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The Young Driver: reckless or unprepared?

David Klein
Leon G. Goldstein
Donald H. Schuster

The Young Driver:

reckless or unprepared?

David Klein — *Michigan State University*

Discussant: Paul B. Fiddleman

Leon G. Goldstein — *Bureau of Surface Transportation Safety of the National Transportation Safety Board*

Discussant: D. J. Moffie

Donald H. Schuster — *Iowa State University*

Discussant: William Laurens Walker

NORTH CAROLINA SYMPOSIUM ON HIGHWAY SAFETY

Chapel Hill, N. C.

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The University of North Carolina Highway Safety Research Center
Chapel Hill, North Carolina 27514 • B. J. Campbell, Director

A few words about the symposium topic . . .

Although at his peak in vision and reflexes, the young driver is grossly overrepresented in highway accidents and fatalities. Can we have young drivers who are also safe drivers?

Part of being young is taking risks. In fact, the death rate on the highway reaches its peak for young males between the ages of 15 and 24. Is this a necessary consequence of allowing the young to drive, or is it possible to prepare our youth so that they can enjoy the privilege of driving without suffering serious injury and death? Should preparation emphasize driver training per se, or should we try to influence attitudes? Or can risk-taking behavior be channeled in less hazardous directions?

The problem of the youthful driver is indeed a challenge to highway safety research.

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About the Center . . .

At the request of the Governor of North Carolina, the 1965 North Carolina State Legislature provided for the establishment of the University of North Carolina Highway Safety Research Center. Dr. B. J. Campbell, then Head of the Accident Research Branch of Cornell Aeronautical Laboratory, was invited to return to his alma mater to direct the new Center. He accepted, and in 1966 the Center officially began operation. Since then the staff has grown to more than fifty, representing skills in experimental psychology, clinical psychology, mathematics, transportation engineering, computer systems, journalism, library science, biostatistics, graphic arts, epidemiology, experimental statistics, general engineering, human factors engineering, and health administration. The University of North Carolina Highway Safety Research Center is the first institution in the South devoted exclusively to research in highway safety.

About the Symposium . . .

The North Carolina Symposium on Highway Safety is a semiannual event sponsored by the North Carolina State University School of Engineering, the University of North Carolina School of Public Health, and the University of North Carolina Highway Safety Research Center. First held in the fall of 1969, the symposium has three major purposes. First, it is designed to attract students to acquaint them with the problems and possibilities for research in the field of highway safety.

Second, it is a means of bringing together professional workers in the greater North Carolina area whose interests are related to this field.

And, third, the published papers from the symposium will provide on a regular basis major positions and summaries of research in the field of highway safety. It is hoped that these volumes will provide ready resource material for persons interested in this field.

INTRODUCTION

" . . . As he drove along his despair lifted. So long as he owned his own car he could always be in control of his fate—he was fated to nothing. He was a true American. His car was like a shell he could maneuver around, at impressive speeds; he was second generation to no one. He was his own ancestors."[1]

The combination of youth and the automobile is dangerous. Although at his peak in vision and reflexes, the young driver is grossly overrepresented in highway accidents and fatalities. For young people between the ages of 15 and 24, motor vehicle accidents are the leading cause of death.

In addition to the personal loss represented by such statistics, the economic loss also must be appreciated. This age group represents a major investment on the part of society from which there is little or no return until adulthood. These young people have been reared and educated but have had at best only a brief opportunity to use their talents and education to benefit society. Consequently, motor vehicle accidents, because they so frequently involve the young, represent one of the most costly health problems confronting society today.

We know that part of being young is taking risks, but are high death rates a necessary consequence of allowing the young to drive? Is it possible to prepare our youth so that they can enjoy the privilege of driving without suffering serious injury or death? Should preparation emphasize driver training per se, or should we try to influence attitudes? Or can risk-taking behavior be channled in less hazardous. directions? If the automobile has the symbolic meaning for young people as expressed in the opening quotation, is it possible to provide successful counter-measures?

Our three speakers address themselves to these questions, approaching them from somewhat different directions. Dr. Shuster describes in detail his efforts to identify psychometric and biographical characteristics of young problem drivers as compared with other driver groups. Dr. Goldstein provides an extensive review of the re-

[1]From Joyce Carol Oates, *Them* (New York: Vanguard Press, Inc.; copyright 1969), with permission.

search literature on young drivers, while Professor Klein develops some theoretical notions to account for their driving records.

Professor Klein examines some of the methodological limitations of the research that has been done on the young driver. He points out the pitfalls of assuming that driver records are accurate descriptions of a person's driving history; the problems associated with a lack of good exposure data; and the difficulties in obtaining representative samples of the population to which we wish to generalize. Rehabilitative measures have largely attempted to make the adolescent driver more like the adult driver. Professor Klein feels such an approach is futile. By definition, adolescents constitute a deviant group; hence they would have to deviate from their own group in order to conform to the adult model.

After defining deviance and pointing out that what is considered deviant for an adolescent may be acceptable for an adult, he describes various types of deviance and how they relate to the problems of the young driver. One kind of deviance, namely deviant performance, may be characteristic of young people's driving in particular because they are in the initial stages of learning the driving task.

Yet the adolescent in our society manifests other symptoms of deviance from adult norms. Professor Klein feels that the two major reasons for this deviance are, first, the isolation of the adolescent from the greater society, which results in the development of a set of norms that is different from those of the dominant group; and, second, the fact that young people suffer, in addition to isolation, deprivation of rights and privileges that adults enjoy. This deprivation becomes more of a problem as adolescence is prolonged. Consequently, the driver license is frequently viewed as a rite of passage into the adult world. Through the automobile the young person can experience vicarious power and autonomy that are not afforded in other areas of his life. In fact, Professor Klein believes the more autonomy and satisfaction a young person can achieve in other ways, the less he will use the automobile to meet his status needs. Thus, the young person who is fulfilled in his work or academic pursuits is not likely to accumulate violations and accidents.

To change the adolescent subculture itself is a pipe dream; to influence youth of future generations calls for an evaluation of our

entire culture, a process that would take years. Our most fruitful efforts, Professor Klein feels, might be to make vehicle and highway changes to increase the chances of survival in the event of a crash. Since, in his opinion, our entire society is taking on many of the behavior patterns of the adolescent, such efforts would benefit all drivers.

Dr. Fiddleman expands Professor's Klein's definition of "deviance," describing it as a label that is often conveniently used by the greater society to discredit troublesome members. The adolescent, in particular, falls victim to this labeling process. To illustrate his point, he focuses on the problem of drugs in our society and the young people who have embraced them. The rewards to be reaped by participating in the drug scene satisfy adolescent needs that have not been fulfilled in other ways. Furthermore, he points out, the adolescent who abuses drugs, including alcohol, usually has at least one parent who abuses them. Likewise, Dr. Fiddleman proposes that the young person who exhibits deviant driving is emulating a parental driving model. Thus, at least some of the behavior of the young driver may simply reflect behavior patterns of the older driver providing the model.

