# Motorcyclists: Who They Are and Why They Do What They Do

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From 1985 to 1987, the Insurance Corporation of British Columbia in Canada undertook a major research initiative on motorcycle riders with emphasis on safety-related factors and the effectiveness of formal rider training. Intensive, open interviews were held with riders, and a comprehensive telephone interview was given to 877 riders in British Columbia, approximately half of whom had completed a formal course of instruction. In addition, an analysis was made of the records of all British Columbia riders involved in accidents during 1984. The results of this work emphasize the difficulties involved in mandating accident or injury countermeasures dealing with items of clothing or protective gear. These are in direct conflict with the motorcyclist's image, which lies behind his reason for riding in the first place. The amount and type of exposure were found to be the most important determinants of accident frequency, and no evidence could be found to support a conclusion that formal motorcycle training was effective in reducing subsequent motorcycle accident risk.

Motorcyclists are high-profile subjects of much speculation and empirical investigation. Traffic safety researchers often ask questions such as "Why do motorcyclists drive the way they do?" "What are the characteristics responsible for their risky driving behavior?" and "To what extent are motorcyclists who have no formal training different from those who have?" Answers to these questions were readily found in the literature. For example, Hurt et al. (*1*) and Mortimer (*2*) established that young males (age 16 to 24) are overrepresented in motorcycle crashes. Jonah et al. (*3*) concluded that less educated riders had a higher incidence of both recorded accidents and accidents reported in interviews. Motorcycle riding experience was a significant characteristic according to E. Dwyer and T. McCord (New York State Motorcycle Rider Education Evaluation Project, 1985), Hurt et al. (*1*) and Mortimer (*2*). They concluded that a significant number of motorcycle accidents occurred within the first 6 months of motorcycle riding. Further, Hurt et al. (*1*) found that approximately 50 percent of their accident-involved riders did not possess a valid operator's license and that motorcycle riders with previous traffic citations and accidents were overrepresented in the accident data.

Combined with the "who are they?" descriptions are definitions of "why do they ride like that?" Most predominant are images of risk takers or thrill seekers (*4*). Motorcyclists engage in risk-taking behavior that deviates from assumed normal behavior (*5*), and the act of simply riding a motorcycle is in

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itself risky because the probability of being injured in an accident is many times that of a car driver.

One predominant belief is that driver training is required to compensate for the motorcyclists' characteristics. Hurt et al. (*1*) found that most riders involved in accidents had no formal training. The authors suggested that training programs reduced accident involvement and led to fewer injuries. Jonah et al. (*3*) and Mortimer (*2*) came to the opposite conclusion when they controlled for confounding factors such as driver training self-selection and riding exposure.

Previous studies, although rigorous in empirical design, made assumptions about (a) the motorcycling reality on the street, and (b) the dynamics of a motorcycle and rider training program. To explicate the hidden dimensions of motorcycle riding, the differences between trained and untrained riders, and the characteristics demonstrated in accidents, information was accumulated from extended interviews with motorcyclists, participant observation of a motorcycle rider training course, telephone questionnaires, and accident analyses.

## MOTORCYCLISTS ON THE STREET

Semistructured interviews were conducted with 100 motorcyclists. Rather than determining statistical frequencies, the interviews sought to uncover the kinds of realities that exist. After a search for patterns of motorcycling entry points, the following categories emerged as the basis for an etiology of motorcycle riding:

- *Initial entrance into motorcycling is the result of a person's psychological drive toward risk taking.* Challenge was a noteworthy entry point.
- *Initial entrance into motorcycling is the result of a practical, conscious decision to partake in a recreational event that promises pleasure while maintaining a level of safety.* Motorcyclists who began riding for recreation or pleasure often did so by experimenting. They wanted to do something different and exciting. They wanted to try something different from their routine lives, "to just go out there and have a good time." Some decisions to ride motorcycles reflected a normative order of progression. For example, a group of motorcycle riders progressed from small bikes to large bikes or from passenger to operator.
- *Initial entrance into motorcycling may be the result of incomplete social adjustment. There is a view of social norms that is marginal according to societal standards.* Some motorcyclists began riding to share a way of life considered to be outside mainstream society. They joined rider groups or motor-

cycle clubs to partake in a lifestyle that absolves them of many societal standards and norms. The motorcycle is the symbol for such groups, which abide by norms and rituals that are distinguishable from society's concept of customary conduct.

