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A COMPARISON OF PERSONALITY FACTORS AND SELECTED CHARACTERISTICS OF ACCIDENT- AND NONACCIDENT-INVOLVED MALE MOTORCYCLE OWNERS IN TWO MICHIGAN COUNTIES

By

John Edward Schlick

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ABSTRACT

A COMPARISON OF PERSONALITY FACTORS AND SELECTED CHARACTERISTICS OF ACCIDENT- AND NONACCIDENT-INVOLVED MALE MOTORCYCLE OWNERS IN TWO MICHIGAN COUNTIES

By

John Edward Schlick

The continued increase of motorcycles in the highway transportation system and a fatality rate far above that for automobiles have resulted in a new emphasis in motorcycle education programs. To be effective, motorcycle education programs must concentrate on those characteristics which differentiate between accident-involved and accident-free motorcycle owners.

The primary purpose of this study was to determine if accident-involved and nonaccident-involved male motorcycle owners differed on any of the sixteen personality factors measured by the Sixteen Personality Factor Questionnaire.

The second purpose was to determine if accident- and nonaccident-involved male motorcycle owners differed on selected biographical and vehicle characteristics of age, occupation, marital status, length of motorcycle

riding experience, primary purpose for riding a motorcycle, miles traveled per year, extent of urban driving, type of motorcycle operating instruction received, size and make of motorcycle owned.

The sample of fifty-one accident-involved and fifty-one nonaccident-involved male motorcycle owners were selected from state police traffic accident reports and Michigan Department of State files of registered motorcycle owners in Calhoun and Jackson Counties, Michigan.

Each motorcycle owner completed a mailed motorcycle information sheet and Sixteen Personality Factor Questionnaire Form A. Hypotheses for personality factors were tested using a one-way multivariate analysis of variance and hypotheses concerning biographical and vehicle characteristics were tested using chi square analysis. The .05 level of confidence was used to accept or reject the null hypotheses. Differences at the .10 level were also reported.

The findings of the study were the following:

1. A difference was found at the .05 level of confidence between accident- and nonaccident-involved owners on factors M (Practical--Imaginative) and Q_3 (Uncontrolled--Controlled) of the sixteen PF indicating that accident-involved owners are more practical and have more undisciplined self-conflict.

2. A difference was found at the .10 level of confidence between accident- and nonaccident-involved owners on factors F (Disurgency--Surgency), I (Tough-minded--Tender-minded), and L (Trusting--Suspicious) of the sixteen PF indicating that accident-involved owners tended to be more happy-go-lucky, more tender-minded, and more suspicious than nonaccident-involved owners.

3. No significant difference was found between accident- and nonaccident-involved owners on any of the four second-order traits of the sixteen PF at the .05 level.

4. A significant difference was found at the .05 level of confidence between accident- and non-accident-involved owners on the biographical characteristics of age, occupation, primary purpose for riding, and total miles traveled per year. The accident-involved owners were younger, more often worked in nonprofessional occupations, rode primarily for basic transportation, and traveled more miles per year when compared to the nonaccident-involved owners.

5. A difference was found at the .05 level of confidence between accident- and nonaccident-involved owners on the vehicle characteristic

of size of motorcycle owned. Accident-involved owners owned larger motorcycles than nonaccident-involved owners.

6. Two relationships between second-order traits and biographical and vehicle characteristics were significant at the .05 level for nonaccident-involved owners. Second-order trait III (Sensitivity--Tough Poise) was related to total miles traveled and trait IV (Subduedness--Independence) was related to the size of motorcycle owned.

7. No significant relationships were found between second-order traits and biographical and vehicle characteristics for the accident-involved owners at the .05 level.

8. Five relationships between biographical and vehicle characteristics were significant for nonaccident-involved owners: primary reason for riding with size of motorcycle owned, experience with make of motorcycle owned, size of motorcycle owned with total miles traveled per year, marital status with total miles traveled, and extent of urban riding with size of motorcycle owned.

9. Four relationships between biographical and vehicle characteristics for accident-involved

owners were significant: size of motorcycle owned with make owned, primary reason for riding with size of motorcycle owned, primary reason for riding with make of motorcycle owned, and size of motorcycle owned and experience.

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CHAPTER I

THE PROBLEM

The number of motorcycles registered in the United States increased tremendously during the decade of the 60's and continued into the 70's. From 1960 to 1971 motorcycle registrations increased from 575,497 to 3,293,400. Compared with a 51 per cent increase in all motor vehicles since 1961, motorcycle registrations increased 453 per cent.[1]

Along with the increase in motorcycle registrations has come an increase in motorcycle accidents and deaths. The actual number of motorcyclists injured annually in the United States is not known. However, in 1971, motorcycles which comprised approximately 2.7 per cent of the total vehicle registrations, accounted for 2,300 (3.4%) of the total motor vehicle deaths and 300,000 (1.1%) of all reported vehicle accidents.[2]

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

[2]National Safety Council, Motorcycle Facts (Chicago: Statistics Division, 1972).

Studies in New Jersey,[3] Vermont,[4] Kansas,[5] and Kentucky[6] indicated that 90.8 per cent, 80.1 per cent, 88.6 per cent, and 87.9 per cent, respectively, of all accidents involving motorcycles resulted in death or injury. The motorcycle mileage death rate, based on 100 million miles traveled, has shown a downward trend in recent years. However, the 1971 death rate for motorcycles nationally was estimated at approximately 20 compared with the overall motor vehicle death rate of 4.7.[7] Obviously, the motorcyclist who is involved in an accident has a much greater chance of being killed or injured than does the driver of an automobile.

The rapid rise in the popularity of motorcycles among all age groups and the mounting statistics regarding

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[3]New Jersey Division of Motor Vehicles, Summary of Motor Vehicle Traffic Accidents-Motorcycles Only (Trenton: State of New Jersey, 1966).

[4]Vermont Department of Motor Vehicles, Motorcycle Accidents in Vermont, Year 1966 (Montpilier: State of Vermont, 1967).

[5]Traffic and Safety Department, Summary of Motor Vehicle Accidents Involving Motorcycles, 1966 (Topeka: State Highway Commission, 1967).

[6]Kentucky State Police, Standard Summary of Motor Vehicle Accidents in Kentucky for 1968 Involving Motorcycles (Frankfort: Kentucky State Police, 1969).

[7]National Safety Council, Motorcycle Facts (Chicago: Statistics Division, 1972).

their contribution to the overall traffic accident problem has created concern among traffic safety officials. In an effort to reduce the number of motorcycle-related deaths and injuries, many states have enacted laws to control the licensing of motorcycle operators and the operation of motorcycles. Although efforts towards more stringent control of the motorcycle and the operators, especially mandatory helmet laws, have been effective in reducing the motorcycle fatality rate, additional methods of accident reduction are needed.

Like most other states, Michigan is experiencing the problem of increased motorcycle registrations, accidents, and deaths. A Department of State report[8] covering driver records in 1970 and 1971 indicated 107,000 persons with motorcycle license endorsements. Of the total, 99,000 were male and 8,500 were female. Although figures are not complete since there is a three-year lag in the requirement for obtaining a motorcycle license endorsement, the Department estimated the 1972 total may be 240,000 endorsements and could reach 275,000 in 1975.

The number of motorcycles registered in Michigan has been increasing steadily since 1967. Compared with a 16 per cent increase in total motor vehicles between 1967 and 1971, the number of motorcycles increased 110 per cent.

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[8]Michigan Department of State, Report of Driver Records (Lansing, 1972).

Estimates of the Michigan motorcycle mileage death rate per 100 million vehicle miles traveled for riders' deaths only ranged from 28.9 to 40.6 deaths. This compares with the 1971 Michigan death rate for all motor vehicles of 3.9 per 100 million miles.[9]

The seriousness of the motorcycle accident problem in Michigan was vividly pointed out when Secretary of State Richard Austin advocated legislation to provide off-street training facilities for motorcycle drivers, require motorcycle and bicycle information in school driver education courses, improve road testing procedures and increased operating knowledge procedures, and restrict major equipment modifications of motorcycles. Secretary Austin called motorcycles by far the most dangerous vehicles on Michigan roads today.[10]

A search of the literature by the writer relative to the traffic accident problem indicated the importance of personality factors and biographical and vehicle characteristics to accident involvement of automobile drivers. However, little research could be found that indicated results found with automobile drivers also were true of motorcyclists. This lack of research led to the development of this study.

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[9]Michigan Department of State Police, Michigan Motorcycle and Motor Scooter Data, 1967-1971 (East Lansing: Department of State Police, 1972).

[10]Michigan Department of State, News Release, 1972.

Purpose of the Study

This study had two purposes: (1) to determine if accident- and nonaccident-involved motorcycle owners differed in personality characteristics as measured by the Sixteen Personality Factor Questionnaire, and (2) to determine if the two samples differed on selected biographical and vehicle characteristics.

Hypotheses

The three hypotheses for this study stated in the null form are:

Ho_1:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the sixteen original personality factors as measured by the Sixteen Personality Factor Questionnaire.

Ho_2:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the four second-order personality factors as measured by the Sixteen Personality Factor Questionnaire.

Ho_3:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the selected biographical and vehicle characteristics.

Importance of the Study

Traffic safety experts have been concerned with human variables in accidents for at least two decades.

Studies to determine personality traits characteristic of accident-involved automobile drivers have been conducted by Conger,[11] Rainey,[12] Beamish and Malfetti[13] to name only a few. At the present time, little research has been conducted to determine if the study results on automobile drivers are reflective of motorcycle riders.

A Canadian report on motorcycle safety indicated the importance of identifying personality characteristics of accident-involved motorcycle riders when it stated:

> Data compiled at accident scenes invariably focuses on the physical rather than the psychological aspects of the incident. We know little about the operator's experience, training, attitude or state of mind prior to the accident. However, it is generally agreed that much or most of the roots of unsafe driving lie in the two general areas of attitude and experience.[14]

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[11] J. J. Conger, "Personality Factors in Motor Vehicle Accidents," Medical Times, March 1, 1960.

[12] R. V. Rainey, et al., "An Investigation of the Role of Psychological Factors in Motor Vehicle Accidents," Highway Research Board, Bulletin 212 (Washington, D.C.: 1959).

[13] J. J. Beamish and J. L. Malfetti, "A Psychological Comparison of Violation and Non-Violator Automobile Drivers," Traffic Safety Research Review, 1962.

[14] Stuart Munro, The Deadliest Vehemence (Ottawa: Ottawa Safety Council, 1967), p. 10.

While millions of new automobile drivers each year are required to complete a driver education course before receiving a license, very few new, inexperienced motorcycle drivers are afforded the same opportunity.

In their guide for motorcycle drivers, the Universal Underwriters Insurance Company stressed the need for motorcycle education programs when they stated:

> Regardless of the reason a motorbike is to be ridden, for pleasure or as a means of economical transportation, it is imperative that adequate initial instruction and subsequent training and development of good riding and driving habits be accomplished.[15]

The National Highway Traffic Safety Administration also pointed out the need for motorcycle education programs in their new proposed standard covering traffic safety education which stated:

> There shall be a special-class instruction program, consisting of courses of instruction specially designed to improve the performance of specific categories of highway users, including school vehicle drivers, motorcyclists . . . [16]

Donald Pelz, in a research report to the Second Annual Traffic Safety Research Symposium of the Automobile Insurance Industry, pointed out the need for driver personality research. He stated:

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[15]Universal Underwriters Insurance Company, Handbook of the Driver Education Program for Motorbike Operators (Kansas City: Universal Underwriters Insurance Company, 1966), p. 3.

[16]United States Department of Transportation, "Proposed Highway Safety Program Standards," Standard N4 National Highway Traffic Safety Administration, 1972.

> Attitude inventories have been used mainly to select or predict who is going to be a safe driver and who is not. It would be valuable to see whether such devices could find out which individuals are going to respond to training and which are not, or what sort of training could be effective for individuals showing different personality constellations.[17]

The need for effective educational programs for motorcyclists is evident. However, to be effective such programs must meet the personality needs of the motorcyclist. The continued high rate of accident involvement for motorcycles makes it important to determine if there are specific personality characteristics which distinguish accident-involved motorcycle drivers from nonaccident-involved drivers. This study is an attempt to meet a part of that need.

Delimitations

This study was limited by the following factors:

1. The sample was limited to motorcycle owners and did not include riders who only used rented or borrowed motorcycles.
2. The sample was limited to those motorcycle owners with motorcycles registered in Calhoun or Jackson County. This study did not include nonregistered motorcycles.

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[17] D. Pelz, Driver Motivations and Attitudes, Report presented to the Second Annual Traffic Safety Research Symposium of the Automobile Insurance Industry, Northbrook, Illinois, March, 1968.

3. The accident-involved sample was limited to those motorcycle owners who survived personal injury traffic accidents that occurred in either Calhoun or Jackson County during 1972. Personal injury accidents resulting in the death of the motorcycle owner and nontraffic personal injury accidents were not included in this study.

4. Both samples in this study were limited to male motorcycle owners who completed and returned the mailed Sixteen Personality Factor Questionnaire and information sheet.

Definition of Terms Used

Accident Involved Motorcycle Owner.--For the purpose of this study, accident-involved motorcycle owners referred to those male motorcycle owners who had motorcycles registered in either Calhoun or Jackson County, Michigan during 1972 and who had been involved in either a Type A or Type B personal injury accident as recorded on the Michigan State Police UD-10A Accident Report Form during 1972.

Motorcycle.--For the purpose of this study, motorcycle referred to a two-wheeled cycle with more than five-brake horsepower.

Motor Vehicle Traffic Accident.--Any motor vehicle accident occurring on a traffic-way.[18]

Motor Vehicle Non-Traffic Accident.--Any motor vehicle accident which occurs entirely in any place other than a traffic-way.[19]

Non-Accident Involved Motorcycle Owner.--Those male motorcycle owners who had motorcycles registered in either Calhoun or Jackson County, Michigan during 1972 who reported they had never been involved in a personal-injury accident requiring attention by a doctor while riding a motorcycle.

Personality Factors.--For the purpose of this study, personality factors referred to the sixteen dimensions or personality traits measured by the Sixteen Personality Factor Questionnaire.

Second-Order Factors.--The four broader personality trait categories derived from conversions of the original sixteen primary factors of the Sixteen Personality Factor Questionnaire.

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[18]J. Stannard Baker, Traffic Accident Investigator's Manual for Police (Evanston, Ill.: Northwestern University, Traffic Institute, 1963), p. 10.

[19]Ibid.

Type A Personal Injury.--Any injury other than fatal which prevents normal activities and generally requires hospitalization.[20]

Type B Personal Injury.--Any injury not incapacitating but evident to others at the scene of an accident.[21]

UD-10A Accident Report Form.--The report form used by all police officers in Michigan for reporting motor vehicle traffic accidents.

Basic Assumptions

The investigation of the problem was based on two assumptions: (1) the knowledge of personality factors and driver and vehicle characteristics associated with accident involvement of motorcycle owners is important to the development of effective motorcycle driver education and improvement programs, and (2) motorcycle owners who consent to participate in this study would answer all questions on the Sixteen Personality Factor Questionnaire and information sheet truthfully.

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[20]State of Michigan, Instructions for Completing State of Michigan Official Traffic Accident Report (East Lansing: Department of State Police), p. 4.

[21]Ibid.

Possible Applications

If the results of this study indicate a significant relationship between any of the sixteen personality factors or selected driver and vehicle characteristics and accident involvement, improved accident prevention programs could be developed taking into consideration those factors.

Organization of the Remaining Chapters

In Chapter II a review of literature is found pertinent to the relationship of personality and attitude to driver behavior, the relationship of driver and vehicle characteristics with accident involvement, and the Sixteen Personality Factor Questionnaire.

In Chapter III are found a description of the design and methodology used to conduct the study, samples and selection procedures, sources of data, collection of data, and procedures for data analysis.

In Chapter IV are the analysis of the data, and the degree of relationships found between accident involvement, the sixteen personality factors, and the characteristics of age, occupation, marital status, experience, purpose for riding, exposure, extent of urban driving, type of instruction, make of motorcycle, and size of motorcycle.

In Chapter V are the summary, conclusions, recommendations, recommendations for further research, and a discussion.

CHAPTER II

A REVIEW OF RELATED LITERATURE

In this chapter is found a review of the literature. The review concerned itself with some of the most important literature in several areas, namely: (1) the relationship of personality traits and driving behavior, (2) the relationship of driver and vehicle characteristics and accident involvement, and (3) the use of the Sixteen Personality Factor Questionnaire as a test instrument.