Dr. Goldstein extensively reviews recent research on the young driver. He examines data pertaining to the relative contribution of inexperience, as opposed to age per se, and concludes that while both play a part, experience is perhaps the greater determiner of accident involvement. Clearly, this is a controversy that is not yet settled. He reports the relation between violations and other driver variables and describes the kinds of violations that characterize youthful offenders. A number of studies show that alcohol is a factor in a surprisingly large proportion of accidents involving young drivers. The extent to which other drugs are implicated is much more difficult to determine. Dr. Goldstein notes that the marked increase in the use of motorcycles by young males reflects an increase in the use of an inherently dangerous vehicle by a group of drivers already known for their poor record. Young people are also overrepresented in single car, run-off-the-road accidents, a kind of crash that is usually considered the fault of the driver.

A number of studies show a consistent relationship between scholastic achievement and use of a car, with those students who use a

car most having the poorest grades. Studies of personality characteristics generally show that young drivers with poor records exhibit personality characteristics that reflect greater hostile, aggressive, and impulsive tendencies, with a corresponding lack of social responsibility. Dr. Goldstein reanalyzes data from studies by Pelz and Schuman, who have focused on the problems of the young male driver. These studies also conclude that for young males crashes and violations are associated with such personality characteristics as impulsive expression, rebellion, and hostility. Measures of smoking and drinking behavior were also found to be related to driver record. Recent data from California confirm the general finding that young people who experience difficulty in their driving are characterized by more disruption in other areas of their lives.

Dr. Goldstein concludes that adolescence remains a period of turbulance, and we are not likely to make rapid progress in changing the social conditions contributing to the problems of the young person. Like Professor Klein, he feels that progress made in the crashworthiness of vehicles and in the design of highways should provide special payoff for the young driver, since he is so overrepresented in injury-producing and fatal crashes. Dr. Goldstein also points out that we have three major programs through which we can increase our efforts to improve the performance of the young driver, namely, driver preparation, driver licensing, and driver improvement. As driver licensing moves toward a diagnostic-remedial stance, we are learning to identify those persons who need help and to develop programs to provide each individual with the specific help he needs. Both driver preparation and driver improvement programs could be more closely related to the kinds of information we are accumulating concerning the kinds of driver errors that lead to crashes.

As everyone in this field knows, most variables associated with crashes account for very little of the total problem. However, Dr. Goldstein notes that while any one factor may show a very low relationship to the total accident picture, still the overrepresentation of that variable among accident-producing drivers may be several times its occurrence in the non-accident population. Realistically, any programs we develop are going to have to be tailor-made for small segments of the accident problem.

Dr. Schuster describes research that compares young problem drivers with older problem drivers and with average drivers. Looking at data from California and Iowa, he finds problem drivers, both young and older, have characteristics different from the average driver. The problem drivers drive more, which could account for some of the driver record differences. However, they also show differences on measures of personality. Furthermore, young problem drivers are significantly different from older problem drivers on a number of measures, although many of them could perhaps be accounted for by age differences per se. When young problem drivers were compared with young average drivers, differences were found for measures of sociability and accident and violation attitudes. Again the problem drivers were found to do more driving. They were also found to be characterized by more immature attitudes.

In reviewing the literature in this area, Dr. Schuster reports a consensus that personality differences are associated with driver record differences. Problem drivers show characteristics that are typically considered descriptive of adolescence, even though they may appear in chronologically older drivers.

Dr. Schuster also reviews studies concerning the role of psychosocial factors, alcohol, visual perceptual skills, and distraction and stress in problem driving. He reports studies concerned with a range of driver improvement techniques that have met with varying degrees of success. Based on the evidence reported, Dr. Schuster makes specific recommendations for dealing with the young problem driver.

In response to Dr. Schuster's paper, Professor Walker points out that highway safety is a major legal problem. When it comes to the enactment of legislation, decisions rest primarily with attorneys. When the legislation is enforced through the court system, again it is usually attorneys who preside. Professor Walker makes a strong argument that the kind of information reported in this symposium needs to reach the legal profession so that it may influence the kinds of decisions that are made. He also feels that the time is ripe for such information to find a receptive audience; that is, the decision makers are interested in what the social sciences have to offer them as they deal with this area of law.

The data reported by our speakers reflect a growing body of knowledge that could be used as the basis for devising pilot programs for

training and monitoring our beginning drivers. While it is a truism that much research remains to be done, it is nevertheless also true that we have accumulated enough consistent evidence to begin to make informed decisions about the directions we should take. As Professor Walker pointed out, we have a major problem remaining, namely, how do we communicate our findings to the decision makers in such a way that they can be tested without becoming ironbound policies before they can be properly evaluated?

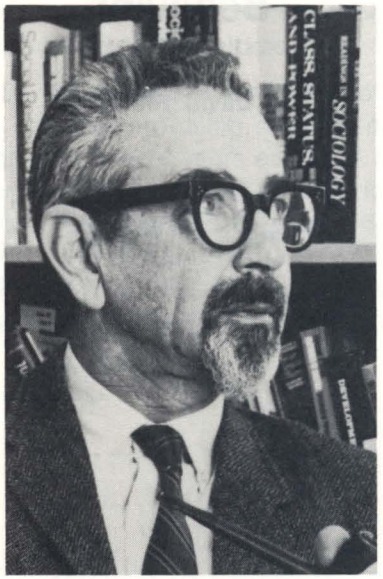
In responding to Dr. Goldstein's paper, Dr. Moffie expresses concern that the studies reported are using methodology which is essentially the same as that used twenty years earlier. A number of exciting techniques have been developed during this period, and Dr. Moffie describes some of these. He advocates their consideration in research planning and suggests possible areas of application in the field of accident research. He closes by describing some of the pitfalls that workers in this field should avoid in executing their research.

Section I

Adolescent Driving as Deviant Behavior

David Klein

Discussant
Paul B. Fiddleman



DAVID KLEIN

Professor David Klein holds a joint appointment in the College of Human Medicine and the Department of Social Science at Michigan State University. One of his special interests is risk-taking behavior—why people take risks in the first place and what kinds of people are more likely to do so. He is also concerned with the influence of societal values on rates of death and injury. Long interested in highway safety, he has recently written a book with Dr. Julian Waller entitled, *Causes, Culpability, and Deterrence in Highway Crashes,* published by the Department of Transportation.

ADOLESCENT DRIVING AS DEVIANT BEHAVIOR

By David Klein

Many investigators believe that current research on the young driver poses relevant and appropriate questions but, because of methodological problems and inadequacies of data, answers them incorrectly or incompletely. I believe, instead, that many current studies—and many action programs as well—are based on irrelevant assumptions, address themselves to inappropriate questions, and hence arrive at conclusions that have little scientific validity or practical value, even though they have been reached through impeccable methodology.

Some Limitations of Current Research and Action Programs

Before I formulate my basic criticism of much of this research and practice, let me review some of its principal shortcomings.

To begin with, most research and action programs use as their measures of adolescent driving behavior the number of citations and reported crashes. These numbers are then compared with similar numbers for the adult population and the conclusion is reached that adolescents are substantially "worse." Although sophisticated investigators are aware that adolescents often receive citations or have their crashes reported because of their personal appearance or their social status rather than because of their driving behavior, relatively few of these investigators examine the specific circumstances—especially the social factors—that contribute to the crash and citation figures.