• *Initial entrance into motorcycling is the result of economic considerations.* A fourth predominant reason for individuals to begin motorcycle riding is practicality or necessity. In short, the motorcycle is "the only transportation they could afford."

## Role Imagery of Motorcyclists

The motorcyclist's self is an extension of others' perceptions. On a Harley, the riders defined themselves as the "lone riders" or "outlaws" who dress and act in ways to fit that look. They are confident—a breed apart.

> Everybody that is on a bike feels that they're the modern-day cowboy. Especially . . . on a Harley, they all feel a little bit of an independent, carefree rider. That's the way they see me. I don't want to be perceived as an outlaw because I don't think I'm that kind of a person. I want to get on a bike, sometimes I don't care, sometimes I do.

Sexual identification often emerged when discussion revolved around self-image. A psychological principle of self-definition for a man is "how the lady sees him seeing her in a situation." Not surprisingly, therefore, some motorcyclists' image of self is attraction to women.

The "who am I in relation to the other" concept often gets acted out in "getting kicks." For physical and mental thrill, some motorcyclists said that they "speed," "do wheelies," "ride down sidewalks," and generally "show off." They recognized that such actions form poor images for motorcyclists. The "who am I" becomes "what I am like, you don't like."

Nearly all motorcyclists had biographical accounts of riders "racing the roads," "driving like jerks," "cutting people off," or "being crazy." It was an everyday assumption that other motorists define motorcyclists in a derogatory way, yet many riders did not place themselves in this mold. They considered themselves as "just riders" who are "normal road users." They described themselves as not having the attitude problem that many other riders have.

## Motorcyclists as Organization Members

Motorcyclists come from a variety of backgrounds with unique interests, but their common tradition is the act of motorcycle riding. On a continuum, the "organization" of motorcyclists is composed of unorganized groups at one end and highly organized ones at the other. The most highly organized are the motorcycle gangs, who sustain a total life commitment to the group's entity, structure, purpose, and leadership. Less highly organized groups, such as the "touring clubs" are more dependent on particular people and planned events. The least organized groups represent people whose only identification is certain motorcycle types or makes that symbolize their interests. Four types of motorcycles that define groups are Harleys (or hogs) (the most common), sport bikes, dirt bikes, and "Gold Wings."

Among motorcycle riders is a large percentage of individuals not organized into any group. Their only qualification for organizational membership is the possession and riding of a motorcycle. This aggregate has open membership and no authority. Although the members do not know each other, they greet each other on the highway.

Different recognizable groups of motorcyclists wear clothes that are intended to reflect their images of self. For example, it would be unusual to see a Harley rider wear a streamlined, high-technology helmet or a sleek set of matching leather jacket and pants. Yet sport bikers driving Interceptors or Ninjas do not tend to wear faded, studded blue jean vests covering black T-shirts. The type of motorcycle, meaning of motorcycling, and style of driving produce different dress codes.

## Motorcyclists and Freedom

Freedom is a concept relevant to motorcycling. Motorcyclists reason through their biking activities in terms of "freedom to" or "freedom from." Interviewees tended to interrelate individualism and freedom. When speaking about reasons for riding, they stressed freedom from external restraints.

Often, freedom and rebellion mean speed. Fast driving becomes the experience for self and communicates to other road users the intuitive sense of danger and excitement. High-speed riding with competent maneuvering amplifies the image of power and freedom. It makes for a smooth, visible performance.

## Safety and Motorcyclists' Reality

When exploring safety and motorcyclists, it is useful to start with the assumption that motorcycle riders share a collective belief in the "cult of the individual." Individualism is the core of morality in the motorcycle riding world. Yet safety legislation supports conformity to the ideologies of the majority. It regulates behavior. Deviation from the law challenges the order, bringing with it negative sanctions. Hence, laws concerning safety restrict individuality and freedom.