A review of the literature revealed several studies indicating a significant relationship of personality traits and attitude with both automobile and motorcycle driving behavior. Additional studies reviewed indicated the relationship of numerous biographical and vehicle characteristics with driving behavior and accident experience.

Several studies using the Cattell Sixteen Personality Factor Questionnaire were also reviewed to determine the suitability for its use in this study.

For many years, driver attitude and personality have been examined as factors in accident and violation experience, both individually and in combination with each other or with other factors.

Mann[1] asserted that poor driving behavior is a projection of undesirable personality traits. He suggested this theory be considered when planning and developing programs for driver improvement.

Relationship of Personality Traits and Attitude with Driving Behavior

Automobile Accidents and Personality Traits

A study by Tillman and Hobbs[2] created the theory that people drive as they live. Forty Canadian taxi-cab drivers categorized by high and low accident rates were studied in an attempt to identify personality characteristics associated with each group. Each driver was interviewed to obtain personal information. Personal information collected included: parental background, childhood and adolescent history, and adult adjustment. Comparisons

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[1]W. Mann, "The Nature of the Problem Driver" (paper presented to the National Driver Improvement School Conference, Michigan State University, East Lansing, December, 1965).

[2]W. A. Tillman and G. E. Hobbs, "The Accident Prone Automobile Driver, A Study of Psychiatric and Social Background," American Journal of Psychiatry, No. 106 (1949), 321-33.

between the high and low accident groups indicated differences in several personality characteristics. The high accident drivers were described as aggressive, impulsive, and disrespectful of authority. The low accident drivers were described as well adjusted, stable individuals.

A follow-up study of 196 male drivers aided in extending the theory to a larger group of drivers. A group of 96 drivers involved in 4 or more accidents was compared to a group of 100 accident-free drivers of the same age. A number of community institutions including the juvenile and adult courts, public health agencies, venereal disease clinics, social service agencies, and credit bureaus were checked to determine if the sample drivers were known to these institutions. In the high accident group it was found that 66 per cent were known to at least one agency. Two drivers were known to all agencies, three drivers were known to four agencies, nine drivers were known to three agencies, sixteen were known to two agencies, and thirty-two were known to one agency. Only six drivers in the low accident group were known to the credit bureau and one driver each to the social agencies, juvenile court, and adult court.[3]

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[3] Ibid., pp. 327-29.

Rommel[4] used five sub-scores of the Minnesota Multiphasic Personality Inventory in an attempt to isolate personality characteristics that distinguished accident repeaters and accident-free high school students. The accident repeaters scored significantly higher than the accident-free group on scales which reflected a disregard for social mores and which emphasized activity and enthusiasm. A high positive correlation (.80) was found between scores on the Hypomania and Psychopathic Deviate scales of the MMPI for the accident repeater group. The difference in mean scores for the two groups was significant at the .05 level on the Psychopathic Deviate Scale and at the .01 level for the Hypomania Scale.

Conger[5] used twenty airmen as subjects to determine the personality factors that might make some drivers more subject than others to automobile accidents. Ten airmen who had been held officially responsible for two or more accidents in the preceding four and one-half years were compared to ten who had no record of accidents during the same period. A psychiatric interview, a psychological examination, and several functional tests were

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[4]R. Rommel, "Personality Characteristics and Attitudes of Youthful Accident-Repeating Drivers," Traffic Safety Research Review, III (March, 1959), 13-14.

[5]J. Conger, et al., "Psychological and Psychophysiological Factors in Motor Vehicle Accidents," American Medical Association Journal, CLXIX, No. 14 (April, 1959), 1,581-87.

given to each subject. No differences in intelligence or psychophysiological responsivity was found between the groups. However, in the area of personality functioning, the accident repeaters were found to display a significantly poorer control of hostility, lower tension-tolerance, higher separation anxiety, higher dependency needs, and extremes of both egocentricity or socio-centricity and fantasy-preoccupation or unreflectiveness. Each of the variables were significant at the .01 or .02 level except for fantasy which was significant at the .10 level. The tests used included the Rorschach, the Wechsler-Bellevue Intelligence Scale, and the Sacks Sentence Completion Test. A conclusion of the study was that psychological factors were clearly related to accident susceptibility.

Rainey,[6] also using airmen, conducted a complex investigation into the role of psychological factors and driving behavior. One hundred and ten airmen were administered a comprehensive battery of psychological tests and measurements including the Minnesota Multi-phasic Personality Inventory, Thurstone Temperament Schedule, Rorschach, Sacks Sentence Completion Test, and the Thematic Apperception Test. The Allport-Vernon and Lindsey Study of Values, Taylor Anxiety Scale, and

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[6]R. Rainey, et al., "An Investigation of the Role of Psychological Factors in Motor Vehicle Accidents," Highway Research Board Bulletin 212 (1959), 11-15.

Level of Aspirations Tests were used to measure specific personal characteristics. Each subject was also individually seen for a structured psychiatric interview directed to a detailed inquiring of the subject's lifetime driving history and accident experience. For the group studied, acceptance or rejection of conformity standards and conventional modes of behavior, and the degree and effectiveness of impulse control were major personal characteristics related to accident frequency. Accident-repeater and accident-free subjects differed significantly at the .10 level on six of the variables. The accident repeater groups were rated high on tension (anxiety) and unconventional behavior, and low on hostility/control ratio and tension behavior.

Kenel[7] used the Mann Inventory to determine the relationship between six behavioral categories and driving records of 1,057 young automobile drivers. Drivers characterized as well adjusted were involved in significantly fewer accidents and moving violations. Those drivers characterized as forceful, outgoing, withdrawn, or vacillating between extremes of aggression and withdrawal were involved in significantly more accidents and moving violations.

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[7]F. Kenel, "The Effectiveness of the Mann Inventory in Classifying Young Drivers Into Behavioral Categories and Its Relationship to Subsequent Driver Performance" (unpublished Ph.D. dissertation, Michigan State University, 1967).

Brown and Berdie[8] studied the relationships between accidents and violations and Minnesota Multiphasic Personality Inventory scores of 993 male college students and found a slight relationship. They concluded that knowledge of the kind of personality organization and motivation of a driver may be useful for the purpose of both licensing and training drivers.

Automobile Violations and Personality Traits

Moffie et al.[9] investigated the relationship between psychological tests and driver performance.

Personality tests used included the Otis SA Test of Mental Ability, the Bennett Test of Mechanical Comprehension, the Kuder Vocational Preference Record, the Bernreuter Personality Inventory, and the Minnesota Multiphasic Personality Inventory. The safe drivers were shown to be more tense, less self-sufficient, and less dominant as measured by the Bernreuter Inventory. The same trends were demonstrated on the MMPI Test but were not statistically significant. One conclusion stated that this study indicated some relationship

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[8]P. Brown and R. Berdie, "Driver Behavior and Scores on the MMPI," Journal of Applied Psychology 44 (February, 1960), 18-21.

[9]D. Moffie, A. Symmes, and C. Milton, "Relation Between Psychological Tests and Driver Performance," Highway Research Board Bulletin 60 (1952), 17-24.

between psychological traits and driver performance, but unlike many other studies it disclosed the importance of the personality of the driver as a factor in safety.[10]

Beamish and Malfetti[11] compared 16- to 19-year-old male violators and nonviolators to determine if certain psychological characteristics of traffic violators differed from nonviolators and to determine if these characteristics affected the violator's responsiveness to retraining. Subjects were administered the Guilford-Zimmerman Temperament Inventory and the Minnesota Counseling Inventory. Results indicated a difference between the two groups on the emotional stability and objectivity traits of the GZTI and the conformity and mood traits of the MCI. The violator group scored lower on all variables.

Heath[12] studied 763 traffic offenders and 195 nonoffenders by interview and the Thurstone Temperament Schedule. He concluded that for the purpose of distinguishing traffic offenders from nonoffenders, impulsive,

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[10] Ibid., p. 24.

[11] J. Beamish and J. Malfetti, "A Psychological Comparison of Violator and Non-Violator Automobile Drivers in the 16 to 19 Year Age Group," Traffic Safety Research Review (1962), 12-14.

[12] E. Heath, "Relationships Between Driving Records, Selected Personality Characteristics, and Biographical Data of Traffic Offenders and Non-Offenders," Highway Research Board Bulletin 212 (1959), 16-20.

sociable, and reflective trait measures seemed to provide for such differentiation. The active vigorous, dominant, and stable trait measures were not of value.

Motorcycle Accidents and Personality Traits

A South African study of motorcycle owners by Biesheuvel and Barnes[13] indicated motorcycle owners involved in an accident had a lower sense of social responsibility than nonaccident owners. Using a mail-out survey questionnaire, they determined the accident-involved owners had a more unfavorable attitude towards safety measures and traffic control. Accident-involved owners also tended to project their own lack of discipline towards other road users. In summarizing the results of the study, the following statement was made. "In brief, character defect, particularly in respect of social consciousness, is at the root of the motorcycle accident."[14]

Waller et al.[15] compared university automobile owners and motorcycle owners using the MMPI. A

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[13] S. Biesheuvel and P. Barnes, "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), 3-14.

[14] Ibid., p. 14.

[15] P. Waller et al., "Motorcycles Versus Automobiles: How Do Their Owners Differ?" Highway Safety Research Center, University of North Carolina, Chapel Hill, 1969.

significant positive correlation was found between the Psychopathic Deviate and Schizophrenia Scales and driving behavior for the motorcycle owners. A significant positive relationship between driver behavior and the Depression scale was found rather than the expected negative relationship. The relationship between depression and owning a motorcycle raised the question of a tendency toward self-destructive or suicidal tendencies, especially in light of the known dangers of motorcycle travel. Additional analysis was conducted with the Psychopathic Deviate and Hypomania scales. Each subject's MMPI was classified according to the three peak clinical scales. Subjects with Psychopathic Deviate as a peak score or Psychopathic Deviate and Hypomania among the three peak scores were separated for further analysis. Driving records for these subjects were compared to those of the other subjects. When the automobile group was compared to the motorcycle group, it was found that the automobile group had a significantly larger proportion of people with a peak score on Psychopathic Deviate or with Psychopathic Deviate and Hypomania among the three peak scores. It was suggested that measures aimed at improving the driving behavior of young males may have to consider more than inexperience factors and come to grips with the problems posed by personality characteristics.[16]

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[16] Ibid., p. 26.

Munro[17] further emphasized the importance of the human element in motorcycle accidents in a paper on motorcycle safety.

A comprehensive study of California motorcycle drivers concluded that motorcycle traffic convictions were related to factors associated with attitude, personal stability, and social responsibility.[18]

Relationship of Driver and Vehicle Characteristics with Accident Involvement

Automobile Driver and Vehicle Characteristics

Several studies have shown significant relationships between driver characteristics and accident involvement for both automobile and motorcycle drivers.

A study of 7,692 Iowa drivers by Lauer[19] indicated that male drivers under 30 years of age were over represented in accidents. Results showed the 18 to 23 years of age category to be highly significant.

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[17] S. Munro, "The Deadliest Vehemence" (a paper on motorcycle safety, Ottawa Safety Council, Ottawa, Canada, 1967).

[18] R. Harano and R. Peck, "The California Motorcycle Study, Driver and Accident Characteristics," California Department of Motor Vehicles, July, 1968, p. 20.

[19] A. Lauer, "Age and Sex in Relation to Accidents," Highway Research Board Bulletin 60 (1959), 137.

Heath[20] found seven items of biographical information which appeared to be useful for the purpose of distinguishing between traffic offenders and nonoffenders. Biographical items of age, marital status, education, occupation, number of positions held during the preceding five-year period, reasons for terminating previous employment, and annual salary were most useful for prediction when combined with personality traits.

Levonion[21] determined that biographical variables of exposure, age, sex, and marital status could be used to identify problem drivers.

Motorcycle Driver and Vehicle Characteristics

A California study of motorcycle accidents by Horano and Peck[22] indicated that in contrast to the overall driving population, the biographical variables of age, and experience were more closely related to accidents than traffic conviction records. An important conclusion of the study asserted that motorcycle drivers involved in motorcycle accidents and those involved in nonmotorcycle accidents were not from the same accident population.

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[20]Heath, op. cit., p. 18.

[21]E. Levonion, "Prediction of Accidents and Convictions," Traffic Safety Research Review, XI (September, 1967), 75-79.

[22]Horano and Peck, op. cit.

The data suggested that accidents were not a homogenous entity with respect to vehicle type and driver sub-population.

Waller et al.[23] found relationships between several biographical and vehicle characteristics of university students who owned motorcycles. Results of the study indicated (1) single students had a higher proportion of high mileage motorcycles, (2) drivers of motorcycles with smaller engine displacement traveled fewer miles than drivers of larger motorcycles, (3) a larger proportion of the students who owned motorcycles and were accident victims were single, and (4) accident-involved motorcycles tended to have a higher percentage of high-mileage drivers than nonaccident-involved motorcycles.

An English study by Munden[24] indicated that large motorcycles were involved in more severe accidents than were smaller motorcycles. It was also determined that motorcycles of over 350 cc and driven by drivers under 25 years of age were involved in 20 per cent of the

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[23]P. Waller, P. Barry, and W. Rouse, "Motorcycles: 1. Estimated Mileage and Its Parameters," Highway Safety Research Center, University of North Carolina, Chapel Hill, March, 1968.

[24]J. 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.

fatal and serious accidents but made up only 5 per cent of the registrations.

A study of driver and vehicle characteristics comparing accident-involved and nonaccident-involved motorcycle owners by Kraus et al.[25] resulted in several interesting findings. The variable of age indicated that the age group of 15 to 19 years of age accounted for 36 per cent of all injury accidents and 32 per cent of the serious injury accidents compared to 20 per cent in the comparison group. Male motorcycle drivers accounted for 88 per cent of all injury accidents and 92 per cent of the serious accidents. Analysis of the rider's principal use of the motorcycle indicated that 34 per cent of the accident group used their motorcycle primarily on two-lane roads. The lack of motorcycle training was highly significant when 85 per cent of the drivers involved in serious injury accidents reported no motorcycle drivers training.

The ratio of injury collisions to make of motorcycle and engine size was also determined. Based on injury accidents per 1,000 registrations, the top three makes of motorcycles involved were (1) Bultaco (76.1),

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[25] J. Kraus, et al., "Some Epidemiologic Features of Motorcycle Injury in a California Community" (paper presented before the Epidemiology Section of the American Public Health Association, Atlantic City, 1972).

(2) Triumph (48.7), and (3) Harley Davidson (44.7). The engine size category of 251 cc - 500 cc showed the largest injury ratio (66.1).

The Sixteen Personality Factor Questionnaire

Automobile Studies Using the 16 PF

The 16PF has been used in several studies involving driver behavior. Freeman[26] used Form C of the 16PF to determine the general pattern of psycho-sociological factors associated with accident-free and accident-liable automobile drivers. Two groups of twenty male drivers with known differences in driving records were compared. The accident liable drivers had been involved in two or more accidents in a one-year period.

Two source traits, Factor E (dominance-submission) and Factor Q_1 (radicalism-conservatism) were statistically significant when the mean scores of the two groups were compared. Although not significant, six additional source traits (G, I, M, N, Q_2, and Q_3) indicated differences between the groups and it was suggested they be given consideration in further studies.

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[26] J. Freeman, "Certain Psycho-sociological Factors of Accident-Free and Accident-Liable Automobile Drivers of Cedar Rapids, Iowa" (unpublished M.A. thesis, Iowa State College, 1952).

Suhr[27] used Form A of the 16PF in a study of sixty commercial drivers selected on the basis of three criteria: (1) Supervisor's subjective estimate, (2) Supervisor's objective ratings, and (3) Accident records from company files. Groups were formed for each criteria by placing the thirty drivers with the highest ratings in one group and the remaining thirty in a second group. Analysis of the 16PF factor scores was then done for each criteria separately.

Analysis based on Supervisor's Subjective Estimate indicated a significant difference between the groups on factor M (Bohemianism-Desurgency). Factors F (Surgency-Desurgency) and Q_3 (Will Control-Character Stability) were just short of significance at the .10 level.[28]

Comparison on the basis of Supervisor's Objective Ratings showed significant differences at the .10 level on factor C (Emotional Stability-General Neuroticism) and again on factor Q_3. Again, factor M and factor O (Worrying-Suspicious-Trustfulness) approached significance.[29]

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[27] V. Suhr, "The Cattell 16PF Test as Prognosticator of Accident Susceptibility," Proceedings of the Iowa Academy of Science, 1953, pp. 558-61.