Second, when attempts are made to measure exposure—that is, the number of miles an individual drives and the conditions under which this mileage is generated—the purpose of such measurement is, once again, to facilitate a comparison of the young driver with the adult. In short, exposure is conceived of as a tool that can make the findings more precise. It is not seen as an inherent part of the problem. Although teen-age exposure is quite different in motivation and in quality from adult exposure—and although it may be far more readily reducible—I know of neither research nor action programs based on the self-evident assumption that crashes and violations can be reduced through a reduction in exposure.

Third, much research, because it is based on what the investigator hopes is a representative sample, presents its conclusions with the implication that they are applicable to "all teen-agers." In other areas of behavioral research, no professionally adequate investigator today would imply that his findings are applicable to "all Negroes" or "all college freshmen." Yet much research on adolescent driving behavior still tends to generalize its findings indiscriminately. True, a few rough sortings have been made—between males and females, between good students and poor students, between those who have and those who have not taken courses in driver education—but these sortings stem essentially from crude statistical associations and involve no causal relationships.

Lastly, both driver education curriculums and the various rehabilitative measures aimed at the young driver are limited largely to improving those skills and attitudes that seem to relate directly to the automobile and the highway in the hope of modifying his behavior in the direction of the adult model. This line of thinking embodies the very dubious assumption that there is only one adult model and that it is a "good" one. But its more important limitation is that it makes no effort to identify or change the wide range of social and psychological variables that may be peculiar to the young driver and that may influence his exposure as well as his driving behavior.

Clearly, each of these limitations warrants further examination, but the ultimate aim of most of the programs and research that embody them is to discover or devise methods that will make the adolescent drive as the adult does. Essentially the question implicit in such research is "Why don't adolescents drive like adults?" —and this to my mind is distressingly similar to (and no more useful than) the question "Why aren't women more like men?" or, more precisely, "What can be done to make women behave more like men?"

My own view is that adolescents are *not* adults and that efforts to make their driving resemble that of adults overlook a number of complexities. This view is by no means original. Sociologists and anthropologists in almost every industrial society have long recognized that adolescents as a group constitute a deviant population. From this it follows not only that they can be expected to drive in a deviant fashion but that their deviant driving may, in fact, conform closely to the

norms and values of their own (deviant) group. More to the point, any efforts to modify their driving in the direction of the adult model necessarily involve persuading them to deviate from their own group norms. In sum, deviant driving is normal driving if the driver belongs to a deviant group. And learning to drive "normally"—that is, as we would like him to—may require that he violate or abandon the driving norms of the deviant group.

Now that I have—simplistically for the moment and certainly without documentation—labeled an entire age group as deviant, let me first define deviance in order to demonstrate why it may be a more useful concept than crashes and violations for the study of adolescent driving. Then I shall go on to demonstrate why adolescents constitute a deviant group and why some adolescents are more deviant than others.

Deviance Defined

In general, deviance may be defined as any behavior that departs substantially from what is regarded as normal or acceptable and that seems to threaten the welfare of society. Note that I have said "from what is *regarded* as acceptable" rather than from "what most people do," because deviance is defined, not by popular vote or by a survey of actual behavior, but by those members of our society who make its laws and define its values. Hence, certain behavior is regarded as deviant even though substantial segments of the population engage in it—a point that becomes extremely important when we deal with adolescents. Note, too, that I have said "seems to threaten" rather than "actually threatens," because some kinds of behavior regarded as threatening (and hence deviant) only a few years ago—such as the dissemination of contraceptive information or the display of nudity in motion pictures—are now regarded as nonthreatening and nondeviant by substantial segments of the population and in many areas of the country.

The definition of deviant behavior varies not only with time and place, but also with the age and status of the person engaging in the behavior. It is obvious, for example, that the 22-year-old girl who engages in premarital intercourse is subject to less disapproval and fewer punitive measures that the 13-year-old who does the same thing. Similarly, the ghetto black who steals a color television set

worth $500 suffers far more severe penalties than the executive who, by conspiring to fix prices, robs the public of many times that amount. Since adolescents are, by definition, young and since they have, as I shall point out, minority status, this differential definition of deviance becomes important.

The relationship between deviance and crime is also a complex one. Some deviant behavior—such as auto theft—is criminal, in that it violates a statutory law. But certain kinds of criminal behavior—such as the violation of a traffic law—is not actually regarded as deviant. For example, the annual *Uniform Crime Reports* (1970), which purports to tabulate all reported crimes in the United States, makes no mention of traffic offenses other than auto theft—even though such offenses place a larger burden on enforcement agencies and the courts than any other. Similarly, the exhaustive report of the Presidential Commission on Crime and Administration of Justice (1967) ignores traffic offenses completely—even though highway crashes kill five times as many persons as homicides and even though property losses resulting from crashes exceed losses from most other categories of crime. And in most social circles the traffic violator is regarded as normal—because "everybody gets a ticket once in a while." Even the man cited for reckless driving, who may have endangered the lives of many people, is regarded with far less disapproval than, for example, the man who is issued a summons for urinating in a public place. As H. L. Ross has pointed out (1960), traffic crime is not taken seriously because it is "folk crime"—but, as I shall point out, adolescents are not regarded as "folk."

More important, with respect to adolescent behavior, is the fact that a great deal of deviant behavior is not criminal but nevertheless leads to the imposition of criminal penalties. A male, for example, who chooses to wear long hair and love beads and who drives a microbus painted in psychedelic style is violating no law. But it appears that such individuals receive more traffic citations than those whose dress and vehicles are more conventional. A similar disproportion of citations is received by individuals whose vehicles carry bumper stickers that challenge the status quo. Conversely, some drivers display bumper stickers with the message "Support Your Local Police," not as a statement of ideological position, but as a safeguard against citations for minor offenses.

In dealing with adolescent driving, then, we need to distinguish among three distinct types of behavior: (1) a broad range of deviant behavior that is not in fact criminal, (2) a variety of behaviors defined as criminal, and (3) behaviors that actually threaten the safety or welfare of our society. These relationships will become clearer once we examine the various types of deviant behavior.

Types of Deviance

The type of deviance that is most consistently criminal has been labeled *predation*—that is, behavior which destroys life or property or appropriates property that belongs to others. With respect to adolescent driving behavior, the two most common types of predation are auto theft and vandalism.

The motivations for both the theft and the vandalism will become clearer when we discuss the adolescent as a member of a basically deviant group. For the moment, let us examine the consequences. The consequences of auto theft are often aggravated by the police response. When the police, on identifying a stolen vehicle, initiate a high-speed, aggressive pursuit, the likelihood that the chase will end in a crash, often with fatalities or injuries, is multiplied manifold. One way of reducing the crash rate in such circumstances might be for the police to modify their response to such juvenile thefts on the grounds that a delay in recovering the vehicle (which in most cases is abandoned unharmed) is preferable to the very real likelihood of injury and damage resulting from a dramatic pursuit. Such a modification, rational though it may appear, seems unlikely as long as the police (largely in response to the mandates of our society) place so high a value on property and so low a value on human life that they are willing to shoot looters and endanger the lives of others in an attempt to protect property. But the point is that a reduction in the crash rate in this category may be achieved more easily by changing the behavior of the police rather than that of the adolescent.