Traffic laws were designed to control social behavior and to maintain the condition of a vehicle. However, the laws most relevant to motorcyclists define physical turf: body and clothing. The most contentious component of safety laws is helmets. The key question on helmet wearing is not the extent to which helmets promote safety, but rather the extent to which the meaning of helmets contradicts the bedrock meaning of riding. Choices become major issues, resulting in the argument that the government should not force individuals to protect themselves. Consider the following responses to the question, "Do you wear a helmet?":

> If I have a choice, I don't. Normally I don't. I like to just walk out of my house, get on my bike and ride. It's a thing to it, it's no preparation . . . Just get on it and go, the way it should be.

> I just feel that government's got their nose in enough of our affairs. You don't need it with helmets.

> If I had a choice, I'd say I probably wouldn't except if the weather was bad. The helmet is definitely safer, wearing one. But that's a choice thing.

I don't wear a helmet unless it's compulsory by law. Because they're not designed to protect against anything but the skipping blues and low-speed impacts. They impair vision, hearing. So, I don't wear a helmet unless I have to do it and then I'll wear the most minimal amount of protection that I can get away with under the law.

On the other hand, personal accident experiences have produced decisions for some motorcyclists to wear helmets. Other riders, broadly grouped as sport riders or their look-alikes, wear helmets for both image and safety. They resolve the demands of safety and freedom by stressing looks and sport-bike recognition. The laws are upheld, the image is saved, and the wearing behavior as generally regarded by other riders as being "cool." It is an image-maintenance choice.

## STATISTICAL TRENDS FOR TRAINED VERSUS UNTRAINED RIDERS

Statistical data were collected in order to explore the objective reality of rider characteristics and safety. First, a telephone survey was undertaken of 877 current motorcycle riders, of which 418 had successfully completed a particular formal motorcycle training program during 1981 and 1982 before licensure. Fifty-seven had failed the formal training but had subsequently begun riding during this period, and 402 had become insured for motorcycle riding in 1981 and 1982 without taking any formal training whatsoever. Complete driver records covering up to 7 yr of past accident and conviction history were obtained for 863 (98.4 percent) of the riders.

The details, strengths, and shortcomings of the training program were uncovered by means of participant observation. The results of this evaluation, unfortunately, cannot be included in this paper because of space limitations.

The questionnaire administered over the telephone was a comprehensive one covering 34 questions related to demographics, riding exposure, attitudes, and riding characteristics. The driver record information was hand-searched to differentiate accidents and convictions related to motorcycle riding from those that occurred when the subjects were operating other vehicles and to ascertain details of the accidents related to motorcycle use. Because riders taking formal training are more likely to be young and female than those not taking training, our sample was stratified to match trained and untrained groups by age group and gender.

### Univariate Comparisons

First, differences were examined on a univariate basis using the chi-square nonparametric test. In terms of riding exposure, the greatest of the two significant differences was in the number of months of reported riding experience. The untrained riders, even though licensed in the same period as the trained ones, reported over twice as much past riding experience as the latter. Because the samples were matched by age, the most likely conclusion is that the untrained riders had gained considerable unauthorized experience before licensure. The only other significant difference was where most riding took place. A greater percentage (39.0 percent) of trained riders reported doing most of their riding on the highway than did the untrained group (at 23.6 percent). This may reflect added confidence attained by the trained riders as a result of the comprehensive formal road training sessions.

The possibility of unofficial experience for untrained riders before taking out a license or insurance was strengthened by the fact that fully 23.1 percent of the untrained riders were not properly licensed as compared to only 3.9 percent of the trained group. The difference was highly significant. It is of interest to note that the majority of the unlicensed riders were not regular commuters, whereas the overwhelming majority of properly licensed riders were. In terms of the motorcycle used, although there was no difference in engine-size distribution between trained and untrained riders, a significantly higher proportion of trained riders were currently using borrowed machines (5.4 percent versus 2.3 percent for untrained operators).

Demographics related to education and marital status were similar for both groups of riders, with the exception of the percentage who had completed post-secondary school education (that is, had graduated from university, college, or trade school). Of the trained riders, 53.3 percent were graduates compared with 41.4 percent of those untrained—a significant difference.