[28] Ibid., p. 559.

[29] Ibid.

Grouping according to Accident Records showed factor G (Positive Character-Immature Dependent Character) close to significance at the .10 level.[30]

Covert[31] used Form A of the 16PF to study the relationships between self-concepts of young drivers and ratings of behavior by their driver education teachers and the Mann Inventory. Using a sample of 668 Michigan high school students, he found significant differences in self-concepts of personality characteristics of the male students when categorized into behavior groups by either teacher ratings or the Mann Inventory. Male students who were characterized as under-controlled and having disturbed personalities indicated they were expedient, forthright, affected by feelings, suspicious, assertive, self-sufficient, apprehensive, and having undisciplined self-conflict. Male students categorized as over-controlled indicated strengths in the personality dimensions of conscientious, emotionally stable, controlled, shrewd, and self-sufficient.

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[30] Ibid., p. 560.

[31] W. Covert, "Relationships Between Self-Concepts of the Young Drivers and Ratings of Behavior by Driver Education Instructors and the Mann Inventory" (unpublished Ph.D. dissertation, Michigan State University, 1972).

A study in Germany[32] used the 16PF in an attempt to relate specific personality traits to selected descriptive driving criteria. The factors A (Reserved-Outgoing), E (Humble-Assertive), and F (Sober-Happy-go-lucky) were significant for the driving behavior described as offensive.

Motorcycle Studies Using the 16PF

No studies using the Sixteen Personality Factor Questionnaire in an investigation of personality characteristics associated with accident-involved and non-accident-involved motorcycle riders could be found. However, Cattell, who developed the Sixteen Personality Factor Questionnaire, stated that the best way to begin research or applied work in any new domain is to take cognizance of the total personality, in all of its main dimensions.[33] He continued by claiming that despite personal interest in one concept, the investigator would generally be wise, in his first attack in a field, to enter with "a wide net" and discover what is happening

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[32]D. Klebelsberg, B. Biehl, J. Turhramm, and V. Seydel, "Fahrverhalten, Beschrenibung, Beurteilung and Diagnostiche Erfassung" (Wein: Kuratarium fuer Verkenhrssicherheit, 1970).

[33]R. Cattell, H. Eber, and M. Tatsuoka, Handbook for the Sixteen Personality Factor Questionnaire (Champaign, Ill.: Institute for Personality and Ability Testing, 1970), p. 5.

on other personality dimensions at the same time.[34] It was determined that the 16PF would provide such a wide net necessary for this study.

Summary

The review of literature revealed several studies that found a significant relationship between personality factors and driver behavior and accident involvement.

Studies reviewed also indicated the importance of biographical and vehicle characteristics in accident experience. Several studies indicated a relationship between size and make of motorcycle, age, sex, and experience of the driver and motorcycle accident experience.

No complex investigation of the personality factors associated with accident-involved and nonaccident-involved motorcycle owners could be found although motorcycle use continues to grow at a tremendous rate.

It was determined that the 16PF had been used successfully in investigations of automobile driver's personality and could be acceptable as a test instrument for this study.

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[34] Ibid., p. 6.

In the following chapter is found a description of the design and methodology used to conduct the study, selection of counties and owners, sources of data, collection of data, and procedures for data analysis.

CHAPTER III

DESIGN AND METHODOLOGY

In the preceding chapter literature indicating the relationship of personality traits to automobile and motorcycle driving behavior was reviewed. Literature showing the relationship of biographical and vehicle characteristics to accident involvement and literature on the Sixteen Personality Factor Questionnaire was also reviewed. This chapter contains a description of the design and methodology used to conduct the study. Included are: (1) purposes and hypotheses, (2) selection of counties and motorcycle owners, (3) sources and collection of data, and (4) procedures for data analysis.

Purpose of the Study

This study was designed to investigate: (1) differences in personality traits between accident- and nonaccident-involved male motorcycle owners as measured by both the sixteen original factors and the four second-order traits of the Sixteen Personality Factor Questionnaire, and (2) differences between the two groups on the selected biographical and vehicle characteristics.

Hypotheses

This study had three hypotheses. Stated in the null form they were:

Ho_1:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the sixteen original personality factors measured by the Sixteen Personality Factor Questionnaire.

Ho_2:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the four second-order personality traits as measured by the Sixteen Personality Factor Questionnaire.

Ho_3:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the selected biographical and vehicle characteristics.

Selection of Counties and Owners

Counties

Ideally, it would have been desirable for this investigation to include representative counties throughout the state. However, this was not possible because of the following factors:

1. The counties would have to have a sufficiently large number of reported motorcycle traffic accidents.

2. All law enforcement agencies with jurisdiction in the counties would have to have been willing to cooperate.

3. The counties would have to have a sufficiently large number of registered motorcycle owners.

Based on the preceding factors and a review of research studies employing a mailed personality test to licensed drivers, a return rate of 25 per cent to 30 per cent could be expected. Based on a return rate of 25 per cent, it was determined that approximately 200 accident-involved and 200 nonaccident-involved male motorcycle owners would have to be contacted to achieve the desired minimum sample size of 50 accident-involved and 50 nonaccident-involved motorcycle owners.

The Michigan State Police Summary Report of Motorcycle Accidents for 1971 indicated 15 counties with 100 or more reported motorcycle traffic accidents. Those counties with special traffic enforcement programs, large universities, or known motorcycle education programs were deleted from possible inclusion in this study to prevent possible biases. Discussions were then held with personnel from the Michigan Department of State on the remaining counties. These discussions resulted in the selection of Calhoun and Jackson Counties for inclusion in this investigation. These two counties were selected because of the following factors:

1. All law enforcement agencies with jurisdiction in the two counties were willing to cooperate in the study.
2. Each county represented a cross section of the state population.
3. Each county contained approximately equal mileage of the same federal interstate route (I-94).
4. Each county contained a large city of approximately the same population.

Accident-Involved Owners

The population from which the subjects for this study were selected were the approximately 8,000 registered male motorcycle owners in Calhoun and Jackson Counties, Michigan, recorded with the Michigan Department of State Driver Services Division in November, 1972.

All motor vehicle traffic accidents, including motorcycles, investigated by a law enforcement agency in Michigan are reported on the Michigan State Police UD-10A Accident Report Form. Copies of all reports are filed with the Michigan State Police Traffic and Safety Division in East Lansing.

Written permission to view the Michigan State Police UD-10A Accident Report Forms was first secured from sixteen police jurisdictions in Calhoun and Jackson Counties. The accident report forms for these two

counties on file in East Lansing were then searched for motorcycle accidents. The names and addresses of 180 male motorcycle owners involved in either a type A or type B personal injury motorcycle traffic accident during the period of January 1, 1972, to November 30, 1972, were found.

Nonaccident-Involved Owners

The Michigan Department of State does not record motorcycle registrations by individual county. However, records are kept of the license plate number series issued to the individual licensing stations in each county. A continuous listing of all motorcycle license plate numbers issued to licensing stations in Calhoun and Jackson Counties for 1972 was made and 220 plates were randomly selected from the listing using a table of random numbers. The 220 selected plate numbers were then run through the Department of State computer to determine the owner's name and address. If a selected plate was registered to a female owner or the male owner's name appeared on the list of accident-involved owners, that plate number was rejected and another randomly selected.

Collection of Data

The name, address, and age of the 180 male motorcycle owners involved in either a type A or type B personal injury traffic accident in Calhoun and Jackson

County was taken from the UD-10A Accident Report Form on file with the Michigan State Police Traffic and Safety Division. The name, address, and make of motorcycle owned for each of the 220 nonaccident-involved male motorcycle owners was determined from the Michigan Department of State computer files.

During the month of December, 1972, each subject was mailed a letter[1] explaining the purpose of the study and a Motorcycle Information Sheet[2] to complete. In addition, each subject was asked to indicate if they would be willing to continue to participate in the study by completing the personality inventory at a later date. As a result of the first mailing, 40 per cent (72) of the accident-involved owners and 34 per cent (75) of the nonaccident-involved owners returned completed Motorcycle Information Sheets and indicated a willingness to participate further. Eleven accident-involved owners and six nonaccident-involved owners returned completed information sheets indicating they did not wish to continue in the study.

During the month of January, 1973, each subject who returned a completed Motorcycle Information Sheet and indicated a willingness to continue in the study was

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[1]Appendix A.

[2]Appendix B.

mailed the Sixteen Personality Factor Questionnaire Form A and a letter of instruction.[3] As a result of this mailing, fifty-two 16PF Questionnaires were returned from accident-involved owners. However, one questionnaire was returned incomplete resulting in fifty-one usable questionnaires. Fifty-five questionnaires were returned from nonaccident-involved owners. Two returned questionnaires were returned incomplete resulting in fifty-three usable questionnaires from the nonaccident sample.

Source of Data

The Sixteen Personality Factor Questionnaire

The Sixteen Personality Factor Questionnaire (16PF) is an objectively-scorable test designed to measure the major dimensions of human personality. Unlike multiphasic personality tests which are designed to measure surface personality traits, the 16PF is designed to determine the primary personality factors. The 16PF is based on thirty years of basic personality research and development and the sixteen personality factors measured have been established as unitary, psychologically meaningful entities.

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[3]Appendix C.

Five parallel forms (A-E) of the 16PF are available. Each form measures the following sixteen factors: (a) reserved--outgoing, (b) less intelligent--more intelligent, (c) affected by feelings--emotionally stable, (e) humble--assertive, (f) sober--happy-to-lucky, (g) expedient--conscientious, (h) shy--venturesome, (i) tough-minded--tender-minded, (l) trusting--suspicious, (m) practical--imaginative, (n) forthright--shrewd, (o) self-assured--apprehensive, (q_1) conservative--experimenting, (q_2) group dependent--self-sufficient, (q_3) undisciplined self-conflict--controlled, and (q_4) relaxed--tense.

Although the different forms vary in reading level difficulty and number of items, each measures the same sixteen personality traits including intelligence. Each is intended for administration in either group or individual situations. For each item on the 16PF, three alternative answers are provided. The author of the tests states:

> The "forced-choice format," i.e., the forbidding of a middle category, frustrates the subjects' genuine attempts to give accurate answers, and may produce poor test morale and a general disinclination to respond to the test carefully.[4]

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[4]R. Cattell, H. Eber, N. Tatsuoka, Handbook for the Sixteen Personality Factor Questionnaire (Champaign, Ill.: Institute for Personality and Ability Testing, 1970), p. 23.

Unlike many personality tests, each item comprising the questionnaire has been subjected to factor-analytic investigation and the entire test has been revised and intensified in validity several times.

An additional factor contributing to the selection of the 16PF for use in this study was the ability to derive four broader "second-order" factors from the original sixteen primary factors. Although the second-order factors are broader, more general personality traits, they may be better understood by the nonpsychologically trained reader. The second-order traits are determined from the sten scores (standard ten score) into which the sixteen primary factors are converted. The four second-order traits were (I) Introversion--Extroversion, (II) Low anxiety--High anxiety, (III) Sensitivity--Tough poise, and (IV) Subduedness--independence.

Because of the possible wide range of reading level of the subjects in this study, Form A was selected for use. The manual for use with the 16PF indicated the reading level of Form A is about seventh-grade reading level, but is also suitable for use with college students.[5] Form A contains 187 test items (10 to 13 for each dimension) and requires 45-55 minutes for the average reader to complete.

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[5] Ibid.

Table 3.1 shows the reliability and validity coefficients for each personality trait measured by Form A of the 16PF. It was determined that both the reliability and validity coefficients were sufficient for use in this study.

Motorcycle Information Sheet

A Motorcycle Information Sheet[6] was developed to collect biographical and vehicle data relative to each motorcycle owner and the registered motorcycle.

Following a search of the literature a comprehensive list of driver and vehicle characteristics was made for possible inclusion in this study. From the initial comprehensive listing the following characteristics were selected because they seemed most related to driver behavior: (1) age, (2) occupation, (3) marital status, (4) length of motorcycle riding experience, (5) primary purpose for riding a motorcycle, (6) make of motorcycle owned, (7) cubic centimeters of engine displacement, (8) total estimated miles of motorcycle travel during the year (1972), (9) estimated amount of urban driving, and (10) type of motorcycle operating instruction received.

A two-page questionnaire was designed and pilot tested with ten motorcycle owners. Pilot test results

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[6]Appendix B.

TABLE 3-1.--Reliability and validity coefficients for Sixteen Personality Factor Questionnaire Form A.

	Source Trait															
	A	B	C	E	F	G	H	I	L	M	N	O	Q1	Q2	Q3	Q4
Reliability[a]	.81	.58[c]	.78	.80	.79	.81	.83	.77	.75	.70	.61	.79	.73	.73	.62	.81
Validity[b]	.79	.35[d]	.70	.63	.83	.67	.92	.70	.49	.44	.41	.71	.62	.70	.68	.57

[a]R. Cattell, H. Eber, M. Totsuoka, Handbook for the Sixteen Personality Factor Questionnaire (Champaign, Ill.: Institute for Personality and Ability Testing, 1970), p. 30.

[b]Ibid., p. 36.

[c]The lower figure for Trait B (intelligence) is due to subjects' solving these test items by reminiscence between testing.

[d]The lower figure is due to the short length of the intelligence scales which prevents reaching the validities of the other factors.

determined: (1) the time needed to complete the questionnaire was approximately two minutes, and (2) three items needed rewording for clarity. The three items were reworded and agreed upon by the ten owners.

Procedures for Data Analysis

Two types of data were recorded for each subject in the study: their responses on the Motorcycle Information Sheet and their responses to the 187 items on the 16PF Questionnaire.

Data from the information sheet for each subject were first recorded on data collection forms. The 16PF Questionnaire provided a total score ranging from 0 to 26 for each of the sixteen primary personality factors. Second-order factor scores were achieved for each subject by conversion formulas provided in the 16PF Handbook.[7] Second-order factors ranged from 1.0 to 10.0. All questionnaires were hand scored using scoring guides.

All data were then placed into dichotomous groups of accident and nonaccident owners. To aid in generalizing the study results to a broader population, ten motorcycle owners who returned a completed information sheet but indicated they did not wish to continue in the study were randomly selected and personally

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[7]R. Cattell, et al., Handbook for the Sixteen Personality Factor Questionnaire (Champaign, Ill.: Institute for Personality and Ability Testing, 1970).

contacted. The study was explained in further detail and each owner was asked again if he would participate. All ten owners contacted personally consented to participate and complete the 16PF Questionnaire. These ten owners were analyzed separately and compared to the accident and nonaccident groups. This was done because if the means of the owners who originally declined to participate were not significantly different from the accident and nonaccident group which did participate, broader generalizations to the population of all male motorcycle owners in Calhoun and Jackson Counties are possible.

Computer data cards were then punched for fifty-one accident-involved and fifty-one nonaccident-involved owners. (Two nonaccident-involved owners were randomly deleted to provide equal cell size.) Each computer card contained the following data:

(1) Subject identification number;

(2) Motorcycle owner group (accident or nonaccident);

(3) Owner's age;

(4) Marital status;

(5) Owner's occupation;

(6) Length of motorcycle riding experience;

(7) Primary purpose for riding motorcycles;

(8) Make of motorcycle owned;

(9) Cubic centimeters of engine displacement;

(10) Estimated total mileage for 1972;

(11) Amount of urban driving;

(12) Type of motorcycle operating instruction received;

(13) Scores for each of the sixteen primary factors;

(14) Scores for each of the four second-order factors.

Computer program cards were then punched for programs which would yield distributions, means, and percentage analysis for each of the two owner categories. Computer program cards were also punched for the CDC 6500 computer which would provide chi-square tests of significance on each of the biographical and vehicle characteristics.

To test the hypotheses concerning the personality factors, it was concluded Cattell's suggestion for such tests should be followed. Cattell[8] claims that multivariate procedures are preferred over a series of univariate tests if several variables possessing some psychological cohesiveness are to be measured, in much the same manner, as the analysis of variance is preferred over several T tests.

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[8]R. Cattell, ed., Handbook of Multivariate Experimental Psychology (Chicago: Rand McNally, 1966).

Computer program cards were punched for the Finn Multivariate Analysis of Variance Program. The Michigan State University CDC 3600 computer was used for this analysis. The .05 level of significance was used to determine the acceptance or rejection of the null hypotheses for each test. The .05 level of significance was chosen to allow this study to take cognizance of a wide range of personality traits which might affect motorcycle accident involvement.