A second form of deviance, some of it criminal, some of it legal, has been termed *deviant consumption*—that is, the consumption of services and goods that are not approved by society, such as the services of a prostitute or a gambling establishment or the consumption of drugs or alcohol or of nonstandard versions of such standardized items as clothing, vehicles, or housing.

Whether certain types of consumption are labeled deviant depends on the age and status of the consumer. Thus, alcohol consumption at a moderate level is regarded as acceptable for adults but deviant for 16-year-olds. The ghetto black who gambles on the numbers game is regarded as deviant, but the middle-class citizen who speculates in common stocks is not.

Both the age and status of the adolescent make him especially prone to types of deviant consumption that relate to his driving. Because his engaging in sexual activity, drinking, and drug use is per se deviant, he must engage in such activities in privacy and there are few places that lend themselves to privacy as conveniently as an automobile. Such use of an automobile inevitably means greater exposure, and hence a higher crash and citation frequency even if he drives as well as an adult.

Another area of deviant consumption relates to the vehicle itself. Despite the economic and technological changes that have made our society increasingly consumption-oriented and decreasingly production-oriented, the more conservative elements in our society—and these include many judges and many traffic policemen—tend to look with disapproval on such examples of conspicuous consumption as the high-performance car and the so-called sports car, which are driven preponderantly by young drivers. And there is some evidence that the police tend to issue citations to drivers of such vehicles more frequently than to others for essentially the same behavior.

The so-called "hard" data from insurance companies—which indicate that high-performance cars generate greater losses—are not very informative. They do not tell us whether (a) sports car drivers generate greater or qualitatively different exposure or (b) sports cars attract drivers who are more likely to crash or (c) sports cars crash with no greater frequency than conventional models but are more expensive to repair or (d) sports cars have inherently poor handling qualities or (e) all of the above. But the insurance industry, by charging the driver of a high-performance car higher premiums, is, in effect, labeling him a deviant before he has been guilty of anything. And most drivers of such cars are young men.

Deviant consumption could not take place, of course, in the absence of another form of deviance—*deviant selling.* Although good

research on the subject is lacking, there are grounds for the belief that the advertising of automobiles and related accessories on the basis of their acceleration and power is contraproductive to highway safety, as is, in fact, the selling of automobiles as status symbols if such sale increases exposure.

Adolescents are especially vulnerable to this kind of deviant selling for three reasons. First, as I shall make plain shortly, the autonomy and power promised by this kind of advertising are particularly appealing to them. Second, they have an especially great need for the automobile as a status symbol because they are barred from other channels through which they might achieve status. Third, many of them—especially in an affluent society—can spend on vehicles and accessories a higher proportion of their disposable income than adults can.

In addition to advertising aimed at the general public (but especially appealing to adolescents), the manufacturers of automobiles and accessories devote substantial resources to specific cultivation of the "youth" market through sponsoring racing, performance clinics, etc. It would be presumptive to argue, in the absence of data, that an interest in competition or high performance contributes to an adolescent's crash or citation frequency. But to argue that it does not is equally presumptive. Obviously some research on this question is essential.

Yet another form of deviance involving adolescents is *deviant appearance*. Unconventional grooming or clothing often appears threatening—and the halo effect causes many people to assume that the unconventional-appearing individual is equally threatening in other ways. Since unconventionality of appearance is largely restricted to adolescence, it is not surprising that both the bearded upper-middle-class college student and the leather-jacketed lower-class adolescent frequently complain (New York Times, 1971) of unjustified "bugging" by the police—a harassment that often culminates in the issuance of a citation.

Deviant belief is yet another form of deviance that often calls forth a punitive response from society. And to the extent that young people today are better educated than their elders (a fact supported by a wide variety of evidence) and more widely informed by the mass

media, many of their ideas and values inevitably seem deviant to their elders—especially to those who are directly responsible for the enforcement of traffic regulation and who tend often to be less educated and more conservative. The extent to which this antipathy to the ideological positions of the young results in punitive actions in a traffic situation has been demonstrated in dramatic fashion (Heussenstamm, 1971). In this study, a group of 15 adolescents with previously exemplary driving records received a total of 33 citations in 17 days after the investigator affixed Black Panther bumper stickers to their personal automobiles.

The final category of deviance—*deviant performance*—is both complex and difficult to specify with respect to driving. Since all crashes have multiple and interrelated causes, our ability to identify specific behaviors that precipitate a crash is negligible. Theoretically, it is the kind of behavior that is discouraged by traffic laws, but the correlation coefficients between crashes and citations in individual driving records are too low to make us confident that the various types of driving designated as illegal are in fact dangerous. And the wide variations among states in the criteria for the operator's license and in the curriculums for driver education courses reinforce the likelihood that our notions of "good" and "bad" driving behavior are based on speculation rather than on data.

Substandard (or deviant) performance is, of course, characteristic of the early stages of any learning process, and in our society adolescence happens to coincide with the time at which most persons learn to drive. Thus a certain number of so-called teen-age crashes are learning errors that have nothing to do with the age of the driver. Measures involving the restriction of beginning drivers to a protective environment or the conspicuous labeling of such drivers (as with the British "L" for the driver's first year) for the protection of others as well as themselves have rarely been considered and have never, to my knowledge, been tested systematically.

Unfortunately, adolescence is also the time when most persons are learning to cope with alcohol—and a small error on the learning curve for driving can, if it coincides with a small error on the learning curve for drinking, produce rather serious consequences. The logical solution to this problem would be to permit adolescents to

learn to drive and to learn to drink at different times in their lives, but the social feasibility of such a solution is low.

Other kinds of deviant performance by adolescents are not directly related to the precipitation of crashes but are nevertheless punished by the issuing of citations. Street dragging, for example, obviously contributes to noise, to atmospheric pollution, and occasionally to highway congestion—a charge that, incidentally, can be made with equal justice against the conventional cargo truck. But whether street dragging contributes disproportionately to the crash rate is not known. Nevertheless, when police respond to community pressures "to do something about it," the response takes the form of citations issued for speeding or for vehicle defects that go unnoticed in other circumstances.

The Adolescent as Deviant

Some of the types of deviance we have examined are clearly age-bound; hence their concentration in the adolescent age group is self-evident. But other types are not necessarily age-bound, and we might well ask why, for example, unconventional clothing, an excessive interest in high-performance cars, a particular concern for speed and power, and interest in defying authority are so heavily concentrated in the youth group that when they manifest themselves in older people we tend to label such people as adolescent.

There are two basic reasons why adolescents show a high deviance rate. First, any social group that is isolated from the dominant group does not have the opportunity to learn the norms of the dominant group, to practice them, or to be rewarded for conformity to them. Hence the isolated group, whether it be an ethnic enclave, a sorority, a ghetto-enclosed racial group, or the elite student body of a small private college, develops or retains its own language, its own clothing styles, its own music, and its own standards of behavior. And to the extent that adolescents are increasingly being isolated from interaction with adult society, their own "youth subculture" has become increasingly complex, conspicuous, and differentiated from the adult culture. Fifty years ago the "youth culture" hardly existed because the youth were highly involved in the adult culture.