One of the major areas of difference between trained and untrained riders was in their attitudes toward clothing and protective gear. In terms of special clothing, significantly more trained (88.3 percent) than untrained riders (73.4 percent) reported wearing protective accoutrements such as gloves, boots, and so on, and almost twice as many (71.1 percent as opposed to 34.9 percent) said they usually wore bright-colored or fluorescent clothing or accessories. Attitudes toward helmets also showed highly significant differences. Untrained riders were more likely to disagree with the notion that only properly tested and approved helmets should be worn and were much more likely (44.9 percent) to believe that helmets impaired hearing and vision than were the trained group (29.6 percent). In line with the foregoing, the untrained riders were also significantly more likely to feel that the advertised protection afforded by helmets is overrated (29.6 percent versus 14.2 percent for trained riders) and more likely to view helmets as uncomfortable and unsafe (10.8 percent versus 4.8 percent, respectively).

### Multivariate Analysis

A multiple discriminant analysis was performed among the three training-related groups: noncourse takers, those who successfully completed the course, and those who took the course but failed the test at the end. Rider accident and conviction records were included. The significant results ($p \leq$ .01) are shown in Table 1.

An examination of the means of the significant variables tabulated in Table 1 revealed that there were no significant differences between those who passed the training course and those who failed, with the exception of the proportion of persons age 45 and older (45 percent of the course failures were 45+ whereas only 10 percent of those successfully completing were in this group). Even had the sample size been higher in the failure group, the other variable means were so

TABLE 1    SIGNIFICANT DISCRIMINANT ANALYSIS RESULTS

| Variable | Number | Partial $R^2$ | F-Statistic | Probability F | Wilks' Lambda | Probability Lambda | Avg. Squared Canonical Correlation (ASCC) | Probability ASCC |
|---|---|---|---|---|---|---|---|---|
| Number of months riding | 1 | 0.123 | 39.5 | 0.0001 | 0.8772 | 0.0000 | 0.0614 | 0.0000 |
| Licensed to ride | 2 | 0.139 | 45.5 | 0.0001 | 0.7552 | 0.0000 | 0.1228 | 0.0000 |
| Wear bright clothes | 3 | 0.094 | 29.1 | 0.0001 | 0.6844 | 0.0000 | 0.1590 | 0.0000 |
| Age 45+ | 4 | 0.066 | 19.8 | 0.0001 | 0.6392 | 0.0000 | 0.1904 | 0.0000 |
| Think helmets overrated | 5 | 0.040 | 11.7 | 0.0001 | 0.6134 | 0.0000 | 0.2041 | 0.0000 |
| Most riding on highway | 6 | 0.019 | 5.5 | 0.0045 | 0.6017 | 0.0000 | 0.2104 | 0.0000 |
| Wear protective gear | 7 | 0.017 | 4.8 | 0.0086 | 0.5915 | 0.0000 | 0.2161 | 0.0000 |

similar to those in the successful group that it is unlikely any additional variables would have shown significance. In further discussion, it will therefore be sufficient simply to describe the difference between successful course takers and nontakers. The means or percentages of the significant variables are given in Table 2.

TABLE 2    COMPARISON OF SUCCESSFUL COURSE TAKERS WITH NONTAKERS

| Variable | No Training | Successfully Completed Training |
|---|---|---|
| Self-reported riding experience (months) | 122.4 | 61.1 |
| Properly licensed for motorcycle (%) | 76.8 | 98.9 |
| Wear bright clothing when riding (%) | 37.5 | 71.4 |
| Think helmet protection overrated (%) | 28.5 | 9.3 |
| Most riding done on highway (%) | 23.6 | 39.0 |
| Wear protective gear when riding (%) | 71.2 | 87.4 |

The interesting thing about the results in Table 2 is that, with the exception of self-reported experience, all the differences between trained and untrained riders were behavioral in nature. Being properly licensed, wearing the right clothing, and having positive attitudes toward helmets all reflect attitudes that are held by safety-conscious people and that are reinforced during formal training. The highway riding differential could represent a higher level of self-confidence on the part of those who have taken a course of instruction that includes instilling familiarity with highway operation.

Finally, it is important to note that when the effects of other variables concerning riding exposure, rider characteristics, and attitudes and behaviors were taken into account, there were no significant differences in accident or conviction history between trained and untrained riders.