Summary

In this chapter the design and methodology used to conduct the study were presented. The sample population was selected from Calhoun and Jackson Counties, Michigan. Accident-involved subjects were selected from the Michigan State Police accident report files and the nonaccident-involved subjects were selected from the Michigan Department of State files. Responses to the Motorcycle Information Sheet and the 16PF Questionnaire were collected from each subject.

A chi-square test of significance was used to test hypotheses concerning biographical and vehicle characteristics and a one-way multivariate analysis of variance was used for testing hypotheses on personality factors.

In the following chapter the findings of this study are presented. Included are: (1) results of the

one-way multivariate analysis of variance on the personality factors, (2) results of the chi-square analysis of biographical and vehicle characteristics, and (3) relationships of characteristics and second-order traits.

CHAPTER IV

ANALYSIS OF DATA

In the preceding chapter the methods of procedure used in this study were presented. In this chapter are the findings resulting from a statistical analysis of the data. Presented is the analysis of the following: (1) Comparisons on primary factors of the Sixteen Personality Factor Questionnaire between accident- and nonaccident-involved owners, (2) Comparisons on second-order traits of the Sixteen Personality Factor Questionnaire between accident- and nonaccident-involved owners, (3) Comparisons on biographical and vehicle characteristics between accident- and nonaccident-involved owners, (4) Relationships between second-order traits and the characteristics of primary reason for riding, size of motorcycle owned, and total miles ridden during the past year for accident- and nonaccident-involved owners, (5) Relationships between characteristics for accident- and nonaccident-involved owners, and (6) Comparison of mean scores on primary factors and second-order traits

between owners who consented to participate by mail and owners who were personally contacted.

The total number of subjects in the final statistical analysis was 102, 51 accident involved and 51 nonaccident involved. In addition, a separate analysis was performed on 10 owners, 5 accident-involved and 5 nonaccident-involved, who originally indicated they did not wish to participate in the study. These 10 owners were contacted personally and agreed to participate. This separate analysis was done to aid in generalizing the findings of this study to a broader population. If the mean scores on the primary factors and second-order traits for owners contacted personally are not significantly different from owners contacted by mail, broader generalizations to the population of all male motorcycle owners in Calhoun and Jackson Counties are strengthened.

Table 4.1 presents the composition of the sample by county and driver category in numbers and percentages. An inspection of this table shows that Jackson County contained twice as many Type A accident-involved owners. The number of Type B accident-involved owners and the number of nonaccident-involved owners is almost equal.

Comparisons of Primary Factors Between Accident- and Nonaccident-Involved Owners

This section contains the findings resulting from a one-way multivariate analysis of variance (MANOVA)

TABLE 4.1.--Number and percentage distribution of sample male motorcycle owners

County		Accident Involved		Nonaccident Involved	Total
		Type A	Type B		
Calhoun	N	8	13	24	45
	P	17.7	28.8	53.3	100
Jackson	N	16	14	27	57
	P	28	24.5	47.3	100
Total	N	24	27	51	102
	P	23.5	26.4	50	100

Note: N = number

P = per cent

of the mean scores on the sixteen primary personality factors for accident- and nonaccident-involved owners. The results of this analysis are presented in two tables, one showing the univariate F-statistics and associated significance levels testing for significant differences between the two groups of owners on each primary factor and a second table presenting directional descriptions of each factor and the mean scores showing the direction of any differences found.

Both a multivariate F-statistic and its associated significance level for the 16 PF as a whole and a univariate F-statistic and its associated significance level for each factor is reported. Although a multivariate F-statistic and significance level for the questionnaire as a composite unit is possible, interpretation of such a statistical test would be impractical because of the unitary nature of the individual personality factors. Therefore, the decision to accept or reject the null hypothesis was based on the univariate F-statistics and associated significance level of .05.

In addition to those factors significantly different at the .05 level, factors which differed between groups at the .10 level of significance will be identified. This is done because the .10 level of significance provides the relatively "wide net" Cattell suggests for identifying the total spectrum of personality dimensions

in this new domain, as well as what is happening on the other dimensions at the same time. The findings for this section are contained in Tables 4.2 and 4.3.

The following is the null hypothesis which was tested for the two categories of motorcycle owners.

Ho_1:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the sixteen primary factors as measured by the Sixteen Personality Factor Questionnaire.

Table 4.2 presents the one-way MANOVA of primary factor scores on the 16 PF for accident- and nonaccident-involved male motorcycle owners. Table 4.2 shows:

1. Two primary factors, factor M (Practical--Imaginative) with a univariate F-statistic of 6.43 and factor Q_3 (Uncontrolled--Controlled) with a univariate F-statistic of 4.07 were significant at the .05 level of confidence and thus the null hypothesis of no significant difference on any of the primary personality factors must be rejected. (For more detailed description of factors see Appendix D.)

2. Three primary factors, factor F (Sober--Happy-go-lucky) with a univariate F-statistic of 3.17, factor I (Tough-minded--Tender-minded) with a univariate F-statistic of 3.30 and factor L

TABLE 4.2.--One-way MANOVA testing the difference between accident (n = 51) and nonaccident-(n = 51) involved male motorcycle owners on the primary factors of the 16 PF

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic 1.647

With 16 and 85 Degrees of Freedom
Level of Significance P < .0739

Factor	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
A	1.92	9.73	0.20	.658
B	3.18	2.85	1.11	.294
C	0.04	13.51	0.002	.957
E	44.01	18.83	2.34	.130
F	69.18	21.82	3.17	.078
G	0.63	11.23	0.06	.814
H	37.69	32.45	1.16	.284
I	40.16	12.17	3.30	.072
L	41.42	11.02	3.76	.055
M	62.75	9.76	6.43	.013
N	17.29	8.25	2.10	.151
O	7.69	15.24	0.50	.479
Q_1	18.13	11.77	1.54	.218
Q_2	4.32	10.74	0.40	.527
Q_3	30.75	7.56	4.07	.047
Q_4	5.19	19.90	0.26	.611

Degrees of Freedom for Univariate F-Statistic 1 and 100

TABLE 4.3.--Means for the sixteen primary factors scores of the 16 PF for accident- (n = 51) and nonaccident- (n = 51) involved male motorcycle owners

Factor	Low Score Description	High Score Description	Accident-Involved Owners	Nonaccident-Involved Owners
A	Reserved	Outgoing	7.39	7.67
B	Less Intelligent	More Intelligent	8.22	8.57
C	Affect by Feelings	Emotionally Stable	15.94	15.90
E	Humble	Assertive	14.24	12.92
F	Sober	Happy-go-lucky	15.57	13.92
G	Expedient	Conscientious	13.70	13.86
H	Shy	Venturesome	14.31	13.10
I	Tough-minded	Tender-minded	8.47	7.22
L	Trusting	Suspicious	8.33	7.06
M	Practical	Imaginative	10.61	12.18
N	Forthright	Shrewd	8.63	9.45
O	Self-assured	Apprehensive	9.67	10.22
Q_1	Conservative	Experimenting	10.78	9.94
Q_2	Group Dependent	Self-sufficient	11.84	12.25
Q_3	Undisciplined Self-conflict	Controlled	12.78	13.88
Q_4	Relaxed	Tense	12.65	12.20

(Trusting--Suspicious) with a univariate F-statistic of 3.76 were significant at the .10 level of confidence. (For more detailed description of factors see Appendix D.)

3. None of the remaining factors were significant at the .10 level of confidence.

Table 4.3 presents the directional descriptions for each of the primary 16 PF factors and the mean scores on each factor for the accident- and nonaccident-involved motorcycle owners. Table 4.3 shows:

1. On factor M the accident-involved owners had a mean score of 10.61 compared to 12.18 for the nonaccident-involved owners, indicating that accident-involved male motorcycle owners were more practical, while the nonaccident-involved owners were more imaginative.

2. On factor Q_3 the accident-involved owners had a mean score of 12.78 compared to 13.88 for the nonaccident-involved owners, indicating that accident-involved male motorcycle owners were more undisciplined self-conflict while the nonaccident-involved owners were more controlled.

3. For those factors significant at the .10 level of confidence the accident-involved owners were more happy-go-lucky (factor F), more tender-minded

(factor I), and more suspicious (factor L) while the nonaccident-involved owners were more sober, more tough-minded and more trusting.

Comparisons of Second-Order Traits Between Accident- and Nonaccident-Involved Owners

This section contains the findings resulting from a one-way multivariate analysis of variance of the mean scores on the four second-order personality traits of the 16 PF for accident- and nonaccident-involved male motorcycle owners. The results of this analysis are presented in two tables, one showing the univariate F-statistics and associated significance levels testing for significant differences between the two groups of owners on each second-order trait and the mean scores for both groups indicating the direction of the differences. The univariate F-statistics and their associated significance levels will be reported and used to accept or reject the null hypothesis.

The following is the null hypothesis which was tested for the two categories of motorcycle owners:

Ho_2:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the four second-order traits as measured by the Sixteen Personality Factor Questionnaire.

Table 4.4 presents the one-way MANOVA of second-order scores on the 16 PF for accident- and nonaccident-involved male motorcycle owners. Table 4.4 shows:

1. No significant difference was found between accident- and nonaccident-involved owners on any of the second-order personality traits at either the .05 or .10 level of confidence.

2. The null hypothesis of no significant difference on any of the second-order traits must be retained.

Table 4.5 presents the directional descriptions of the four second-order personality traits of the 16 PF and the mean scores on each trait for the accident- and nonaccident-involved motorcycle owners. Table 4.5 shows that the accident-involved owners had higher mean scores on three of the four second-order traits. The higher mean scores indicated that the accident-involved owners were slightly more extroverted (trait I), had higher anxiety (trait II), and were slightly more independent (trait IV) than the nonaccident-involved owners. However, none of the differences were significant at the .05 or .10 level of confidence.

TABLE 4.4.--One-way MANOVA testing the difference between accident-(n = 51) and nonaccident-involved (n = 51) male motorcycle owners on second-order traits of the 16 PF

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic .868

With 4 and 97 Degrees of Freedom
Level of Significance P < .486

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
SO_1	.71	4.37	0.16	.688
SO_2	13.49	5.42	2.49	.118
SO_3	.17	1.91	0.10	.764
SO_4	.61	4.21	0.15	.704

Degrees of Freedom for Univariate F-Statistic 1 and 100

TABLE 4.5.--Means for the four second-order traits of the 16 PF for accident (n = 51) and nonaccident- (n = 51) involved male motorcycle owners

Trait	Low Score Description	High Score Description	Accident-Involved Owners	Nonaccident-Involved Owners
SO_1	Introversion	Extroversion	5.55	5.38
SO_2	Low Anxiety	High Anxiety	5.67	4.95
SO_3	Sensitivity, Emotionalism	Tough Poise	6.12	6.20
SO_4	Subduedness	Independence	6.34	6.19

Comparisons of Biographical and Vehicle Characteristics Between Accident- and Nonaccident-Involved Owners

This section contains the findings resulting from the chi square analysis between accident- and nonaccident-involved male motorcycle owners on the biographical and vehicle characteristics. The section has been divided into three subsections dealing with biographical characteristics, vehicle characteristics, and a summary. The findings for this section are shown in Tables 4.6 through 4.15.

The following is the null hypothesis which was tested for the two categories of motorcycle owners:

Ho_3:

There is no significant difference between accident- and nonaccident-involved male motorcycle owners on any of the selected biographical and vehicle characteristics as reported on the Motorcycle Information Sheet.

Biographical Characteristics

This section contains the comparisons between accident- and nonaccident-involved owners on the biographical characteristics of age, marital status, occupation, primary reason for riding, experience, total miles traveled during the previous year, extent of urban driving, and type of motorcycle instruction received. The findings for this section are found in Tables 4.6 through 4.13.

TABLE 4.6.--Chi square test for significance between accident- (n = 51) and non-accident-involved (n = 51) male motorcycle owners on age

		15 to 24 yr.	25 to 34 yr.	35 to 44 yr.	45 and older	Total	Mean	Standard Deviation
Accident Involved	N	25	20	3	3	51	1.69	.84
	P	49.02	39.22	5.88	5.88	100		
Nonaccident Involved	N	19	12	9	11	51	2.24	1.18
	P	37.25	23.53	17.65	21.57	100		
Total	N	44	32	12	14	102	1.96	1.05
	P	43.14	31.37	11.76	13.73	100		
		Chi Square Value 10.390*				Degrees of Freedom 3		

*Significant at the .025 level

N = number

P = per cent

Age.--Table 4.6 contains the results of the chi square test for difference between accident- and non-accident-involved male motorcycle owners on the variable of age. For the purpose of this study each motorcycle owner was placed in one of the following age categories: 15 to 24 years, 25 to 34 years, 35 to 44 years, and 45 and older. Table 4.6 shows that the chi square test for difference between the two groups of owners resulted in a chi square value of 10.390 which was significant at the .025 level and thus the null hypothesis must be rejected for the variable of age. Table 4.6 shows that the direction of the significant difference found indicated that accident-involved motorcycle owners were younger than nonaccident-involved owners. A total of 88.24 per cent of the accident-involved owners were in the two youngest age categories compared to 60.78 per cent of the nonaccident-involved owners. In the two oldest age categories, 11.76 per cent of the accident-involved owners were found compared to 39.22 per cent of the nonaccident-involved owners.

Marital Status.--Table 4.7 presents the chi square test for difference between the two owner groups on the variable of marital status. Each motorcycle owner indicated on the Motorcycle Information Sheet whether he was married, single, divorced or widowed. However, because only two owners indicated they were either

TABLE 4.7.--Chi square test for significance between accident- (n = 51) and nonaccident- (n = 51) involved male motorcycle owners on marital status

		Married	Single	Total	Mean	Standard Deviation
Accident Involved	N	26	25	51	1.49	.50
	P	50.98	49.02	100		
Nonaccident Involved	N	35	16	51	1.31	.47
	P	68.63	31.37	100		
Total	N	61	41	102	1.40	.49
	P	59.80	40.20	100		
	Chi Square Value	3.303	Degrees of Freedom	1		

N = number

P = per cent

divorced or widowed the four marital status categories were collapsed into the two categories of married or single for purposes of analysis. The two owners who reported being either divorced or widowed were placed in the single category. Table 4.7 shows that the chi square test resulted in a chi square value of 3.303 which was not significant at the .05 level indicating there was no difference between accident- and nonaccident-involved male motorcycle owners on marital status.

Occupation.--Table 4.8 presents the chi square test for difference between accident- and nonaccident-involved motorcycle owners on the variable of occupation. Based on the occupation each owner reported on the information sheet, he was placed in the occupation category of professional/business, nonprofessional, student, or other for the purpose of analysis. The resulting chi square value of 8.424 indicated there was a significant difference between the two groups of owners at the .05 level of confidence and thus the null hypothesis must be rejected for the biographical variable of occupation. Table 4.8 shows that accident-involved male motorcycle owners more often worked in nonprofessional occupations than did nonaccident-involved owners. For this study, 58.82 per cent of the accident-involved owners were employed in nonprofessional occupations

TABLE 4.8.--Chi square test for significance between accident- (n = 51) and non-accident-involved (n = 51) male motorcycle owners on occupation

		Professional/ Business	Nonprofessional	Student	Other	Total	Mean	Standard Deviation
Accident Involved	N	11	30	6	4	51	2.06	.81
	P	21.57	58.82	11.76	7.84	100		
Nonaccident Involved	N	24	17	6	4	51	1.80	.94
	P	47.06	33.83	11.76	7.84	100		
Total	N	35	47	12	8	102	1.93	.88
	P	34.31	46.08	11.76	7.84	100		
	Chi Square Value	8.424*		Degrees of Freedom		3		

*Significant at the .05 level

N = number

P = per cent

compared to 33.83 per cent of the nonaccident-involved owners. Of the nonaccident-involved owners, 47.06 per cent were employed in professional or business occupations compared to 21.57 per cent of the accident-involved owners.

Reason for Riding.--To test the difference between the two groups of owners on the primary reason for riding motorcycles, each owner was asked to indicate whether he rode a motorcycle primarily for basic transportation, trail riding, or racing. Only one owner reported riding a motorcycle primarily for racing and for the purpose of analysis only the two reasons of basic transportation and trail riding were used. The one owner who reported riding primarily for racing was included in the category of trail riders since he indicated he did none of his riding in urban areas.