This isolation has several causes. The shift from the extended family, replete with uncles, aunts, grandparents, cousins, to the

nuclear, two-generation family, consisting of two parents and one or two siblings, has deprived the adolescent of meaningful day-to-day contacts with older people of various ages and has left him virtually no one but his age peers, since the adults he does meet—teachers, dentists, storekeepers, auto mechanics—have a highly segmented, largely impersonal, and usually superordinate relationship with him. Even in the nuclear family, he tends to spend less time with his parents than he used to. This is especially true of the male because there is very little that he can learn at home about his future occupational role.

A similar shift of the productive sector of the economy from the family-owned store, farm, or shop to the corporate enterprise, coupled with the increasing complexity of our technology, prevents him from developing in a work situation the kinds of relationships that facilitate his incorporation of the dominant social norms. As Urie Bronfenbrenner (1970) has pointed out, today's adolescent has grown up with two basic sources for his values and norms—his peers and a series of television programs featuring heroes whose competitiveness, toughness, aggressiveness, and violence are always rewarded in the end.

Social isolation per se tends to produce a set of norms that are different from those of the dominant group but not necessarily antagonistic to them. What makes the youth culture a "contraculture"—that is, what makes so many of the youth norms clearly deviant from adult norms—is the fact that our young people suffer not merely isolation but also deprivation of certain rights and privileges that adults enjoy. And this deprivation becomes more severe as adolescence becomes increasingly prolonged—partly because puberty is occurring earlier and partly because, during the past two decades, the increasing complexity of our technology has extended the length of schooling (and hence dependency) by several years.

This means that the typical 17-year-old has been biologically mature for several years, is close to his peak physically, and yet is in many ways a second-class citizen. He is not permitted to work, to vote, to drink, to engage in sexual activity, or to make the kind of productive contribution to society that will earn him psychic gratification or social rewards. He is taught in the schools to work hard

and to achieve; yet channels toward achievement, except in a narrow range of academic or athletic efforts, are rather restricted for him. (He cannot, as his grandfather could, at his age, earn status by rearing a prize calf, or growing an acre of prize corn, or by working at a job that contributes to his own development and to his family's standard of living.) He is urged to be individual and innovative; yet most opportunities for productive individualism and initiative are largely closed to him. (Today, building a better mousetrap requires a degree in mechanical engineering.) He learns from books, from television, and from a variety of other sources that the "real man" is one who is tough, ingenious, and willing to take risks. Yet what aspects of his life can be coped with effectively through toughness, ingenuity, or risk-taking? He is taught that freedom is our most precious value—yet he feels that his own freedom is severely restricted—by parents, by schools, by laws—in ways that strike him as arbitrary. He is taught that all men are equal; yet he feels that he is not the equal of adults who, often enough, know less than he and are less willing to learn.

Given such a situation, it is easy to see why the automobile becomes so important to the adolescent. His driver's license is, very often, his first rite of passage into the adult world. He can develop an expertise about automobiles or a virtuosity in handling them that matches that of many adults and exceeds that of most. Customizing his car offers him a unique opportunity to innovate and to express his individualism. And on the highway, he is the equal of any adult—that is, until he is stopped by a traffic policeman!

A physically handicapped woman once wrote about her joy in owning a car: "I could never in my life pass anyone on the street. But in a car, I can!" Small wonder that the adolescent feels likewise, although his passing may occasionally precipitate a crash or, more often, trigger outrage in the adult he passes. Small wonder that he sees the automobile as offering him the only autonomy he can enjoy. And, since the media have taught him how precious a possession an automobile is, small wonder that he steals one if he can't obtain one legitimately or that he sees vandalism of an automobile as the most effective way of striking out against adult society. One might venture to say that if the automobile had not existed, the contemporary teen-ager would have had to invent it.

The Suburbs and Cultural Deprivation

A substantial amount of adolescent exposure—and inevitably a certain proportion of citations and crashes—stem from two other characteristics of contemporary life. First, our increasingly suburban pattern of residence makes the use of a car almost essential for an adequate social life with peers, for holding a part-time job, and often for getting to and from school if one wants to enjoy those extracurricular activities that don't coincide with the school bus schedule.

The increase in exposure caused by suburbanization is not, of course, restricted to adolescents. But a greater proportion of this increase in exposure of adolescents is not actually necessary for economic or educational reasons. It involves, instead, a second characteristic of our social life. A great deal of adolescent mileage is generated simply because the suburb or the small town does not offer the adolescent a meaningful alternative to "just driving around." Here is a description (Lyford, 1965) of adolescents on a Saturday night in small-town America:

> For the most part, the common substitute for something to do is for a gang to pile into a car and drive a traditional circuit in and about town, down Gallatin Street, around in the Kroger Parking lot, back up Gallatin, then out Route 51 to Route 40 to stop for a hamburger, then back on the raceway. Saturday night on Vandalia's main thoroughfare is a steady stream of flap-fendered vehicles, hot rods, and family sedans traveling in both directions and honking at familiar cars going in the opposite direction. The effect is weird in a town where, except for the taverns and a couple of coffee shops, everything closes up tight early in the evening. "Where are they going?" one wonders. A young driver might answer, "Nowhere, but we're under way."

It is important to bear in mind that, although we have been describing the reasons for deviant driving behavior, we are referring essentially to normal adolescents. These are not "bad kids." They are normal human beings who, when barred from certain activities that offer reward or gratification, seek out activities from which they are not barred. Their behavior is no more irrational than that of the stereotype of the Negro who buys a Cadillac. Many white people tend to use

their homes as visible indicators of their status. Since most Negroes are prevented from buying a home that adequately reflects their status, they may quite logically buy the status symbol that is available to them. Their behavior seems deviant only to those who don't understand the constrictions under which they live.

The More Deviant and the Less

Although we have thus far been examining deprivations and constraints that apply to adolescents as a group, it seems clear that they apply more strongly to some adolescents than to others or—to state it obversely—that some adolescents have easier access to (or are more willing to accept) the rewards and gratifications offered by adult society. Hence, if our hypothesis is correct, those adolescents with greater access to socially approved activities should show a lower crash and citation rate.

There is some evidence (though it is far from adequate) to support this. Carlson and Klein (1970), for example, have found that students whose academic performance (as measured by grades) is below the level of their abilities (as predicted by achievement tests) not only have a higher citation rate than those who perform at or above their predicted level but also demonstrate greater deviance in other situations—that is, they are arrested more frequently for nontraffic offenses. These findings do more than confirm the inverse relationship between grades and traffic citations; they imply that the student who is able to do well academically but who rejects academic work as a route to success and reward is the one most likely to be involved in a wide range of deviant behavior. Schuman, et al. (1968) similarly note a degree of alienation in the young drivers in their sample who had the highest crash frequencies.