## RIDER CHARACTERISTICS INFLUENCING SAFETY PERFORMANCE OF SURVEYED RIDERS

In preliminary examination of the data, one of the first noticeable characteristics was the strong relationship between past accidents or violation convictions when the subjects were riding their motorcycles and those when they were driving other vehicles. The majority of subjects were licensed for passenger vehicles in addition to motorcycles. Many of the characteristics that make for a good or bad car driver may also apply to motorcycle riding.

Because rider characteristics that are correlated with violations may be different from those rider characteristics that are correlated with accidents, the group of dependent variables was divided into two subsets: other vehicle and motorcycle violations and other vehicle and motorcycle accidents. The research questions then became: (a) Does a significant structural relationship exist between motorcyclists' traffic violations (differentiated by whether or not they were operating a motorcycle at the time) and a set of other driver characteristics? and (b) Does a significant structural relationship exist between motorcyclists' accidents (differentiated for motorcycle and other vehicle operation) and a set of other driver characteristics?

To answer these questions, canonical analyses (CAs) were performed using various combinations of dependent variables. Canonical analysis is a generalized form of multiple regression that involves forming two linear combinations of variables—those on the dependent side (accidents and violations in this case) and those on the independent side. The canonical correlation is the correlation between the two linear combinations; the square of the canonical correlation ($R_c^2$) is an estimate of the variance shared by the two canonical variates (6). The exact relationships between individual variables must then be explored using multiple analysis of variance techniques. The major advantage of CA in this case was its ability to account for relations among the dependent variables of motorcycle accidents, other-vehicle accidents, motorcycle convictions, and other-vehicle convictions.

Approximate normality is a prerequisite for variable distributions used in multivariate analyses. The dependent variables of accident and conviction rates (adjusted to account for different lengths of riding experience) had to be normalized using a square root transformation. All class or categorical variables were effect-coded for this analysis procedure.

Two canonical analyses were performed: one between motorcycle convictions/other-vehicle convictions and motorcycle rider characteristics, and the other between motorcycle accidents/other-vehicle accidents and motorcycle rider characteristics. The significant results for accidents are illustrated in Table 3.

The next stage in the analysis was to incorporate these independent variables into a series of multiple analyses of variance (MANOVAs). All main effects and interactions to the third level were run using procedures for unbalanced cell design. No disordinal interactions were found and thus the main effects could be considered valid.

The directions of the significant effects were further examined in a series of one-way analyses of variance (ANOVAs)

TABLE 3 RESULTS OF CANONICAL CORRELATION ANALYSIS BETWEEN ACCIDENTS AND MOTORCYCLE RIDER CHARACTERISTICS

| Variables | First Canonical Variate | | Second Canonical Variate | |
|---|---|---|---|---|
| | Structural Coefficient | Standardized Coefficient | Structural Coefficient | Standardized Coefficient |
| Accident sets | | | | |
| $Y_1$ = other vehicle | 1.00 | 1.00 | −0.01 | −0.14 |
| $Y_2$ = motorcycle | 0.13 | 0.01 | 0.99 | 1.00 |
| Proportion of variance (total = 1.00) | 0.51 | | 0.49 | |
| Redundancy (total = 0.22) | 0.12 | | 0.10 | |
| Driver characteristics set | | | | |
| Do not ride to work or school | 0.08 | 0.10 | −0.49 | −0.30 |
| Major moving violations—other vehicle | −0.48 | −0.28 | −0.05 | 0.01 |
| Minor moving violations—other vehicle | −0.46 | −0.23 | −0.13 | −0.11 |
| Major moving violations—motorcycle | −0.23 | −0.07 | −0.50 | −0.40 |
| Major operator violations—other vehicle | −0.44 | −0.24 | 0.04 | 0.06 |
| Major behavioral violations—other vehicle | −0.43 | −0.28 | −0.04 | 0.02 |
| Age 16–19 | 0.41 | 0.38 | 0.24 | −0.03 |
| Minor operator violations—other vehicle | −0.40 | −0.12 | −0.11 | −0.02 |
| Days per week riding | 0.20 | 0.15 | 0.37 | −0.01 |
| Minor moving violations—motorcycle | −0.19 | 0.07 | −0.35 | 0.02 |
| Marital status | −0.30 | −0.04 | −0.23 | −0.04 |
| Motorcycle training—passed | 0.30 | −0.07 | 0.05 | −0.41 |
| Riding experience—49–72 months | 0.04 | −0.15 | 0.30 | 0.37 |
| Canonical correlation ($R^2$) | 0.49 | | 0.44 | |
| Canonical $R$-squared ($R_c^2$) | 0.24 | | 0.20 | |
| Probability > $F$ | 0.0000 | | 0.0000 | |

using Tukey's studentized Honestly Significant Difference (HSD) range test to assess significance between pairs of categories. The resulting findings were as follows:

- Other-vehicle convictions
  - The age group 16 to 19 was associated with a significantly higher average number of other-vehicle convictions per rider than any other age groups, except for that of ages 20 to 24, which had less but not significantly so;
  - Other-vehicle convictions per rider increased with the level of self-reported motorcycle riding experience;
  - Males had more other-vehicle convictions per rider than females;
  - Other-vehicle convictions per rider decreased as the number of days per week riding the motorcycle increased;
  - Those who did not wear bright-colored clothing while riding had more other-vehicle convictions per rider than those who did;
  - Unlicensed motorcycle riders had more other-vehicle convictions per rider than properly licensed riders; and
  - Average other-vehicle convictions per rider increased with the engine size of the motorcycle operated.
- Motorcycle convictions
  - The age group 16 to 19 had significantly more motorcycle convictions than all other age groups and the group 20 to 24 had significantly more convictions than all age groups above it.
  - Male riders had more motorcycle convictions than females.
  - The number of motorcycle convictions per rider increased with the number of days per week the motorcycle was ridden.

- The number of motorcycle convictions per rider increased with the percentage of time spent riding at night.
- Those who rode to work or school in all weather had significantly more convictions than those who rode to work or school only in good weather; and those who rode to work or school only in good weather had significantly more motorcycle convictions than those who did not ride to work or school at all.
- Average motorcycle convictions per rider increased with the engine size of the motorcycle operated.
- Unmarried riders averaged more convictions than married riders.
- Riders who reported wearing bright-colored clothing when riding had fewer average convictions than those who did not.
- Those with motorcycle training had fewer average motorcycle convictions than those who had not taken training.
- Other-vehicle accidents
  - There were no significant differences among 16 to 19, 20 to 24, and 25 to 29 age groups (although the younger groups had the higher average number of accidents), but those from 30 to 34 and older had significantly fewer other-vehicle accidents age than those from age 16 to 19; and those from 35 to 39 and older had significantly fewer other-vehicles accidents than those from age 20 to 24.
  - Those who had passed the motorcycle training course had lower average other-vehicle accidents per rider than those who had not taken the course.
  - Those who had convictions for either minor or major operational violations, minor or major moving viola-

tions, or major behavioral violations when operating other vehicles also averaged significantly more other-vehicle accidents than those who did not have such convictions on their records.
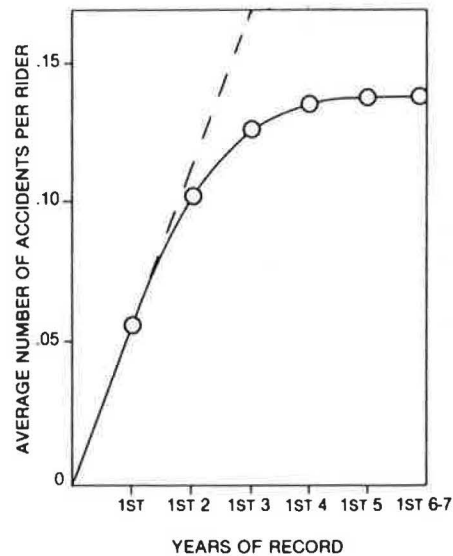
- Motorcycle accidents
  - The number of motorcycle accidents per rider increased with the number of days per week of reported riding.
  - The number of motorcycle accidents per rider increased with the percentage of time of reported riding at night.
  - Those who rode to work or school in all weather conditions had significantly more motorcycle accidents per rider than those who rode only in good weather, and the latter had significantly more than those who did not ride to work or school at all.
  - Those who had convictions for minor or major moving violations when riding a motorcycle also averaged significantly more motorcycle accidents than those who did not have such convictions on their records.