Table 4.9 presents the results of the chi square test for difference between the two owner groups on the primary purpose of riding motorcycles. Table 4.9 reveals that the resulting chi square value of 11.403 was significant at the .001 level of confidence and the null hypothesis was rejected for the variable of primary purpose for riding. Table 4.9 also reveals that the direction of the significant finding indicates that accident-involved owners primarily rode motorcycles for basic transportation while nonaccident-involved

TABLE 4.9.--Chi square test for significance between accident- (n = 51) and nonaccident-involved (n = 51) male motorcycle owners on primary purpose for riding motorcycles

		Basic Transportation	Trail Riding	Total	Mean	Standard Deviation
Accident Involved	N	36	15	51	1.29	.46
	P	70.59	29.41	100		
Nonaccident Involved	N	19	32	51	1.63	.49
	P	37.25	62.41	100		
Total	N	55	47	102	1.46	.50
	P	53.92	46.08	100		
Chi Square Value		11.403*		Degrees of Freedom		1

*Significant at the .001 level

N = number

P = per cent

owners were primarily trail riders. Of the accident-involved owners, 70.59 per cent rode primarily for basic transportation compared to 37.25 per cent of the nonaccident-involved owners.

Experience.--Table 4.10 reports the chi square test for difference between accident- and nonaccident-involved male motorcycle owners on the variable of experience. Each owner was placed in one of the experience categories based on the number of years he had been riding motorcycles. The four categories of length of motorcycle experience for this study were: one year or less, one to three years, four to seven years, and more than seven years. Table 4.10 shows that the resulting chi square value of 2.738 was not significant at the .05 level of confidence and indicates that accident- and nonaccident-involved male motorcycle owners did not differ significantly on length of motorcycle experience.

Miles Traveled.--Table 4.11 presents the results of the chi square test for difference between the two groups of motorcycle owners on the variable of total number of motorcycle miles traveled during the previous year. Each owner was categorized on the reported number of miles traveled during the year. The four categories for miles traveled were: 0 to 1,000 miles, 1,001 to

TABLE 4.10.--Chi square test for significance between accident- (n = 51) and non-accident- (n = 51) involved male motorcycle owners on experience

		1 Year or less	1 to 3 Years	4 to 7 Years	More Than 7 Years	Total	Mean	Standard Deviation
Accident Involved	N	9	22	9	11	51	2.43	1.02
	P	17.65	43.14	17.65	21.57	100		
Nonaccident Involved	N	5	20	15	11	51	2.63	.94
	P	9.80	39.22	29.41	21.57	100		
Total	N	14	42	24	22	102	2.53	.98
	P	13.73	41.18	23.53	21.57	100		
	Chi Square Value 2.738				Degrees of Freedom	3		

N = number

P = per cent

TABLE 4.11.--Chi square test for significance between accident- (n = 51) and non-accident-(n = 51) involved male motorcycle owners on total number of motorcycle miles traveled during 1972

		0 to 1,000	1,001 to 3,000	3,001 to 5,000	More than 5,000	Total	Mean	Standard Deviation
Accident Involved	N	9	20	15	7	51	2.39	.94
	P	17.65	39.22	29.41	13.73	100		
Nonaccident Involved	N	16	26	5	4	51	1.94	.86
	P	31.37	50.98	9.80	7.84	100		
Total	N	25	46	20	11	102	2.17	.92
	P	24.51	45.10	19.61	10.78	100		

Chi Square Value 8.561* Degrees of Freedom 3

*Significant at the .05 level

N = number

P = per cent

3,000 miles, 3,001 to 5,000 miles, and more than 5,000 miles. The resulting chi square value of 8.561 was significant at the .05 level and the null hypothesis of no difference in total miles traveled was rejected. Table 4.11 reveals that accident-involved male motorcycle owners traveled more miles per year than did nonaccident-involved male owners. Major differences were found in all categories of miles traveled. Of the nonaccident-involved owners in this study, 31.37 per cent rode less than 1,000 miles during the previous year compared to 17.65 per cent of the accident-involved owners.

Riding in Urban Areas.--Table 4.12 presents the results of the chi square test for difference between accident- and nonaccident-involved motorcycle owners on the extent of motorcycle riding done in urban areas. Each owner was asked to indicate which of the following categories best described the amount of urban motorcycle riding he did: almost all, most, evenly divided, little, and almost none. Table 4.12 reveals that the chi square value of 6.559 was not significant at the .05 level and therefore the null hypothesis of no difference between the two groups of owners on the extent of urban riding must be retained.

Type of Instruction.--To test the difference between owner groups on the type of motorcycle instruction

TABLE 4.12.--Chi square test for significance between accident- (n = 51) and non-accident- (n = 51) involved male motorcycle owners on extent of urban driving

		Almost All	Most	Evenly Divided	Little	Almost None	Total	Mean	Standard Deviation
Accident Involved	N	4	15	16	12	4	51	2.94	1.08
	P	7.84	29.41	31.37	23.53	7.84	100		
Nonaccident Involved	N	6	13	7	16	9	51	3.18	1.32
	P	11.76	25.49	13.73	31.37	17.65	100		
Total	N	10	28	23	28	13	102	3.06	1.21
	P	9.80	27.45	22.55	27.45	12.75	100		

Chi Square Value 6.559 Degrees of Freedom 4

N = number

P = per cent

received, each owner indicated on the information sheet whether he received motorcycle operating instructions from an organized program, informally from friends, or was self-taught. Table 4.13 presents the chi square test for difference between accident- and nonaccident-involved owners on the type of operating instruction received. Table 4.13 reveals that the chi square value of 1.980 was not significant at the .05 level, indicating that accident- and nonaccident-involved male motorcycle owners did not differ significantly in the type of operating instruction received.

Vehicle Characteristics

This section contains the comparisons between accident- and nonaccident-involved owners on the vehicle characteristics of size and make of motorcycle owned. The findings for this section are found in Tables 4.14 and 4.15.

Make of Motorcycle.--Table 4.14 presents the test results for the difference between owner groups on the make of motorcycle owned. The chi square test for difference was run for six categories of motorcycle make: Honda, Yamaha, Suzuki, Kawasaki, Harley-Davidson, and other. Table 4.14 reveals that the chi square value of 3.178 was not significant at the .05 level indicating that accident- and nonaccident-involved male motorcycle owners did not differ on the make of motorcycle owned.

TABLE 4.13.--Chi square test for significance between accident- (n = 51) and non-accident-involved (n = 51) male motorcycle owners on type of motorcycle instruction received

		Organized Program	Informal (Friends)	Self-Taught	Total	Mean	Standard Deviation
Accident Involved	N	1	19	31	51	2.59	.54
	P	1.96	37.25	60.78	100		
Nonaccident Involved	N	1	26	24	51	2.45	.54
	P	1.96	50.98	47.06	100		
Total	N	2	45	55	102	2.52	.54
	P	1.96	44.12	53.92	100		
	Chi Square Value	1.980		Degrees of Freedom	2		

N = number

P = per cent

TABLE 4.14.--Chi square test for significance between accident- (n = 51) and non-accident-involved (n = 51) male motorcycle owners on make of motorcycle owned

		Honda	Yamaha	Suzuki	Kawasaki	Harley Davidson	Other	Total	Mean	Standard Deviation
Accident Involved	N	20	3	5	5	5	13	51	3.22	2.11
	P	39.22	5.88	9.80	9.80	9.80	25.49	100		
Nonaccident Involved	N	24	3	4	5	1	14	51	2.96	2.16
	P	47.06	5.88	9.80	9.80	1.96	27.45	100		
Total	N	44	6	9	10	6	27	102	3.09	2.13
	P	43.14	5.88	8.82	9.80	5.88	26.47	100		

Chi Square Value 3.178 Degrees of Freedom 5

N = number

P = per cent

TABLE 4.15.--Chi square test for significance between accident- (n = 51) and non-accident-involved (n = 51) male motorcycle owners on size of motorcycle owned

		125cc or less	126cc to 250cc	251cc to 500cc	501 or more	Total	Mean	Standard Deviation
Accident Involved	N	2	5	26	18	51	3.18	.77
	P	3.92	9.80	50.98	35.29	100		
Nonaccident Involved	N	11	14	24	2	51	2.33	.86
	P	21.57	27.45	47.06	3.92	100		
Total	N	13	19	50	20	102	2.75	.92
	P	12.75	18.63	49.02	19.61	100		
		Chi Square Value 23.374*				Degrees of Freedom 3		

*Significant at the .001 level

N = number

P = per cent

Size of Motorcycle Owned.--Table 4.15 presents the chi square test for difference between accident- and nonaccident-involved owners on the size of motorcycle owned. Based on the cubic centimeters of engine displacement reported on the information sheet, each owner was placed in one of the following size categories: 125cc or less, 126cc to 250cc, 251cc to 500cc, and 501cc or more. Table 4.15 reveals that the chi square value of 23.374 was significant at the .001 level of confidence indicating that accident- and nonaccident-involved male motorcycle owners differed on the size of motorcycle owned. The direction of the significant difference found indicated that accident-involved owners owned motorcycles of a larger size than do nonaccident-involved owners. Major differences were noted in all categories of motorcycle size except 251cc to 500cc. Table 4.15 shows that 35.29 per cent of the accident-involved owners owned motorcycles of 501cc or more compared to 3.92 per cent of the nonaccident-involved owners. Compared to 3.92 per cent of the accident-involved owners, 21.57 per cent of the nonaccident-involved owners owned motorcycles of 125cc or less.

Summary of Tests on Biographical and Vehicle Characteristics

Table 4.16 presents a summary of the chi square tests for difference between the accident- and

TABLE 4.16.--A summary of chi square tests for difference between accident- (n = 51) and nonaccident- (n = 51) involved male motorcycle owners on biographical and vehicle characteristics

Characteristic	Chi Square Value	Comments
Biographical		
Age	10.390	Significant at .025
Marital Status	3.303	Nonsignificant at .05
Occupation	8.424	Significant at .05
Purpose for Riding	11.403	Significant at .001
Experience	2.738	Nonsignificant at .05
Total Mileage	8.561	Significant at .05
Urban Driving	6.559	Nonsignificant at .05
Instruction	1.980	Nonsignificant at .05
Vehicle		
Make	3.178	Nonsignificant at .05
Size	23.374	Significant at .001

nonaccident-involved motorcycle owners on biographical and vehicle characteristics. Table 4.16 reveals that four biographical characteristics, age, occupation, primary purpose for riding, and total mileage were significant at the .05 level or less and that one vehicle characteristic, size of motorcycle owned was significant at the .001 level. Because of the significant difference found on the five variables, the null hypothesis of no significant difference on any of the biographical and vehicle characteristics was rejected. The direction of the significant differences indicate that accident-involved male motorcycle owners tended to be younger, more often worked in nonprofessional occupations, and rode larger motorcycles primarily for transportation more miles per year than did nonaccident-involved male motorcycle owners.

Relationships Between Second-Order Traits and Characteristics for Accident- and Nonaccident-Involved Owners

This section contains the findings resulting from one-way multivariate analysis of variance testing the relationships between second-order traits of the Sixteen Personality Factor Questionnaire and biographical and vehicle characteristics for the accident- and nonaccident-involved male motorcycle owners. Tests for relationships were performed for the characteristics of primary purpose for riding, total miles traveled, and size of

motorcycle owned which had earlier been found to significantly differentiate between accident- and non-accident-involved owners. Tests for relationships between the characteristics of age and occupation were not run because it was felt that such relationships, even if significant, would not be useful in attempting to solve the motorcycle accident problem. Two tables are used to present the findings for each relationship. The first table presents the results of the one-way MANOVA testing for relationships and shows the resulting F-statistics and associated significance levels and the second table shows the mean scores on second-order traits for each category of the variable being tested. The section is divided into two subsections, one dealing with relationships for nonaccident-involved owners and one dealing with relationships for accident-involved owners. The results of the findings for this section are presented in Tables 4.17 through 4.28.

Relationships for Nonaccident-Involved Owners

This section contains the relationships between second-order personality traits and the primary purpose for riding motorcycles, total number of miles traveled during the previous year, and size of motorcycle owned for the nonaccident-involved owners. The findings for this section are found in Tables 4.17 through 4.22.

Reason for Riding.--Table 4.17 contains the results of the test for relationship between mean scores on the four second-order traits and the two categories of primary purpose for riding of basic transportation and trail riding for nonaccident-involved owners. Table 4.17 shows that no significant relationship was found between any of the second-order personality traits and either category of primary purpose for riding at the .05 or .10 level. Table 4.18 presents the mean scores on each of the second-order traits for each category of purpose for riding motorcycles. Table 4.18 shows that nonaccident-involved owners who rode primarily for basic transportation had higher mean scores on trait I in the direction of being slightly more extroverted and trait IV in the direction of being slightly more independent. On traits II and III the owners who rode primarily for trail riding had mean scores indicating they were slightly higher in anxiety and tough poise than the owners who rode primarily for basic transportation although none of the differences were significant at the .05 level or .10 level.

Miles Traveled.--Table 4.19 presents the results of the test for relationship between the four second-order traits and the total number of motorcycle miles traveled during 1972 for the nonaccident-involved owners.

TABLE 4.17.--One-way MANOVA testing the relationship between second-order traits of the 16 PF and the primary purpose for riding motorcycles for nonaccident-involved male motorcycle owners (n = 51)

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic .560

With 4 and 46 Degrees of Freedom
Level of Significance P < .6931

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	p < than
SO_1	0.81	4.14	.196	.660
SO_2	3.12	5.86	.531	.470
SO_3	0.18	1.89	.095	.759
SO_4	4.54	3.94	1.155	.288

Degrees of Freedom for Univariate F-Statistic 1 and 49

TABLE 4.18.--Mean scores on the second order traits of the 16 PF for nonaccident-involved male motorcycle owners (n = 51) classified by primary purpose for riding

	SO_1	SO_2	SO_3	SO_4
Basic Transportation	5.54	4.63	6.12	6.57
Trail Riding	5.29	5.14	6.24	5.96
Standard Deviation	2.04	2.42	1.37	1.98

TABLE 4.19.--One-way MANOVA testing the relationship between second-order traits of the 16 PF and total number of motorcycle miles traveled during 1972 for nonaccident-involved male motorcycle owners (n = 51)

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic 1.497

With 12 and 116.7 Degrees of Freedom
Level of Significance P < .1349

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
SO_1	5.93	3.96	1.499	.227
SO_2	1.14	6.11	.187	.905
SO_3	6.42	1.56	4.103	.012
SO_4	2.43	4.05	.600	.618

Degrees of Freedom for Univariate F-Statistic 3 and 47

Table 4.19 shows that second-order trait III (Sensitivity--Tough Poise) was significantly related to the total number of miles traveled at the .012 level of confidence.

Table 4.20 contains the mean scores on each of the second-order traits for nonaccident-involved owners categorized by the total number of miles traveled during 1972. Table 4.20 reveals that nonaccident-involved owners who traveled more miles per year were less sensitive and emotional than nonaccident owners who traveled fewer miles per year. The relationship is true for the first three categories of total miles traveled but is reversed when nonaccident-involved owners traveled more than 5,000 miles per year. Nonaccident-involved owners who traveled more than 5,000 miles per year were more sensitive and emotional than owners who traveled either 1,001 to 3,000 or 3,001 to 5,000 miles per year.

Size.--Table 4.21 presents the findings of the test for relationship between second-order traits and the size of motorcycle owned for the nonaccident-involved owners. Table 4.21 shows that second-order trait IV (Subduedness--Independence) was significantly related to the size of motorcycle owned at the .04 level of confidence.

Table 4.22 which contains the mean scores on each second-order trait for nonaccident-involved owners categorized by size of motorcycle owned shows that the

TABLE 4.20.--Mean scores on the second-order traits of the 16 PF for nonaccident-involved male motorcycle owners (n = 51) classified by total motorcycle miles traveled during the previous year

	SO_1	SO_2	SO_3	SO_4
0 to 1,000 miles	4.86	5.21	5.34	5.77
1,001 to 3,000 miles	5.36	4.93	6.65	6.52
3,001 to 5,000 miles	7.02	4.28	6.82	5.64
More than 5,000	5.50	4.83	5.95	6.40
Standard Deviation	1.99	2.47	1.25	2.01

TABLE 4.21.--One-way MANOVA testing the relationship between second-order traits of the 16 PF and size of motorcycle owned for nonaccident-involved male motorcycle owners (n = 51)

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic 1.767

With 12 and 116.7 Degrees of Freedom
Level of Significance P < .0617

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
SO_1	2.51	4.18	.601	.618
SO_2	10.46	5.51	1.897	.143
SO_3	1.22	1.90	.643	.591
SO_4	10.33	3.54	2.919	.044

Degrees of Freedom for Univariate F-Statistic 3 and 47

TABLE 4.22.--Mean scores on the second-order traits of the 16 PF for nonaccident-involved male motorcycle owners (n = 51) classified by size of motorcycle owned

	SO_1	SO_2	SO_3	SO_4
125cc or less	5.20	4.34	5.70	5.24
126cc to 250cc	6.00	6.08	6.36	6.71
251cc to 500cc	5.12	4.73	6.30	6.08
501cc or more	5.10	2.95	6.60	9.10
Standard Deviation	2.04	2.35	1.38	1.88

direction of the significant relationship indicates that nonaccident-involved owners who owned large motorcycles were more independent than nonaccident owners who owned smaller motorcycles. This relationship is especially true for owners of motorcycles larger than 500cc. Table 4.22 shows that owners of motorcycles of 251cc to 500cc had a mean score on trait IV of 6.08 compared to a mean score of 9.10 for owners of motorcycles larger than 500cc.