To sum up, one might say that the adolescent is less likely to involve himself in exposure, citations, and crashes to the extent that he can find satisfaction in a meaningful, legitimate, socially useful task such as might be offered by school or work, but often, apparently, is not. On the other hand, to the extent that society's expectations of the adolescent are discrepent with his own expectations or his own capacities as he perceives them, the adolescent is likely to engage quite deliberately in deviant behavior that expresses his resentment or defiance.

Some Implications for Research and Action Programs

The solutions that suggest themselves are complex and very difficult to achieve. But all of them require that the adolescent be given a more meaningful role in society and that those restrictions that tend most to infantilize or to isolate him be removed or modified. (The extension of the vote to 18-year-olds is an example that should be watched with interest.)

Numerous reports of volunteer programs indicate that when adolescents are offered adult responsibilities, they respond in an adult fashion. In Kaestner's (1967) well-known study, in which a "soft-sell," personal letter replaced a stern, impersonal letter warning drivers about their accumulated violation points, the softer letter turned out to be more effective in reducing the crash frequency of the drivers thus warned. This effectiveness was especially pronounced with younger male drivers. And when, as happened in New York several years ago, a group of hot-rodders approached the police with the proposal of volunteering its services as a highway patrol to make minor repairs free of charge for motorists disabled on expressways, such a proposal should be looked upon receptively instead of being summarily rejected, as it was by the New York police.

Clearly, the educational system needs to learn how to motivate the very large proportion of students that it currently succeeds only in alienating. Industry needs to be modified so that the youth entering the work situation sees it as something more than a boring routine that he must endure in order to earn enough money to buy a car or other physical or psychological necessities.

Adolescent behavior that is "normal" biologically must not continue to be labeled as deviant legally. A colleague of mine asked recently, "What would happen to the teen-age crash rate if every teen-ager had his own apartment where he could experiment with sex and alcohol or just talk with his friends in complete privacy?" I would add to this: What would happen to the crash rate if every adolescent were given the skills and the opportunities to involve himself in something that he would find substantially more meaningful and more rewarding than driving around in an automobile, which he has modified with labor and ingenuity that might have been devoted to more productive purposes.

Obviously, such changes involve all aspects of society—the school system, industry, the laws, family structure, and residential patterns. Not only will they be difficult to effect but observers note that the trends in many of these institutions are in a direction opposite to what the changes would require.

What makes such change even more difficult is the fact that adult society tends to be hostile toward adolescents, as it is toward any other socially isolated minority group. And, like the members of any other minority group, adolescents who behave deviantly are more likely to be arrested, more likely to be severely punished, and more likely to have their deviance publicized.

One can find reasons for this hostility both in psychoanalytic theory and in ethology. But there are simpler explanations. First, as we have been transformed from an agricultural to an industrial society, children have become economic liabilities instead of economic assets. Our own we may occasionally regard as emotional assets, but other people's children are simply an expense to us as taxpayers and an environmental nuisance as neighbors. Second, when most of us adults grew up, money was more scarce, education was harder to acquire, and full-time work occurred earlier in the life span. Hence, the presense of well-fed, well-accoutred young people who seem neither to toil nor to spin offends all of us to some extent. And when, in addition, these "spoiled kids" generate ideas and philosophies that threaten much of our own raison d' etre, all of us tend to share the feelings of the traffic policeman who stops a bearded youth in a sports car that costs eight months of the policeman's salary and that carries a bumper sticker advocating fornication as a substitute for war.

Although we may, to some extent, share the traffic policeman's feelings in such a situation, we must not allow ourselves as investigators, consultants, practitioners, or citizens to share his view that adolescent traffic violations are direct evidence of criminal intent, that punishing the offender will make him a better driver, or that we can teach him to drive "better" without changing other aspects of his life.

This line of reasoning should not leave us with the depressing conclusion that we can do little about the young driver's crash rate and

its consequences until vast and improbable changes occur in the total social system. If we shift our focus from changing the driver's behavior and the social environment that governs it to changing the driver's physical environment, we have grounds for optimism that is firmly based in good empirical data.

Passenger restraint systems and other changes in vehicle design have already proved their worth in reducing the number of fatalities and the severity of injuries. Passive restraint systems, such as air bags, promise to be far more effective than those, such as seat belts, that require voluntary action on the part of the individual. There are also grounds for believing that passive systems will be even more effective with young drivers than with their elders.

Design changes in the vehicle (e.g., better braking systems, improved dynamic stability) and in the highway (crash barriers, breakaway sign stanchions) have been devised to make both of these environments more "forgiving" of driver error. To the extent that the young, inexperienced driver is more likely to commit errors than his experienced elders, the active encouragement of such design innovations will be of especial benefit to this group.

But, promising as environmental improvements undoubtedly are, it would be a serious mistake to concentrate on them exclusively and to dismiss our concern for adolescent behavior with the facile assumption that "they will grow out of it." Actually there are reasons to believe that adolescents will not become "normal" adults in our present sense of the word but that the adult culture is likely to adopt increasingly some of the characteristics we now label as "adolescent." Today's adolescents have already influenced our culture profoundly—in terms of its music, its clothing styles, its sexual attitudes and behavior, its media of communication. If certain of the current social and technogolical trends continue; that is, the depersonalization and bureaucratization of work, the lack of meaningful relationships with non-peers, the decrease in feelings of personal autonomy in the community—those characteristics that we now perceive as peculiarly adolescent; that is, a detachment from meaningful work, an emphasis on hedonistic styles of consumption, a lack of interaction with members of other age groups, a concern for "kicks" and "thrills" in recreational activities—may become characteristic of our society as

a whole. For this reason we need to look at the adolescent driver not as a deviant but perhaps as a forerunner of the society of the future.

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DISCUSSION

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Deviance, Adolescence and the Psychiatric Labeling Process

As we probably all recognize, adolescence is a time of great stress. With puberty comes the triggering of a chain reaction of physical, psychological, and physiological changes—changes that can present the adolescent with difficulties of awesome proportions. The strength of sexual and aggressive drives and the ability to implement them are markedly increased, while concurrently there is rapid growth in body size and strength. During this period of rapid change, the adolescent, as an adult-in-being, is also called upon more and more to assume responsibilty which brings with it few of the rights and privileges of adulthood.

To further complicate the issue, it is also a time when the individual turns away from the emotional support offered by his parents, and attempts to develop relationships among his or her own peer group. One might say that the adolescent at this time must, in some way, challenge the values presented by the parents, if only to assist in defining themselves as independent and autonomous. However, these kids are anything but autonomous and so they cluster nervously with their peers, exchanging horror stories about monumental hassles with

their parents. I think it important to note that this state of affairs has always existed and that the dominant generation, the people with "clout," have traditionally looked upon the next generation with feelings of dismay and concern.

In times of social and cultural stability, there is a consensus concerning the interpretation and application of sociocultural values so that, if nothing else, the dominant group is able to present a united front, thereby eventually resolving the conflict with a minimum amount of fuss and disruption. The adolescent, lacking any adequate alternatives, and faced with clear-cut, traditional, and almost universally accepted values (which, if adhered to, lead to a series of tangible rewards), tends, once he is able to develop a firmer sense of identity, to be absorbed into what we now refer to as the "establishment." Few of us would seriously hold to the position that there is any such consensus today.