Motorcycle training is noticeably absent from these results as a factor influencing motorcycle accident involvement. Its presence as a variable accounting for fewer other-vehicle crashes, however, suggests that it is likely a function of other behavioral and attitudinal characteristics. Because this was an important area of concern, additional analysis was done using only those accidents and violation convictions occurring within each rider's first year of riding experience (i.e., immediately subsequent to training). Again, no evidence of training as a significant factor in predicting subsequent motorcycle accident involvement was found, but the importance of the early years of experience in terms of conviction and accident accumulation is evident in Figures 1 and 2, respectively.

Another variable not apparently affecting motorcycle accident rate was engine size. The results suggest that engine size may only be important in that it represents the choice of a certain group of riders who have a predisposition toward unsafe
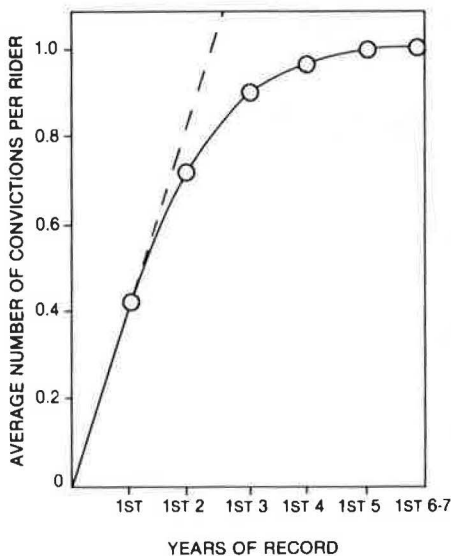
FIGURE 1  Accumulation of motorcycle convictions by years of official riding experience.

FIGURE 2  Accumulation of motorcycle accidents by years of official riding experience.

behavior. Rather than representing a handling problem, therefore, size may simply be a characteristic of motorcycles favored (because of image) by those more likely to have poor riding or driving attitudes and behaviors. This postulate is supported by the fact that persons operating large motorcycles were found to have more convictions while driving other vehicles than were users of smaller motorcycles.

## MOTORCYCLISTS IN THE ACCIDENT DATA BASE

Using a joint data base combining police accident reports, driver record files, and insurance data, a data set was created containing 620 accident-involved motorcycle riders. The independent variables available for analysis after normality tests were as follows:

- Rider age,
- Motorcycle engine size,
- Riding experience,
- Previous alcohol conviction (yes/no),
- Motorcycle ownership (yes/no),
- Helmet worn at time of accident (yes/no),
- Probable causer of accident (yes/no),
- Time of day of accident (day/night),
- Road conditions at time of accident (good/bad),
- Location of accident (city/highway), and
- Passenger carried at time of accident (yes/no).

The dependent variables used were past numbers of accidents and convictions per year of riding experience. A multiple discriminant analysis was performed between high and low accident and conviction rate riders.

The most efficient independent variable by far in explaining past accident variance was past conviction rate. Riding experience at the time of the accident of record was also found to be significant in discriminating high-rate from low-rate groups. The high-accident rate group had the lower average experience and, as before, the highest proportion of drinking-driving

offenders, probable accident causers, and those carrying passengers. Age was not a significant factor in itself, although younger riders were more likely to be carrying a passenger (Figure 3).

For the high-conviction rate group the proportions of those with previous drinking-driving offenses, those considered at fault, and those carrying a passenger in their latest accident were greater than for the low-conviction rate group. Age was marginally significant, with the high-rate group having a lower average age. The major results for both convictions and accidents are summarized in Figure 4.

One of the important findings from the analysis of population and accident data when compared with the previously reported survey results was that the more attitudinal and behavioral variables were available, the less important became large-scale class and demographic variables such as rider gender, motorcycle engine size, and rider age. Young male riders of large motorcycles are not excessively at risk because of these factors but rather as a result of image-related attitudes and behaviors to which these factors are related. Broad, epidemiological categorization can hinder understanding.