Relationships for Accident-Involved Owners

This section contains the relationship between second-order personality traits and the primary reason for riding motorcycles, total number of miles traveled during the previous year, and size of motorcycle owned for the accident-involved owners. The findings for this section are found in Tables 4.23 through 4.28.

Reason for Riding.--Table 4.23 presents the findings of the multivariate analysis of variance test for relationship between second-order traits of the 16 PF and primary purpose for riding motorcycles for accident-involved owners. Table 4.23 shows that none of the second-order traits were significantly related to either riding for basic transportation or trail riding at the .05 level indicating that accident-involved owners do

TABLE 4.23.--One-way MANOVA testing the relationship between second-order traits of the 16 PF and the primary purpose for riding motorcycles for accident-involved male motorcycle owners (n = 51)

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic .373

With 4 and 46 Degrees of Freedom
Level of Significance P < .8270

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
SO_1	0.02	4.75	.005	.947
SO_2	0.65	5.12	.126	.724
SO_3	0.83	1.98	.419	.521
SO_4	4.39	4.47	.983	.326

Degrees of Freedom for Univariate F-Statistic 1 and 49

not differ on second-order personality traits when categorized by the primary purpose for riding a motorcycle.

Table 4.24 presents the mean scores on each of the second-order traits for accident-involved owners categorized by the primary reason they ride motorcycles. Table 4.24 reveals that the largest difference between the owners who rode primarily for basic transportation and those who rode primarily for trail riding was on trait IV (Subduedness--Independence) where the owners who rode for basic transportation were slightly more independent than those owners who were primarily trail riders although this difference was not large enough to be significant at the .05 or .10 level.

Miles Traveled.--Table 4.25 presents the results of the test for relationship between second-order traits and the total number of motorcycle miles traveled during the previous year for accident-involved owners. Table 4.25 shows that none of the second-order traits were significantly related to total miles traveled at the .05 level, but that trait I (Introversion--Extroversion) was related to total miles traveled at the .071 level of confidence.

Table 4.26 reveals that the direction of the relationship between trait I and the total miles traveled indicates that accident-involved owners who traveled

TABLE 4.24.--Mean scores on the second-order traits of the 16 PF for accident-involved male motorcycle owners (n = 51) classified by primary purpose for riding

	SO_1	SO_2	SO_3	SO_4
Basic Transportation	5.56	5.75	6.03	6.53
Trail Riding	5.51	5.50	6.31	5.89
Standard Deviation	2.18	2.26	1.41	2.11

TABLE 4.25.--One-way MANOVA testing the relationship between second-order traits of the 16 PF and total number of motorcycle miles traveled during 1972 for accident-involved male motorcycle owners (n = 51)

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic 1.013

With 12 and 116.7 Degrees of Freedom
Level of Significance P < .4422

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
SO_1	10.69	4.28	2.499	.071
SO_2	0.85	5.30	.160	.923
SO_3	1.64	1.98	.828	.486
SO_4	0.25	4.73	.052	.984

Degrees of Freedom for Univariate F-Statistic 3 and 47

TABLE 4.26.--Mean scores on the second order traits of the 16 PF for accident-involved male motorcycle owners (n = 51) classified by total motorcycle miles traveled during the previous year

	SO_1	SO_2	SO_3	SO_4
0 to 1,000 miles	4.70	5.92	6.23	6.14
1,001 to 3,000 miles	6.20	5.82	6.00	6.30
3,001 to 5,000 miles	5.88	5.35	6.48	6.50
More than 5,000	4.06	5.63	5.51	6.39
Standard Deviation	2.07	2.30	1.41	2.18

between 1,001 and 3,000 miles per year are more extroverted than owners who traveled less than 1,000 or more than 3,000 miles per year. Table 4.26 also reveals that accident-involved owners who traveled more than 5,000 miles per year are the most introverted of any of the accident-involved owners.

Size.--Table 4.27 presents the findings of the test for relationship between second-order traits and the size of motorcycle owned for accident-involved owners. Table 4.27 reveals that none of the second-order traits were related to the size of motorcycle owned at either the .05 or .10 level of confidence indicating that accident-involved owners categorized by size of motorcycle owned did not differ on the second-order personality traits measured by the 16 PF.

Table 4.28 presents the mean scores for each second-order trait for accident-involved owners categorized by size of motorcycle owned. Table 4.28 reveals that for second-order trait I (Introversion--Extroversion) mean scores decreased as the size of motorcycle increased indicating that accident-involved owners of larger motorcycles were more introverted than owners of smaller motorcycles. However, this relationship was not significant in the analysis of variance test.

TABLE 4.27.--One-way MANOVA testing the relationship between second-order traits of the 16 PF and size of motorcycle owned for accident-involved male motorcycle owners (n = 51)

Multivariate Test of Equality of Mean Vectors
Multivariate F-Statistic .334

With 12 and 116.7 Degrees of Freedom
Level of Significance P < .9815

Trait	Between Mean Square	Within Mean Square	Univariate F-Statistic	P < than
SO_1	4.20	4.70	.891	.453
SO_2	1.90	5.23	.364	.780
SO_3	0.63	2.04	.308	.819
SO_4	0.78	4.70	.167	.918

Degrees of Freedom for Univariate F-Statistic 3 and 47

TABLE 4.28.--Mean scores on the second order traits of the 16 PF for accident-involved male motorcycle owners (n = 51) classified by size of motorcycle owned

	SO_1	SO_2	SO_3	SO_4
125cc or less	6.30	5.45	5.90	6.15
126cc to 250cc	6.14	4.82	6.66	6.54
251cc to 500cc	5.82	5.63	6.12	6.51
501cc or more	4.90	6.00	5.99	6.07
Standard Deviation	2.17	2.29	1.43	2.17

Relationships Between Biographical and Vehicle Characteristics for Accident- and Nonaccident-Involved Owners

This section contains the findings resulting from chi square tests for relationships between biographical and vehicle characteristics for accident- and nonaccident-involved motorcycle owners. Chi square tests for relationships were run for all possible combinations of characteristics individually for the accident- and nonaccident-involved owners. Some of the relationships possible such as the relationship between age and occupation, age and marital status, occupation and make of motorcycle owned resulted in relationships expected in the general population and are not reported in this section. Only those relationships which seem to indicate possible information relative to the motorcycle accident problem and were significant were selected to be reported in this section. This section is divided into two sections, one dealing with relationships for nonaccident-involved owners and one dealing with relationships for the accident-involved owners. The results of these findings are presented in Tables 4.29 through 4.36.

Relationships for Nonaccident-Involved Owners

This section contains the relationships between biographical and vehicle characteristics for the

nonaccident-involved owners. The findings for this section are found in Tables 4.29 through 4.33.

Primary Reason for Riding with Size.--Table 4.29 presents the results of the test for relationship between the primary reason for riding motorcycles and the size of motorcycle owned for nonaccident-involved owners. Table 4.29 reveals that the chi square value for this test was 11.538 and was significant at the .01 level. Table 4.29 indicates that 90.91 per cent of the non-accident-involved owners who owned motorcycles of 125cc or less were primarily trail riders. Motorcycles of 251cc to 500cc were used by 54.17 per cent of the nonaccident owners primarily for basic transportation and by 45.83 per cent of the owners primarily for trail riding. The number of nonaccident-involved owners who rode motorcycles primarily for trail riding was almost equal for the three smallest classifications of motor-cycle size. The direction of the relationship found indicated that nonaccident-involved owners of motorcycles of 250cc or less were primarily trail riders and that owners of motorcycles of 251cc or larger primarily rode for basic transportation. The relationship also indi-cates that motorcycles of between 251cc and 500cc were used by nonaccident-involved owners almost equally for basic transportation or trail riding.

TABLE 4.29.--Chi square test for significance between primary reason for riding and size of motorcycle owned for nonaccident-involved male motorcycle owners (n = 51)

		Basic Transportation	Trail Riding	Total	Mean	Standard Deviation
Size of Motorcycle						
125cc or less	N	1	10	11	1.91	.30
	P	9.09	90.91	100		
126cc to 250cc	N	3	11	14	1.79	.43
	P	21.43	78.57	100		
251cc to 500cc	N	13	11	24	1.46	.51
	P	54.17	45.83	100		
501cc or more	N	2	0	2	1.00	.00
	P	100	0	100		
Total	N	19	32	51	2.33	.86
	P	37.25	62.75	100		
	Chi Square	11.538*		Degrees of Freedom		3

*Significant at the .01 level

N = number; P = per cent

Experience with Make.--Table 4.30 presents the results of the chi square test for relationship between experience of nonaccident-involved owners and the make of motorcycle owned. The chi square value of 26.006 indicated a significant relationship between the two variables at the .05 level. Table 4.30 reveals that twenty-four of the fifty-one nonaccident-involved owners owned Honda motorcycles and that the largest group of Honda owners was in the one to three years' experience group. The direction of the relationship indicates that nonaccident-involved owners of Honda motorcycles had more experience than owners of any other make of motorcycle.

Size with Urban Driving.--Table 4.31 presents the test results for the relationship between the size of motorcycle owned and the extent of motorcycle riding done in urban areas for nonaccident-involved owners. The chi square value of 32.539 was significant at the .005 level, indicating that a relationship between the two variables does exist. Table 4.31 shows that the nonaccident-involved owners of smaller motorcycles did less riding in urban areas than did the owners of larger motorcycles. However, the nonaccident-involved owners of motorcycles of 125cc or less were split between those who did almost all of their riding in urban areas and those who did almost none of their riding in urban areas.

TABLE 4.30.--Chi square test for significance between experience and make of motorcycle owned for nonaccident-involved male motorcycle owners (n = 51)

		1 Year or less	1 to 3 Years	4 to 7 Years	More Than 7 Years	Total	Mean	Standard Deviation
Make of Motorcycle								
Honda	N	2	11	5	6	24	2.63	.97
	P	8.33	45.83	20.83	11.76	100		
Yamaha	N	1	1	1	0	3	2.00	1.00
	P	33.33	33.33	33.33	0	100		
Suzuki	N	0	0	1	3	4	3.75	.50
	P	0	0	25.00	75.00	100		
Kawasaki	N	1	3	1	0	5	2.00	.71
	P	20.00	60.00	20.00	0	100		
Harley-Davidson	N	1	0	0	0	1	1.00	.00
	P	100.00	0	0	0	100		
Other	N	0	5	7	2	14	2.79	.70
	P	0	35.71	50.00	14.29	100		
Total	N	5	20	15	11	51	2.96	2.16
	P	9.80	39.22	29.41	21.57	100		
	Chi Square 26.006*				Degrees of Freedom 15			

*Significant at the .05 level; N = number; P = per cent

TABLE 4.31.--Chi square test for significance between size of motorcycle owned and extent of urban driving for nonaccident-involved male motorcycle owners (n = 51)

		Almost All	Most	Evenly Divided	Little	Almost None	Total	Mean	Standard Deviation
Size									
125cc or less	N	4	0	0	2	5	11	3.36	1.91
	P	36.36	0	0	18.18	45.45	100		
126cc-250cc	N	0	2	3	6	3	14	3.71	.99
	P	0	14.29	21.43	42.86	21.43	100		
251cc-500cc	N	1	11	3	8	1	24	2.88	1.08
	P	4.17	45.83	12.50	33.33	4.17	100		
501cc or more	N	1	0	1	0	0	2	2.00	1.41
	P	50.0	0	50.0	0	0	100		
Total	N	6	13	7	16	9	51	3.18	1.32
	P	11.76	25.49	13.73	31.37	17.65	100		
	Chi Square		32.539*		Degrees of Freedom		12		

*Significant at the .005 level

N = number

P = per cent

Table 4.31 shows that 45.45 per cent of the owners of motorcycles of 125cc or less did almost none of their riding in urban areas contrasted to 36.36 per cent who did most of their riding in urban areas.

Marital Status with Miles Traveled.--Table 4.32 presents the results of the chi square test for relationship between marital status and the total number of motorcycle miles traveled during the previous year for nonaccident-involved owners. The chi square value of 13.740 revealed that marital status and total motorcycle miles traveled were significantly related at the .005 level. Table 4.32 shows that the direction of the relationship indicated that single nonaccident-involved owners traveled more miles during the previous year than the married nonaccident-involved owners. Compared to 42.86 per cent of the married nonaccident owners who rode less than 1,000 miles, only 6.25 per cent of the single owners rode less than 1,000 miles during the previous year.

Size with Miles Traveled.--Table 4.33 presents the findings of the relationship between the size of motorcycle owned and the total number of motorcycle miles traveled during the previous year. The resulting chi square value of 18.774 was significant at the .05 level of confidence. Table 4.33 shows that the direction of

TABLE 4.32.--Chi square test for significance between marital status and total number of motorcycle miles traveled during 1972 for nonaccident-involved male motorcycle owners (n = 51)

		0 to 1,001	1,001 to 3,000	3,001 to 5,000	More than 5,000	Total	Mean	Standard Deviation
Marital Status								
Married	N	15	17	3	0	35	1.66	.64
	P	42.86	48.57	8.57	0	100		
Single	N	1	9	2	4	16	2.56	.96
	P	6.25	56.25	12.50	25.00	100		
Total	N	16	26	5	4	51	1.94	.86
	P	31.37	50.98	9.80	7.84	100		
		Chi Square 13.740*			Degrees of Freedom 3			

*Significant at the .005 level

N = number

P = per cent

TABLE 4.33.--Chi square test for significance between size of motorcycle owned and total number of motorcycle miles traveled during 1972 for nonaccident-involved male motorcycle owners (n = 51)

		0 to 1,001	1,001 to 3,000	3,001 to 5,000	More than 5,000	Total	Mean	Standard Deviation
Size								
125cc or less	N	8	2	1	0	11	1.36	.67
	P	72.73	18.18	9.09	0	100		
126cc to 250cc	N	2	9	2	1	14	2.14	.77
	P	14.29	64.29	14.29	7.14	100		
251cc to 500cc	N	5	15	2	2	24	2.04	.81
	P	20.83	62.50	8.33	8.33	100		
501cc or more	N	1	0	0	1	2	2.50	2.12
	P	50.00	0	0	50.00	100		
Total	N	16	26	5	4	51	1.94	.86
	P	31.37	50.98	9.80	7.84	100		
	Chi Square	18.774*		Degrees of Freedom		9		

*Significant at the .05 level

N = number

P = per cent

the relationship indicated that nonaccident-involved owners of larger sized motorcycles tended to travel more miles during the previous year than nonaccident-involved owners of smaller motorcycles. The largest difference was between owners of motorcycles of 125cc or less and owners of motorcycles between 126cc and 250cc. Compared to 72.73 per cent of the nonaccident-involved owners who owned motorcycles of 125cc or less, only 14.29 per cent of the owners of motorcycles between 126cc and 250cc traveled 1,000 or less miles during the previous year.

Relationships for Accident-Involved Owners

This section contains the relationships between size and make of motorcycle owned, size and primary reason for riding, primary reason for riding and make of motorcycle owned, and size of motorcycle owned and experience for the accident-involved owners. The findings for this section are found in Tables 4.34 through 4.37.