For a variety of reasons we are currently experiencing a condition of rapid social change, change which has led at least to confusion and uncertainty about hitherto accepted cultural "givens," if not to a set of new cultural values. Since parents have always had the task of interpreting and applying these values, we no longer are able to present these givens with the certainty that the "official party line" will be clearly supported by the majority of our society. The parental task of presenting these values in a meaningful and reinforcing manner, never easy at best, has become very difficult, if not impossible. The educational system, our "second team" in terms of inculcating societal values, has not been particularly effective, and appears to be undergoing a rather intense re-evaluation both from within and without. Organized religion, our third means of value dissemination, appears to have declined in influence to the extent that it is rare for one to feel particularly comfortable in clearly labeling moral values as all black or all white. The churches themselves are feeling the impact of this change, as witness the large scale defection from the ministerial ranks, and the shifting of roles so that the minister often becomes a low paid counselor rather than an arbiter of moral values. For example, in chaplaincy programs, especially in psychiatric hospitals and correctional institutions, I am struck with how difficult it is for the chaplain-counselor to ever address himself to basic moral

issues—issues which his clients seem to want to work through with him.

It appears that the impact of rapid social change has made it difficult for us to transmit values with any degree of consensus and conviction. This uncertainty has deprived many parents of support and conviction in their own child-rearing practices, and this, in turn, has tended to deprive children of the benefit of relatively clear-cut limits and guidelines for their impulses and behavior. The adolescent, already experiencing more than sufficient amounts of discomfort because of biological-developmental changes, would appear to deserve, if nothing else, a relatively clear-cut set of values against which to rebound. Alas, today we seem unable to provide him a solid backboard for practice shots—most of the time he finds himself stranded out-of-bounds. If we are able to curb some of our outrage and dismay at much of adolescent deviant behavior, we can often hear a clear and loud demand for some degree of structure or perhaps, more appropriately, of limits. Typically, parents and others charged with the responsibility of maintaining order, have ignored the motives and intent and have concentrated all their efforts on the impact of the deviant behavior.

I think that most of us would agree that, if given the chance, few would choose to relive these wonderful, carefree years, despite the visions of a glorious, successful and rewarding future. While probably the societal carrots dangling over the heads of our adolescents are real enough, getting them is difficult. Many of my mental health brethren would probably express this syndrome as "adolescent turmoil," because it is a rare adolescent who does not experience some degree of turmoil at this age. Some mental health professionals have said that without this developmental milestone, the adolescent is probably headed for real trouble at some later time. Distress during adolescence is thus viewed as somewhat of a necessary, albeit unpleasant state, and we should accept the fact that much of the adolescent's behavior at this time is going to look "deviant." In this context, then, I would agree that Professor Klein is correct in stating that adolescents represent a deviant group.

However, as a practitioner, I am disturbed by this label. Professor Klein defines deviance as "any behavior that departs substantially from what is regarded as normal or acceptable and that seems to

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threaten the welfare of society." He makes a special point of emphasizing that it is "what is *regarded* (my emphasis) as acceptable," not by popular vote or by a survey of actual behavior, but by "those members of our society who make its laws and define its values." He also stresses the fact that these behaviors "seem to threaten," rather than actually threaten, the welfare of society. Well, Professor Klein understands this, and I understand this, and hopefully the majority of people here understand this, but it is evident that many of the individuals charged with the responsibility of formulating and enforcing our laws have difficulty assuming this position.

It appears to me that despite our apparent shift away from a rigidly dichotomized black-white value orientation toward a growing acceptance of what has been called "situation ethics," we are in many ways less tolerant of deviant behavior today than ever before. With the increased complexities of living, stemming from urbanization, and the demands and stresses of an ever-increasing technological society, it becomes more and more imperative that the system function as smoothly as possible. We have increasingly less tolerance for square pegs or deviantly programmed punch cards.

That is, individuals tend to be evaluated in terms of whether their behavior is functional or dysfunctional to the system, whether that system is the family, the peer group, the school, or the community. Although we pay lip service to the idea that one's vistas are basically unlimited and that people should be allowed to "do their own thing" as long as it doesn't harm anyone else, in actuality we place quite a high premium on adaptation or "adjustment." We rarely express this in terms of a demand for regimentation or conformity because this is not congruent with our stated values, but rather we feel such adjustment is a sign of "positive mental health."

In a review of the typical give-away materials offered by our mental health associations, one is struck by the fact that the message presented is essentially a middle-class one and bears little relation to the situation facing our outgroups, including low income whites and blacks, our youth, our elderly, etc. The message is loud and clear: to be mentally healthy, to be adjusted, to be stable, is to adopt a middle-class orientation and position. The fact that access to the middle class is denied a significant proportion of our population, either due to

economic or social deprivation, or because we have failed to provide adequately defined "ground rules" to reach such a goal, seems not to be considered in these communications. Further, while we may classify many of our adolescents as middle class by virtue of their family position, they themselves, as Professor Klein so well puts it, are actually barred from participation in the middle class to any significant degree, or at least are limited in collecting many of the rewards available to older members of the middle class. On the other hand, we do demand that they accept the obligations and responsibilities of the middle class, with some allowance for inexperience and error potential.

Getting back to what one might refer to as a need for "good fit," in order for our society to move in accustomed ways, people are expected to "manage" to "get along," and anyone who does not is considered dysfunctional to the system and represents to other members of the system a burden or hardship or both. Such people represent a group that has been classified as deviant. In this situation, deviance also implies some degree of social disability. This definition of deviance has been used to encompass the poor, the offender, the mentally ill, the truant, the delinquent, and the school drop-out, to name just a few. The labeling of these groups as deviant serves the purpose of red flagging them for rescue or for suppression. What we choose to do with them, and in fact our whole labeling system, has disquieting, if not actually frightening, implications for the way we may be going in our society.

Let me expand upon this for a few minutes. We have seen within the past four or five decades a trend in mental health which Thomas Szasz has so well labeled "Psychiatric Imperialism." Simply stated, what we have done is to expand the limits of what we have called "mental illness." From a classification system that considered markedly deviant behavioral states, such as "neurosis," "psychosis," and various neurological conditions, as disease processes necessitating the intervention of a psychiatrist, we have now defined a whole range of other behaviors as "sick." While we have developed additional labels to encompass and refine these behaviors, essentially they can all be placed under the classification, "behavior disorders." This range of behavior used to be referred to collectively as character disorders, an appellation that reflected a certain judgmental position but one

that was less judgmental than the adjectives "psychopathic" or "sociopathic" and certainly less stigmatizing than descriptors such as "constitutional psychopathic inferiority" or the earlier "moral insanity." As is clear, these earlier labels reflected a moral evaluation, based on the recognition of some basic and non-modifiable character flaw, which was thus non-treatable. We seem to have moved a long way from those times and have replaced a moral, judgmental, and essentially punitive stance toward these people with a more objective, reasonable and basically therapeutic approach.

But have we?

