Life Insurance Company, 1967.

Royal Ulster Constabulary. Death and Injury Road Accidents in Northern Ireland 1968. Northern Ireland: Royal Ulster Constabulary, 1969.

"Rules of the Road Revised 1968." Traffic Laws Commentary (October 31, 1968), 1-43.

"SAE Technical Reports Referenced in Motor Vehicle Safety Studies." Safety Automotive Engineers (December, 1968), 1-5.

"Safety Group Demands Safer Conditions for Motorcycle Use." Medical Tribune and Medical News, VII (November 30, 1966), 1.

Smeed, R. J. "Methods Available to Reduce the Numbers of Road Casualities." International Road Safety and Traffic Review, XIII (Autumn, 1964), 10.

Snively, George G. Statement for National Commission on Product Safety. N. P.: Snell Memorial Foundation, 1969.

State Highway Commission. Summary of Motor Vehicle Accidents Involving Motorcycles, 1966. Topeka, Kansas: State Highway Commission, 1967.

"Technical Reports Reprints." Society Automotive Engineers (1969), 1-5.

"The Economic Costs of Motor Vehicle Accidents of Different Types." Public Roads, XXX (June, 1958), 42.

Timberlake, W. E. "The Motorcycle Rider in Traffic." Traffic Digest and Review, XV, No. 1 (January, 1967), 3-7.

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

Tooley, R. W. "The Case for Crash Helmets for Motorcyclists." Traffic Injury Research Foundation of Canada (1965), 1-4.

Traffic Safety Association of Detroit. Annual Report for 1968. Detroit: Traffic Safety Association, 1969.

Turfboer, Robert. "Do People Really Drive as They Live?" Traffic Quarterly, XXI (January, 1967), 101, 103, 105, 108.

"Two-Wheeled Trouble." Journal of American Insurance, XL (September, 1964), 23.

Universal Underwriters Insurance Company. "Facts on Cycle Safety That Can Help You Sell." Talk delivered at Yamaha Dealer Schools, Kansas City, Missouri, 1967.

U. S. Bureau of Railroad Safety. Rail Highway Grade Crossing Accidents for Year Ended December 31, 1968. Washington, D.C.: U.S. Bureau of Railroad Safety.

U. S. Department of Commerce. Draft Highway Safety Program Standard No. 4.4.3--Motorcycle Safety. Washington, D.C.: National Highway Safety Bureau, February, 1967.

U. S. Department of Health, Education and Welfare. "Exploratory Meeting on Motorcycle Safety Education." Washington, 1966. Mimeographed.

_____. Motorcycles in the United States--Popularity, Accidents, Injury Control. Washington, D.C.: Government Printing Office, 1966.

_____. Report of the Secretary's Advisory Committee on Traffic Safety. Washington, D.C.: Government Printing Office, 1968.

U. S. Department of Motor Vehicles. Motorcycle Riders Guide. Washington, D.C.: U.S. Department of Motor Vehicles.

U. S. Department of Transportation. Administration of Highway Safety Act of 1966 for January 1, 1968 to December 31, 1968. Washington, D.C.: U.S. Department of Transportation, 1969.

Waller, P. F.; Barry, Patricia Z.; and Rouse, W. S. Motorcycles. I. Estimated Mileage and Its Parameters. Chapel Hill: North Carolina University Highway Safety Research Center, 1968.

Waller, Patricia F.; Reinfurt, D. W.; Reifler, C. B.; and Koch, G. G. Motorcycles Versus Automobiles: How Their Owners Differ. Chapel Hill: North Carolina University Highway Safety Research Center, 1969.

Washington State Patrol. Summary of Motorcycle Accidents Occurring in the Rural Areas of Washington, 1964. Olympia: Washington State Patrol, 1965.

_____. Summary of Motorcycle Accidents Occurring in the Rural Areas of Washington 1965. Olympia: Washington State Patrol, 1966.

_____. Washington State Traffic Accident Facts, 1967. Olympia: Washington State Patrol, 1968.

Welgemead, P. J. Aspects of Ownership and Use of Motor Vehicles in South Africa. South Africa: Stettenbosch University, 1967.

Wisconsin Department of Transportation. Wisconsin Accident Facts for 1968. Wisconsin: Department of Transportation, 1969.

Wisconsin Motor Vehicle Department. "Summary--Motorcycle Safety Conference." Unpublished report of conference. Madison, February 15, 1966. Mimeographed.

Wyoming State Highway Department. Traffic Accident Facts 1968. Wyoming: State Highway Department, 1968.

APPENDICES

APPENDIX A

PARTICIPATING POLICE AGENCIES

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PARTICIPATING POLICE AGENCIES

Delhi Township Police Department

East Lansing Police Department

Ingham County Sheriff's Department

Lansing Police Department

Lansing Township Police Department

Leslie Police Department

Mason Police Department

Meridian Township Police Department

Michigan State Police Department

Michigan State University Department of Public Safety

Williamston Police Department

APPENDIX B

PERSONAL INTERVIEW QUESTIONNAIRE

APPENDIX B

PERSONAL INTERVIEW QUESTIONNAIRE

Statement: To identify those characteristics which will help informing a more complete profile of motorcycle operators, who have been involved in accidents, as they pertain to the operator, environment, experience, and educational needs.