Size with Make.--Table 4.34 presents the results of the chi square test for relationship between the size of motorcycle owned and make of motorcycle owned. The chi square value for this test was 45.887 and was significant at the .005 level. The direction of the relationship indicated that accident-involved owners

TABLE 4.34.--Chi square test for significance between size of motorcycle owned and make of motorcycle owned for accident-involved male motorcycle owners (n = 51)

		125cc or less	126cc to 250cc	251cc to 500cc	501cc or more	Total	Mean	Standard Deviation
Make of Motorcycle								
Honda	N	1	0	16	3	20	3.05	.60
	P	5.00	0	80.00	15.00	100		
Yamaha	N	0	1	1	1	3	3.00	1.00
	P	0	33.33	33.33	33.33	100		
Suzuki	N	1	3	0	1	5	2.20	1.10
	P	20.00	60.00	0	20.00	100		
Kawasaki	N	0	1	4	0	5	2.80	.45
	P	0	20.00	80.00	0	100		
Harley-Davidson	N	0	0	0	5	5	4.00	.00
	P	0	0	0	100.00	100		
Other	N	0	0	5	8	13	3.62	.51
	P	0	0	38.46	61.54	100		
Total	N	2	5	26	18	51	3.18	.77
	P	3.92	9.80	50.98	35.29	100		
	Chi Square		45.887*		Degrees of Freedom		15	

*Significant at the .005 level; N = number; P = per cent.

of larger motorcycles tended to own either Honda, Harley-Davidson models or a make not included in this study while owners of smaller motorcycles owned Suzuki or Kawasaki motorcycles. Table 4.34 reveals that 80 per cent of the owners who owned Honda motorcycles owned one between 251cc and 500cc compared to 5 per cent who owned Hondas of less than 250cc. Table 4.34 also reveals that 50.98 per cent of the accident-involved owners owned motorcycles of between 251cc and 500cc.

Primary Reason for Riding with Size.--Table 4.35 contains the findings from the chi square test for relationship between the primary reason for riding motorcycles and the size of motorcycle owned. The resulting chi square value of 9.498 was significant at the .025 level of confidence. Table 4.35 shows that accident-involved owners who rode primarily for basic transportation owned larger-sized motorcycles than did accident-involved owners who were primarily trail riders. The largest difference found was in the 501cc or larger category of motorcycle size where 44.44 per cent of the basic transportation riders were found compared to 13.33 per cent of the trail riders. Table 4.35 also reveals that for the 251cc to 500cc category the percentage of accident owners who rode primarily for basic transportation was about equal to the owners who were primarily trail riders.

TABLE 4.35.--Chi square test for significance between primary reason for riding and size of motorcycle owned for accident-involved male motorcycle owners (n = 51)

		125cc or less	126cc to 250	251cc to 500	501cc or more	Total	Mean	Standard Deviation
Reason								
Basic Transportation	N	1	1	18	16	36	3.36	.68
	P	2.78	2.78	50.00	44.44	100		
Trail Riding	N	1	4	8	2	15	2.73	.80
	P	6.67	26.67	53.33	13.33	100		
Total	N	2	5	26	18	51	3.18	.77
	P	3.92	9.80	50.98	35.29	100		
	Chi Square	9.498*		Degrees of Freedom		3		

*Significant at the .025 level

N = number

P = per cent

Primary Reason for Riding with Make.--Table 4.36 presents the findings for the relationship between the primary reason for riding motorcycles and the make of motorcycle owned. The resulting chi square value of 13.868 was significant at the .025 level. Table 4.36 reveals that the direction of the relationship indicated that accident-involved owners who rode primarily for basic transportation tended to own either a Honda or a make not included in this study while accident-involved trail riders tended to own Kawasaki, Yamaha, or Honda motorcycles. Of the accident-involved owners who rode primarily for basic transportation, 47.22 per cent owned Honda motorcycles compared to 20 per cent who were primarily trail riders. For those owners who were primarily trail riders, 26.67 per cent owned Kawasaki motorcycles compared to 2.78 per cent of the owners who rode primarily for basic transportation.

Size with Experience.--Table 4.37 contains the findings for the test for relationship between the size of motorcycle owned and the experience of the owner. The resulting chi square value for this test was 21.425 and was significant at the .025 level. Table 4.37 reveals that the direction of the relationship indicates that accident-involved owners with more experience riding motorcycles tended to own larger motorcycles. Of the accident-involved owners with more than seven

TABLE 4.36.--Chi square test for significance between primary reason for riding and make of motorcycle owned for accident-involved male motorcycle owners (n = 51)

		Honda	Yamaha	Suzuki	Kawasaki	Harley Davidson	Other	Total	Mean	Standard Deviation
Basic Transportation	N	17	1	2	1	4	11	36	3.19	2.29
	P	47.22	2.78	5.56	2.78	11.11	30.56	100		
Trail	N	3	2	3	4	1	2	15	3.27	1.67
	P	20.00	13.33	20.00	26.67	6.67	13.33	100		
Total	N	20	3	5	5	5	13	51	3.22	2.11
	P	39.22	5.88	9.80	9.80	9.80	25.49	100		

Chi Square Value 13.868 Degrees of Freedom 5

TABLE 4.37.--Chi square test for significance between experience and size of motorcycle owned for accident-involved male motorcycle owners (n = 51)

		125cc or less	126cc to 250cc	251cc to 500cc	501 or more	Total	Mean	Standard Deviation
Experience								
1 year or less	N	0	3	5	1	9	2.78	.67
	P	0	33.33	55.56	11.11	100		
1 to 3 years	N	0	1	13	8	22	3.32	.57
	P	0	4.55	59.09	36.36	100		
4 to 7 years	N	2	1	4	2	9	2.67	1.12
	P	22.22	11.11	44.44	22.22	100		
More than 7 yrs.	N	0	0	4	7	11	3.64	.50
	P	0	0	36.36	63.64	100		
Total	N	2	5	26	18	51	3.18	.77
	P	3.92	9.80	50.98	35.29	100		
	Chi Square		21.425*		Degrees of Freedom		9	

*Significant at the .025 level

N = number

P = per cent

years' experience, 63.64 per cent owned motorcycles of 501cc or more compared to 11.11 per cent of the owners with one year or less experience. Table 4.37 also shows that no owners with three years or less experience owned motorcycles of less than 125cc and no owners with more than seven years' experience owned a motorcycle of less than 251cc.

Comparison of 16 PF Scores Between Sample Group Owners and Owners Contacted Personally

This section contains the findings of a comparison of mean scores on the sixteen primary and four second-order traits of the 16 PF for the sample population owners who consented by mail to participate in this study and a comparison group of owners who initially declined to participate but agreed to participate after being contacted personally. This comparison was performed separately to aid in generalizing the findings of this study to a broader population. If the comparison between these two groups indicate that male motorcycle owners who consented to participate in a study of this nature and owners who declined are similar, the argument that the findings and conclusions of this study are true of a broader population would be strengthened. The findings of this comparison are presented in Tables 4.38 and 4.39.

Table 4.38 presents the comparison of mean scores on the primary personality factors of the 16 PF between the male motorcycle owners who consented to participate in this study when contacted by mail and the owners who initially declined to participate but who later agreed when contacted personally. Because of the small number of owners in the group contacted personally, a reliable statistical analysis for difference was impossible, however a visual comparison of mean scores was made. Table 4.38 reveals that the largest difference between the two groups on any primary factor was 3.6 and that most of the mean scores were less than one point.

Table 4.39 presents the comparison of mean scores on the four second-order personality traits of the 16 PF for the owners contacted by mail and the owners contacted personally. The comparison of mean scores shows that the largest difference between the two groups on any second-order trait was 1.1 and that two traits varied less than one point.

Summary

This chapter presented the findings of this investigation. Presented were the findings of a one-way multivariate analysis of variance comparison of accident- and nonaccident-involved male motorcycle owners on the sixteen primary and four second-order personality traits measured by the Sixteen Personality Factor Questionnaire.

TABLE 4.38.--Comparison of means between sample group motorcycle owners contacted by mail and comparison group owners contacted personally on primary factors of the 16 PF

Factor	Accident Involved		Nonaccident Involved	
	Sample	Comparison	Sample	Comparison
A	7.4	6.6	7.7	6.2
B	8.2	8.6	8.6	8.0
C	15.9	16.0	15.9	14.8
E	14.2	14.4	12.9	12.8
F	15.6	15.2	13.9	14.0
G	13.7	14.4	13.9	13.6
H	14.3	13.8	13.1	9.6
I	8.5	6.2	7.2	5.2
L	8.3	9.2	7.1	7.2
M	10.6	9.6	12.2	11.2
N	8.6	8.4	9.6	9.8
O	9.7	9.8	10.2	10.8
Q_1	10.8	10.8	9.9	10.4
Q_2	11.8	11.6	12.3	13.2
Q_3	12.8	12.8	13.9	12.6
Q_4	12.7	12.4	12.2	15.8

Note: Sample Accident Involved n = 51

Comparison Accident Involved n = 5

Sample Nonaccident Involved n = 51

Comparison Nonaccident Involved n = 5

TABLE 4.39.--Comparison of means between sample group motorcycle owners contacted by mail and comparison group owners contacted personally on second-order traits of the 16 PF

Trait	Accident Involved		Nonaccident Involved	
	Sample	Comparison	Sample	Comparison
SO_1	5.6	5.8	5.4	6.6
SO_2	5.7	5.3	5.0	4.2
SO_3	6.1	7.0	6.2	7.3
SO_4	6.3	6.1	6.2	6.6

Note: Sample Accident Involved n = 51

Comparison Accident Involved n = 5

Sample Nonaccident Involved n = 51

Comparison Nonaccident Involved n = 5

The findings resulting from chi square comparisons of selected biographical and vehicle characteristics were also presented. Relationships between the second-order traits and the characteristics of primary purpose for riding, total miles traveled during the previous year, and the size of motorcycle owned were determined for each group of owners. Relationships between characteristics were also determined for both groups of owners. Finally, a nonstatistical comparison was made between the owners who consented by mail to participate in the study and owners who were contacted personally. In the following chapter is found a summary, the conclusions and recommendations based upon these findings, and a discussion.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In the preceding chapter the analysis of the data was presented. In this chapter is found: (1) a summary of the study, (2) conclusions, (3) recommendations based upon the findings, (4) recommendations for further research, and (5) a discussion.

Summary

Statement of the Problem

The purposes of this study were (1) to determine if accident-involved and nonaccident-involved motorcycle owners differed on personality traits and (2) to determine if the motorcycle owners differed on selected biographical and vehicle characteristics. This investigation was designed to answer the following specific questions:

1. Do male motorcycle owners involved in personal injury traffic accidents differ significantly from nonaccident-involved male motorcycle owners

on any of the sixteen primary personality factors measured by the Sixteen Personality Factor Questionnaire?

2. Do male motorcycle owners involved in personal injury traffic accidents differ significantly from nonaccident-involved male motorcycle owners on any of the four second-order personality traits measured by the Sixteen Personality Factor Questionnaire?

3. Do male motorcycle owners involved in personal injury traffic accidents differ significantly from nonaccident-involved male motorcycle owners on any of the selected biographical characteristics of age, marital status, occupation, primary purpose for riding, experience, type of motorcycle instruction received, total miles traveled, and extent of urban driving?

4. Do male motorcycle owners involved in personal injury traffic accidents differ significantly from nonaccident-involved male motorcycle owners on the selected vehicle characteristics of make of motorcycle owned and size of motorcycle owned?

5. What are the relationships between the four second-order traits of the 16 PF and the characteristics of size of motorcycle owned, total

miles traveled during the previous year, and the primary purpose for riding motorcycles?

6. What significant relationships exist between the selected biographical and vehicle characteristics for accident- and nonaccident-involved male motorcycle owners?

The Methods of Procedure

Calhoun and Jackson Counties, Michigan, were selected for this study on the basis of their numbers of motorcycle traffic accidents and the willingness of the law enforcement agencies in these counties to cooperate in the study. Initially, 180 male motorcycle owners were selected from the Michigan State Police Traffic Accident Report Files and 220 male motorcycle owners were randomly selected from the Michigan Department of State computer files. Each of the 400 motorcycle owners were mailed a letter explaining the purpose of the study, a Motorcycle Information Sheet, and asked if they would participate in the study by completing the Sixteen Personality Factor Questionnaire at a later date. Fifty-one accident-involved owners and fifty-one nonaccident-involved owners agreed to participate in the study and returned properly completed information sheets and personality questionnaires. The accident-involved owners were male motorcycle owners who had been involved

in personal injury motorcycle traffic accidents during the period of January 1, 1972, to November 30, 1972. The nonaccident-involved owners were male motorcycle owners who reported never having been involved in a personal injury traffic accident while riding a motorcycle. The two groups of owners were compared by testing the difference between mean scores on the sixteen primary factors and four second-order traits of the personality questionnaire using a one-way multivariate analysis of variance. Chi square analysis was used to test the differences on biographical and vehicle characteristics. The relationship between the second-order traits and the characteristics of primary purpose for riding motorcycles, size of motorcycle owned, and total number of miles traveled during the previous year were determined by one-way multivariate analysis of variance. Relationships between biographical and vehicle characteristics were determined for both groups of owners using chi square analysis.

The Major Findings

The following is a summary of the major findings of this investigation:

1. A difference was found at the .05 level of confidence between accident- and nonaccident-involved male motorcycle owners on primary personality factors M (Practical--Imaginative) and Q_3 (Uncontrolled--

Controlled) of the 16 PF with the accident-involved owners being more practical and having more undisciplined self-conflict and the nonaccident-involved owners being more imaginative and more controlled.

2. A difference was found at the .10 level of confidence between accident- and nonaccident-involved male motorcycle owners on factors F (Disurgency--Surgency), I (Tough-minded--Tender-minded), and L (Trusting--Suspicious) of the 16 PF with the accident-involved owners being more happy-go-lucky, more tender-minded, and more suspicious and the nonaccident-involved owners being more sober, more tough-minded, and more trusting.

3. No significant difference at the .05 level was found between accident- and nonaccident-involved male motorcycle owners on any of the four second-order personality traits measured by the 16 PF.

4. A difference was found between accident- and nonaccident-involved male motorcycle owners at the .05 level of confidence on the biographical characteristics of age, occupation, primary purpose for riding, and total miles traveled during the previous year. The accident-involved owners tended to be younger, more often worked in nonprofessional occupations, rode primarily for basic transportation, and traveled more miles per year while nonaccident-involved owners tended to be older, more

often worked in professional or business occupations, rode primarily for trail riding, and traveled fewer miles per year.

5. A difference was found at the .05 level of confidence between accident- and nonaccident-involved male motorcycle owners on the vehicle characteristic of size of motorcycle owned with the accident-involved owners owning larger motorcycles than the nonaccident-involved owners.

6. Two relationships between second-order personality traits and biographical and vehicle characteristics for the nonaccident-involved owners were significant at the .05 level of confidence. Second-order trait III (Sensitivity--Tough Poise) was significantly related to the total number of miles traveled during the previous year with owners who traveled fewer miles per year being more sensitive and owners who traveled more miles per year having more tough poise. Second-order trait IV (Subduedness--Independence) was significantly related to the size of motorcycle owned with the owners of smaller motorcycles being more subdued and the owners of larger motorcycles being more independent.

7. No significant relationships between second-order personality traits and biographical and vehicle characteristics were found for the accident-involved owners at the .05 level.

8. Five relationships between biographical and vehicle characteristics for the nonaccident-involved owners were significant at the .05 or less level. The relationship between primary reason for riding and size of motorcycle owned indicated that nonaccident-involved owners of smaller motorcycles tended to be trail riders and owners of larger motorcycles rode primarily for basic transportation. The relationship between experience and make of motorcycle owned indicated that nonaccident-involved owners of Honda and Suzuki motorcycles tended to have more experience than nonaccident-involved owners of other makes of motorcycles. The relationship between size of motorcycle owned and total miles traveled during the previous year and size of motorcycle owned and urban driving indicated that nonaccident-involved owners of smaller motorcycles tended to ride fewer miles per year and less often in urban areas than nonaccident-involved owners of larger motorcycles. The relationship between marital status and total miles traveled during the previous year indicated that single nonaccident-involved owners traveled more miles per year than did married nonaccident-involved owners.

9. Four relationships between biographical and vehicle characteristics for the accident-involved owners were significant at the .05 or less level. The relationship between size of motorcycle owned and make of

motorcycle owned indicated that accident-involved owners of larger motorcycles tended to own a Honda, Harley-Davidson or make of motorcycle not specified in this study while owners of smaller motorcycles tended to own either a Suzuki or Kawasaki motorcycle. The relationship between the primary reason for riding and size of motorcycle owned indicated that owners of larger motorcycles rode primarily for basic transportation and owners of smaller motorcycles were primarily trail riders. The relationship between primary reason for riding and make of motorcycle owned indicated that accident-involved owners who rode primarily for basic transportation tended to own a Honda or a make of motorcycle not specified in the study and that accident-involved owners who were primarily trail riders tended to own Kawasaki, Yamaha, or Honda motorcycles. The relationship between size of motorcycle owned and experience indicated that accident-involved owners with more experience tend to own larger motorcycles than accident-involved owners with less experience.