## RECOMMENDATIONS

The following recommendations result from the major research findings:
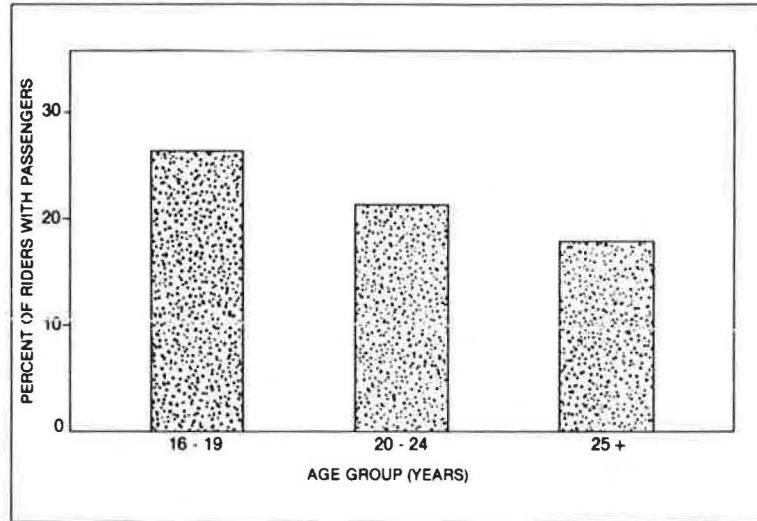


FIGURE 3  Propensity for motorcycle operators to carry passengers as a function of operator age.
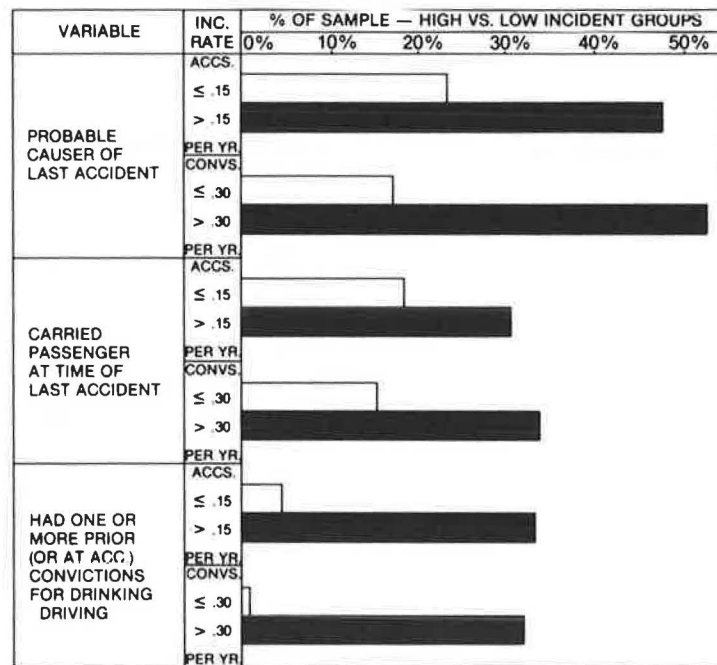


FIGURE 4  Critical safety related variables for accident involved riders.

• Motorcycle rider training courses should be more attentive to education than training. It is necessary to understand the social and existential conditions of riding and the influence of experience, images, and expectations on motorcycling and learn about structural determinants of choice and decisions, to enhance a greater likelihood for safer riding practices. There should be an emphasis on identifying potentially hazardous situations and avoiding them rather than on simply controlling the motorcycle.

Motorists should be made aware of the motorcyclists on the road, and their rights and privileges, and of poor motorcycle visibility to other road users. Greater awareness of these factors may contribute to motorists' being more observant on the road and more aware of motorcyclist roles.

• Education and motorcyclist awareness programs should stress the concept of individual identity with motorcycle helmet and other safety equipment wearing, using the sport bikers as an example of how helmets, besides being safe, look good.

• Motorcycle rider training programs should pay greater attention to reasons for riding and selection of motorcycles.

• Aspects of riding such as the carrying of passengers and the accumulation of traffic violation convictions could be considered as part of a provisional (restricted) licensing system for novice riders.

• Because rider exposure factors (e.g., riding in all-weather conditions, riding at night, etc.) are key variables in explaining accident variance, additional emphasis might be placed on these situations in training programs; otherwise restrictions could be applied to novice riders.

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