1. Sex: M_____ F_____

2. Age: _____

3. How far did you go in school? Elementary_____ Junior High _____ Senior High _____ College _____ Graduate School _____

4. What is your occupation?_____

5. What date did the accident occur?_____

6. What amount in dollars was the medical cost of the motorcycle accident in which you were involved? $_____

7. How much experience in riding a motorcycle did you have prior to your accident? Years_____ Months_____

8. How many hours do you generally ride a motorcycle per week? _____0-5 _____6-10 _____11-15 _____16-20 _____Over 20

9. Do you ride a motorcycle every day? _____Yes _____No

10. What time of the day do you usually ride? _____8-12 A.M. _____12-4 P.M. _____408 P.M. _____8-12 P.M. _____12-8 A.M.

11. What time of the day did your accident occur?
_____

12. For what primary purpose do you use your motorcycle?
_____Recreation _____Racing _____Work

13. What days of the week do you do most of your riding?
_____Sunday _____Monday _____Tuesday
_____Wednesday _____Thursday _____Friday
_____Saturday

14. What date did you first ride a motorcycle?_____

15. How long had you been riding at the time of your accident? _____0-2 hrs. _____3-4 hrs. _____5-6 hrs.
_____6-8 hrs. _____Over 8 hrs.

16. In what kind of locality did your accident occur?
_____Industrial _____Shopping or Business
_____School _____Residential _____Rural

17. Do you usually ride your motorcycle in the county of your residence? _____Yes _____No

18. Is this the first time you have ridden your motorcycle in the area where the accident happened?
_____Yes _____No

19. How often did you ride on the road on which the accident occurred? _____every day _____twice a week
_____once a week _____once a month _____every few months _____never _____other

20. At the time your accident occurred, on what type of road were you riding?
_____one driving lane _____divided roadway
_____two driving lanes _____limited access
_____three driving lanes _____one-way street
_____four driving lanes _____unpaved, any width

21. What was the type of road surface at the location of the accident? _____Asphalt _____Concrete
_____Gravel _____Dirt

22. What was the vertical contour of the road at the location of the accident? _____level _____slight grade _____steep grade _____hill crest _____dip

23. What was the horizontal contour of the road at the location of the accident? _____Straight _____Slight curve _____Sharp curve _____Other

24. What was the highway condition just before the accident happened? _____crowned road _____chuck holes _____"washboard" _____other

25. What were the light conditions at the time of your accident? _____daylight _____darkness _____dawn _____dusk

26. What were the weather conditions at the time of your accident? _____clear _____cloudy _____rain _____snow _____fog _____other

27. What was the condition of the road surface at the time of your accident? _____dry _____wet _____snowy or icy _____other

28. Were you riding with your headlight on at the time of the accident? _____Yes _____No

29. Was your visibility reduced in any way just before the accident occurred? _____Yes _____No

30. Was there a lack of appropriate signs, signals, or highway markings just before the accident occurred? _____Yes _____No

31. Was there any distraction(s) that you recall just before the accident occurred? _____Yes _____No

32. What did you do to avoid the accident when you realized you were in an emergency situation?

_____

_____

33. Do you feel this action helped reduce the severity of the accident? _____Yes _____No

34. Did anything happen that upset, worried, or bothered you on this trip? _____Yes _____No

35. What were you thinking about just before the accident occurred?_____

_____

36. Where did your trip originate? _____work _____home _____other

37. What was your destination? _____work _____home _____other

38. Are you riding any differently as a result of this accident? _____Yes In what way?_____
_____No

39. Was there anything mechanically wrong with the motorcycle that you feel helped cause the accident?
_____Yes Explain:_____
_____No

40. Briefly describe the major causes of your accident.

_____

_____

_____

41. Did you have beer, wine, whiskey, or other alcoholic beverages within six hours before the accident?
_____Yes _____No How much?_____

42. Had you been taking any type of drugs within 24 hours of the accident? _____Yes _____No
What were they?_____
Did it have anything to do with the accident?
_____Yes _____No

43. How many hours of instruction did you receive before riding the motorcycle by yourself?
_____none _____1 hr. _____2 hrs. _____3 hrs.
_____4 hrs. _____5 hrs. _____6 hrs. _____over 6 hrs.

44. What kind of instruction did you receive?
_____Verbal
_____Behind-the-wheel Explain:_____
_____Not Applicable
_____None

45. Who gave you the instruction? _____Dealer
_____Parent _____Friend _____Driver Education Program _____Local Safety Council _____Not available
_____None

46. Did you successfully complete a high school driver education program?
_____Yes When?_____
_____No

47. If you successfully completed a high school driver education program, how much time in hours was spent on motorcycle safety education? _____Hours

48. Are you familiar with the Michigan law pertaining to motorcycles? _____Yes _____No

49. Did you have insurance coverage on your motorcycle? _____Yes _____No

50. Were you wearing any safety protective equipment? _____helmet _____goggles _____clothing _____none

51. Did you take a special motorcycle operator's license exam? _____Yes _____No

52. Was this your own motorcycle? _____Yes _____No
If no, how many times had you ridden it before the accident?_____

53. Were you charged with a violation in connection with the accident? _____Yes What?_____
_____No

54. What advice do you have for others to prevent this type of accident?

_____

_____

_____

APPENDIX C

LETTER OF INTRODUCTION

MICHIGAN STATE UNIVERSITY EAST LANSING · MICHIGAN 48823

COLLEGE OF EDUCATION · ERICKSON HALL

Dear

As a doctoral candidate at Michigan State University, I am currently conducting a research project concerned with motorcycle accidents that occurred in Ingham County during 1971.

You have been randomly selected for this study. I would appreciate it very much if I could have approximately fifteen (15) minutes of your time to ask you a few questions concerning the accident in which you were involved.

The information which I obtain from you during this interview will be used for educational purposes only and will be held in strict confidence.

I will be contacting you by phone in the near future to set up a time and place that would be convenient for you so that I may be able to obtain this information.

Your cooperation and participation in this research project will be greatly appreciated.

Sincerely yours,

Frank C. Young
Doctoral Candidate
Michigan State University