Conclusions

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

1. There are significant differences between accident- and nonaccident-involved male motorcycle owners on primary personality factors measured by the

Sixteen Personality Factor Questionnaire. Accident-involved male motorcycle owners are more practical, have more undisciplined self-conflict, more happy-go-lucky, more tender-minded, and more suspicious than nonaccident-involved owners. Compared to accident-involved owners, the nonaccident owners are more imaginative, more controlled, more sober, more tough-minded, and more trusting.

2. There are no significant differences between accident- and nonaccident-involved male motorcycle owners on any of the second-order personality traits measured by the Sixteen Personality Factor Questionnaire. The lack of any significant difference on any of the second-order traits may have been due to the method of achieving second-order scores. It is possible that the combination of high scores on some personality factors and lower scores on others resulted in no significant differences for the broader second-order traits.

3. Significant differences did exist between the accident- and nonaccident-involved male motorcycle owners on biographical characteristics. The accident-involved owners were younger, more often worked in non-professional occupations, more often rode primarily for basic transportation, and traveled more miles per year when compared to the nonaccident-involved owners.

4. A significant difference existed between accident- and nonaccident-involved male motorcycle owners on the vehicle characteristic of size of motorcycle owned. When compared to the nonaccident-involved owners, the accident-involved owners owned larger motorcycles.

5. A significant relationship existed for the nonaccident-involved owner between the degree of emotionalism and total number of miles traveled per year and between the degree of independence and the size of motorcycle owned. Nonaccident-involved owners who were more emotional tended to ride more miles per year and owners who were more independent owned larger motorcycles.

6. No significant relationships existed between second-order personality traits and biographical or vehicle characteristics for accident-involved owners.

7. There were different significant relationships between biographical and vehicle characteristics for the accident-involved owners than for the nonaccident-involved owners. For the accident-involved owners there was a significant relationship between size of motorcycle owned and experience, between primary reason for riding and make of motorcycle owned, and between size of motorcycle owned and make of motorcycle owned. For the nonaccident-involved owners there was a significant

relationship between extent of urban riding and total miles traveled, experience and make of motorcycle owned, marital status and total miles traveled, and between size of motorcycle owned and the extent of urban riding. The relationship between primary purpose for riding motorcycles and the size of motorcycle owned was significant for both the accident and the nonaccident-involved owners. For both groups of owners, those who rode primarily for basic transportation owned larger motorcycles than those who were primarily trail riders.

8. Male motorcycle owners who consent to participate in a study of this nature do not appear to have different personality traits than owners who would refuse to participate when contacted by mail. Therefore, the results of this study are probably valid to male motorcycle owners other than those in the sample.

Recommendations

On the basis of the findings and conclusions of this study, it is recommended that:

1. Instructional methodologies be developed and implemented in motorcycle education programs that are designed to help develop those personality traits identified in this study that lead to accident-free motorcycle operation.

2. Colleges and universities responsible for teacher preparation in the traffic safety field provide information regarding the importance of proper personality traits to safe motorcycle operation.

3. Informational programs be developed for both new and experienced motorcycle owners to indicate the importance of proper selection of motorcycle size and make.

4. Present licensing procedures for motorcycle operators be reviewed and improved taking into consideration the findings of this study wherever possible.

Recommendations for Further Research

As a result of the findings of this investigation, the following recommendations for further research are made:

1. Research be conducted using several different personality instruments to determine if similar or additional personality traits associated with accident involvement can be identified.

2. A study be conducted to identify personality factors associated with specific types of motorcycle accidents.

3. Research be conducted to determine the most effective methods and procedures for use in motorcycle education programs.

4. A similar study be conducted using the Sixteen Personality Factor Questionnaire with female motorcycle owners to determine if the findings of this study are representative of female owners. The rapid growth of motorcycle popularity has increased the number of female owners using motorcycles for both basic transportation and trail riding.

5. A study be undertaken to discover what factors are considered by motorcycle owners in selecting a particular size and make of motorcycle for purchase.

6. A study be conducted comparing motorcycle owners who also drive automobiles to owners who do not.

Discussion

The findings of this investigation revealing a lower mean score for accident-involved motorcycle owners on factors M and Q_3 than for nonaccident-involved owners comes as somewhat of a surprise. The directional description of factor M associates a lower score on the factor with individuals who are described as practical and steady while higher scores are associated with individuals who are inclined to be disregardful of practical matters. Individuals with lower scores on factor Q_3 are described as uncontrolled and careless of social rules while higher score individuals are described as controlled and possessing approved character responses. The

findings for these two personality factors are exactly opposite from those found by Suhr[1] with commercial automobile drivers. The findings of this study would seem to substantiate the theory of some researchers that accident-involved automobile drivers and accident-involved motorcycle drivers are not from the same population.

Although not significant at the .05 level, the three additional factors F, I, and L approached significance for this study. Only factor I has been identified in earlier research as being possibly associated with accident-free driving. Again these results would seem to indicate that motorcycle owners may have personality make-ups different from automobile drivers.

The reader should be cautioned about interpreting the results on personality factors. It must be remembered that the accident-involved owners only had one accident during the study period which occurred in the two counties. (It is not known whether they had other accidents at other times or in other locations.) Some of the accidents could have been caused by a lack of attention or other factors rather than personality.

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[1]V. Suhr, "The Cattell 16 PF as a Prognosticator of Accident Susceptibility," Proceedings of the Iowa Academy of Sciences, 1953, p. 559.

One possible explanation for the lack of significance between second-order traits may be in the method of obtaining second-order scores. Second-order scores are determined by combining primary factor scores using formulas provided by the designers of the 16 PF. Since a person's total personality is made up of many factors of varying degrees, it is possible that the combining of higher scores on some factors and lower scores on others resulted in no significance.

The significant difference discovered between the accident- and nonaccident-involved owners on the characteristics of age, total mileage, and size of motorcycle owned is consistent with earlier research. However, the difference in occupation and primary reason for riding are possible areas for educators to explore in the development of motorcycle education programs. The lack of a significant relationship between experience and size of motorcycle owned for nonaccident-involved owners raises the question of what criteria inexperienced riders use in selecting their first motorcycle. The importance of selecting a proper size motorcycle to fit the rider's ability and experience would seem to be an appropriate topic to be included in education programs for new owners. The significant relationship between size of motorcycle owned and second-order trait IV would seem to indicate that nonaccident-involved owners select a

motorcycle size that matches their feelings of independence. The more independent one feels, the more apt he is to purchase a larger size motorcycle.

In summary, the results of this investigation have raised several important questions regarding the personality make-up of accident- and nonaccident-involved motorcycle owners. It would seem desirable that additional research be conducted involving motorcycle owners, especially in view of the rising popularity and increased usage of motorcycles in the transportation system.

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APPENDICES

APPENDIX A

PROJECT EXPLANATION LETTER

APPENDIX A

Michigan Motorcycle Study

c/o Michigan State University
Room 72, Kellogg Center
East Lansing, Michigan 48823

Dear Motorcycle Owner:

As the owner of a motorcycle, you are undoubtedly aware of the serious problems faced by Michigan motorcyclists. Last year over 7,000 motorcycle riders were injured and more than 140 were killed in Michigan alone. These figures are much too high. With your assistance, accidents can be reduced to provide safer and more enjoyable riding for all of us.

I would very much like to have you participate in a motorcycle study by taking a minute or two to complete the enclosed information sheet and return it in the enclosed, self-addressed envelope. All information obtained in this study will remain completely confidential.

I also hope you indicate a willingness to participate further in this study by answering "yes" to question number 11. If you do, I will mail you an inventory which you may complete at home in approximately 50 minutes. This inventory is not a test. There are no right or wrong answers. I realize your time is valuable, but I feel that as a motorcycle rider you can be of assistance in solving the motorcycle problem.

I need your participation in order to proceed with this study.

May I extend my sincere appreciation for your help. At the conclusion of this study, you will be sent a summary of the results which I am sure you will find both interesting and useful.

Sincerely,

John E. Schlick

John E. Schlick
Graduate Student
Michigan State University

Enclosures

APPENDIX B

MOTORCYCLE INFORMATION SHEET

APPENDIX B

Motorcycle Information Sheet

Please complete all the following questions carefully.
All information will remain completely confidential.

1. Your age?_____ 2. Occupation?_____

3. Marital Status? ___Single ___Divorced ___Separated

___Married ___Widowed

4. How long have you been riding motorcycles?

_____years _____months

5. What is the primary purpose for which you ride a motorcycle?

____Basic Transportation ____Trail riding ____Racing

6. Have you ever been the driver of a motorcycle involved in a personal injury accident requiring attention by a doctor?

___Yes ___No If "yes", when? Year_____

7. Check the make of motorcycle and indicate the c.c. displacement of the motorcycle you ride most often.

Make	c.c. Displacement
____Honda	_____
____Yamaha	_____
____Suzuki	_____
____Kawasaki	_____
____Harley-Davidson	_____
____Other, please specify below	
_____	_____

(OVER)

8. How many miles have you ridden a motorcycle this year? (1972)

(Estimate your mileage)_____miles

9. Check the statement which most accurately describes the amount of riding you do in what you consider urban areas.

____Almost all (over 90%)

____Most (60% to 90%)

____About evenly divided (40% to 60%)

____Little (10% to 40%)

____Almost none (less than 10%)

10. What type of operating instruction did you receive?

____Organized motorcycle instruction program

____Informal instruction from friends

____No instruction, self-taught

11. Would you be willing to participate further in this effort by completing an inventory? There are no right or wrong answers, and when you have completed the inventory I am sure you will see why your personal contribution is important.

____yes no____

12. Comments:_____

_____

_____

_____

Name:_____

Address:_____

_____

APPENDIX C

LETTER OF INSTRUCTION

FOR 16 PF

Michigan Motorcycle Study

c/o Michigan State University
Room 72, Kellogg Center
East Lansing, Michigan 48823

APPENDIX C

Dear Motorcycle Study Participant:

I want to thank you for continuing to be a part of this important study. Without your cooperation, a study of this nature would not be possible.

Enclosed is the inventory I asked you to complete. This inventory will provide basic information about motorcycle riders which will be used to develop educational programs for motorcyclists and automobile drivers. You are not required to sign your name on the inventory booklet or the answer sheet. All responses will be analyzed anonymously and will be kept completely confidential. Although responses are analyzed anonymously, accurate and useful data requires that each carefully selected participant complete and return the inventory and answer sheet.

BEFORE BEGINNING THE INVENTORY:

* Please read carefully the front cover of the booklet giving directions for answering the questions.
* Please read the sample questions on the answer sheet provided for your use.
* Remember, there are no right or wrong answers, only your personal preferences.
* It is important that all responses be yours -- please do not have anyone help you.

When you have completed the inventory, simply return the booklet and answer sheet in the enclosed postage paid envelope. It would help if you could return the inventory by January 26.

Again, thank you for sharing some of your valuable time with us. Your contribution to this study will help make motorcycling safer for all of us. When all inventories have been returned and analyzed, you will be sent a summary of the study, which you helped make possible.

Sincerely,

John E. Schlick

John E. Schlick
Michigan Motorcycle Study

JES:jj
Encl.

APPENDIX D

FACTORS MEASURED BY THE SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

APPENDIX D

FACTORS MEASURED BY THE SIXTEEN PERSONALITY FACTOR QUESTIONNAIRE

The following is a brief description of the sixteen primary dimensions of the Sixteen Personality Factors Questionnaire.

Factor	A person with a low score is described as:
A	RESERVED, cool, detached, aloof
B	LESS INTELLIGENT, concrete-thinking
C	AFFECTED BY FEELINGS, emotionally less stable, easily upset
E	SUBMISSIVE, mild, accommodating
F	SOBER, prudent, serious, taciturn
G	EXPEDIENT, disregards rules, feels few obligations
H	SHY, restrained, timid, threat-sensitive
I	TOUGH-MINDED, self-reliant, realistic, no-nonsense
L	TRUSTING, adaptable, free of jealousy, easy to get along with
M	PRACTICAL,careful, conventional, regulated by external realities
N	FORTHRIGHT, natural, artless, unpretentious
O	SELF-ASSURED, confident, complacent
Q_1	CONSERVATIVE, respecting established ideas, tolerant of traditional difficulties
Q_2	GROUP-DEPENDENT, a "joiner"and good follower

Factor	
Q_3	UNDISCIPLINED SELF-CONFLICT, follows own urges, careless of social rules
Q_4	RELAXED, tranquil, composed

Factor	A person with a high score is described as:
A	WARMHEARTED, easygoing, participating, outgoing
B	MORE INTELLIGENT, abstract thinking, bright
C	EMOTIONALLY STABLE, faces reality, calm, mature
E	ASSERTIVE, dominant, aggressive, competitive
F	HAPPY-GO-LUCKY, impulsively lively, enthusiastic
G	CONSCIENTIOUS, persevering, moralistic, straight-laced
H	VENTURESOME, socially bold, uninhibited, spontaneous
I	TENDER-MINDED, gentle, overprotected, sensitive
L	SUSPICIOUS, self-opinionated, hard to fool
M	IMAGINATIVE, wrapped up in inner urgencies, careless of practical matters, bohemian
N	SHREWD, calculating, worldly, penetrating
O	APPREHENSIVE, self-reproaching, worrying, troubled
Q_1	EXPERIMENTING, liberal, analytical, free-thinking
Q_2	SELF-SUFFICIENT, prefers own decisions, resourceful
Q_3	CONTROLLED, socially precise, compulsive, following self-image
Q_4	TENSE, frustrated, driven, overwrought

APPENDIX E

MICHIGAN STATE POLICE UD-10A ACCIDENT REPORT FORM

APPENDIX E

ORIGINAL

State of Michigan
OFFICIAL TRAFFIC ACCIDENT REPORT

Department | DO NOT USE

Location: County | City | Twp. | Date | Time (A.M. / P.M.)
ON | Route No. | Name | Ft. Mi. N S E W | Intersection | Route No.

Vehicle #1: State | Driver's License | DOB | Hazardous Action | HBD | HN | Test
Driver No. 1 | First | M. | Last | Address | City | State | Age | Sex | Inj
Year | Make | Type | Trailer | Reg. | Yr./State | Removed to by
Name | Address | Pos | Age | Sex | Inj
Seat Position: 1 2 3 / 4 5 6 | Total Occupants | Local Use/Owner | Injured Taken to

Vehicle #2: State | Driver's License | DOB | Hazardous Action | HBD | HN | Test
Driver No. 2 | First | M. | Last | Address | City | State | Age | Sex | Inj
Year | Make | Type | Trailer | Reg. | Yr./State | Removed to by
Name | Address | Pos | Age | Sex | Inj
Seat Position: 1 2 3 / 4 5 6 | Total Occupants | Local Use/Owner | Injured Taken to

WEATHER	LIGHT	ROAD SURFACE	ROAD CONDITION	VISION OBSTRUCTION	VEHICLE DEFECTS
[ ] Clear [ ] Cloudy [ ] Rain [ ] Fog [ ] Snow	[ ] Day [ ] Dark [ ] Dawn [ ] Dusk [ ] Street Lights	[ ] Dry [ ] Snowy Icy [ ] Wet [ ] Other	[ ] Engineering [ ] Maintenance [ ] Construction Zone	☐ Vehicle #1 ☐ Vehicle #2 Explain ☐ None	☐ Vehicle #1 ☐ Vehicle #2 Explain ☐ None

IMPACT CODE: Veh. #1 | Veh. #2 | Total Veh.
TOTAL LANES: ☐ Divided ☐ Limited Access
DRIVER RE-EXAM: [ ] Driver #1 [ ] Driver #2
Damage Property Other Than Vehicles: Owner | Address

North

Include All Traffic Control Devices

ACCIDENT DESCRIPTION & REMARKS

Describe all unusual conditions and circumstances

Date Received | Time (A.M. / P.M.) | Investigated by | Reviewer
Photos by | Charge
1 2 POLICE ACTION: ☐ ☐ Cited for Hazardous Vio. ☐ ☐ Cited for Other Violation ☐ ☐ No Enforcement Action ☐ ☐ Investigated at Scene
Comp. Status: ☐ open ☐ closed

FORWARD COPY TO: Michigan State Police, Safety & Traffic Division, East Lansing, Mich. 48823

This form is prescribed by Director, Michigan State Police pursuant to Section 622, Act 300, P.A. 1949, as amended.