It is quite clear that while we have expanded the limits of what we consider "sick" or "deviant" behavior and have charged the mental health professionals with the responsibility of treating such individuals (with their tacit agreement, of course), we have neglected one fairly important factor. That is, we have failed to adequately develop any treatment plan effective in intervening in, or modifying, these "conditions." By these conditions I refer to the drug user, the alcoholic, the delinquent, the criminal, the sexually deviant, the truant, and so on. Further, our "treatment" programs, as they now stand, provide little else than a socially acceptable, and therefore more palatable means of "hiding" these deviant and therefore "unpleasant" people from our community. What we end up doing, in actuality, is incarcerating them in a way that is not only in violation of their basic procedural rights, but also places them in a setting where release is typically contingent, not on the serving of a clearly delineated sentence, but rather on their ability to convince the institutional staff that they have been "changed" for the "better." This can cause some difficulty to the person so labeled, since most of the time he does not clearly understand why he ended up in the hospital (as opposed to prison) or what change should come about. He may, in fact, view his behavior not as deviant or sick but as an appropriate response to a particular situation. It is not at all uncommon for a person diagnostically labeled as an "alcoholic" to protest bitterly after being committed to a state hospital that "I'm not sick, I'm a drunk."

Nowhere is this situation seen more clearly than in the case of the adolescent. It is rare for an adolescent to seek out a mental health practitioner of his own accord, someone else usually does it for him. Because his discomfort is so great, the adolescent clearly recognizes

the necessity for intervention; however, he rarely seeks out a mental health practitioner of his own accord. In the majority of situations, he is not "sick" but his family, his school, his community, etc., are sick of him. Furthermore, while in the traditional doctor-patient transaction, the doctor is viewed as the agent of the patient, for the most part, the doctor is the agent of anyone *but* the adolescent, and unless he is incredibly naive or trusting, the adolescent knows this. The typical parental plea, once beyond the my-poor-child-is-sick-please-help-him stage, is "Will you *please* do *something* about him. He is driving me nuts." What the practitioner is supposed to "do" is make the adolescent obey his parents, accept their values, or at least refrain from challenging them to the extent that the parents are climbing the walls. Even if the practitioner is totally oriented toward mediating the stress of the labeled patient (often defined as "siding" with the patient), he must also deal with the fact that all too often this offer of help and the means to reduce the distress may not be at all congruent with the expectation and wishes of the parents. The practitioner often finds himself in a bind, particularly when the parents are paying the bill. Those who work regularly with adolescents are frequently confronted with patients who see nothing wrong or deviant about their own behavior, and consequently are unwilling to accept any responsibility for involvement in treatment. In a sense, and sometimes openly, these patients are saying, *"They* sent me here; *they* think I'm sick, now *you* do something about it if you can." When an adolescent is admitted to a hospital and frequently when he appears at a practitioner's office, it is unusual to see any crisis or acute discomfort on the part of the adolescent, but rather the crisis and discomfort reside in the parents, who look clinically more "sick" than the labeled patient.

It is only the extremely skillful professional who will attempt to confront the parents directly with what the issue actually seems to be and what he perceives as their basic involvement in the situation. At the risk of generalizing even more than I have, the parents are often buying a "cop-out," and frequently any attempt to focus the issue on the parental-adolescent interaction will result in an explosion of guilt-rage on the part of the parents. The result of dealing almost exclusively with the adjudged deviant or "sick" teenager, who has the audacity to deny that his problem is, in fact, a problem, is that too

often the treatment becomes a "game." In this game, one player either refuses to participate according to the rules (silence, non-response), or gives the practitioner exactly what he "wants" (for example, a problem per session) and then sits back and internally grins at the "shrink doing his shrink thing." The other player eventually realizes that he is being "taken," which brings up uncomfortable questions about his skills and increases his frustration. This frustration is usually called "resistance" or "transference," depending on the manner in which the doctor "interprets" the resistance. Very often the game ends in termination, mutual or unilateral, affording great relief to both parties. The parents, on the other hand, see themselves as paying exhorbitant fees with no observable change in behavior. Nevertheless, they may continue to pay as a way of doing penance, or as a justification for shifting responsibility onto someone else for whatever happens, or does not happen. Too often a coalition is formed between practitioner and parent, and the labeled patient is sent to a local mental hospital for continuous and "intensive" treatment, otherwise translated as *"that* ought to give him something to think about."

In a way I am overstating my case. I am not referring to the severely disturbed adolescent who may in fact need long term intensive treatment on an outpatient or inpatient basis, but rather to the bulk of adolescents whose behavior adversely affects everyone with whom they come in contact, especially their parents. The "un-ease" they engender in those around them tends to be projected back as "disease." These people seem to make up the majority of clients seen in counseling situations, psychiatrists' offices, and, unfortunately, on the wards of our private and state psychiatric facilities.

I think by emphasizing the deviance aspects of behavior, we also invoke a concept of "sickness" that has a great deal of surplus meaning. That is, by attaching such a label to behavior, we immediately activate all our myths concerning the "mental patient." Despite the saturation of the media with the message that mental illness can be cured, that it is not a "bad" disease, and that we should not feel afraid or ill at ease among individuals so labeled, a majority still respond to the psychiatric patient with a reaction akin to that evoked by a leper during the Middle Ages. Although we couch it in non-pejorative terms, mental illness is considered a shameful disease, and a person so

labeled immediately undergoes a downward evaluation in terms of his trustworthiness, reliability, predictability, and overall worth.

There is also a variety of practical problems associated with the euphemism "psychiatric history." Not the least of these problems is gaining acceptance to the college of one's choice, obtaining certain valued jobs, or entering into a variety of situations where acceptance is contingent upon a "clean record." While in some limited social groupings getting oneself "shrunk" is looked upon as a high status activity, the person who finds himself on the "wrong" side of a mental health practitioner's desk is going to find increasing difficulty in gaining entrance into a number of high level or even medium level positions, particularly whenever there is increasing competition for an ever decreasing number of jobs.

Another negative aspect of being so labeled is that the individual with a psychiatric history is going to find that his credibility will be suspect and his motivations subtly challenged. I have at times pointed out to my classes that the most effective means of quelling campus disruption is not to hit large numbers of students over the head, but rather to have the leaders of the disruption committed to a mental hospital. In many states this is a relatively easy task. The laws are so vaguely written that any sort of deviant behavior can be considered grounds for commitment. Further, at least in this state, the person responsible for commitment is not necessarily a psychiatrist, but may be any physician licensed by the state. Once committed, it could be extremely difficult for the adjudged "mental patient" to regain his credibility. A person who would seriously challenge the grounds of his commitment and deny vehemently that he is sick might begin to sound paranoid after a while.

It is to this perception of a person as deviant and to the possibility that such a label may also classify him as "sick" that I expressed by concern earlier. A society may use a label as a means of ensuring conformity and thus "hide" persons perceived as guilty of abnormal or unacceptable behaviors that "seem to threaten" the welfare of the dominant group. We have a precedent for expanding the limits of what we call psychopathology, which has the equal and opposite effect of shrinking the limits of what we consider normal or acceptable. Moreover, we certainly can go further along this line if it is

expedient. This method of coping with dissidence may merit majority support if we can demonstrate that such behaviors are potentially a danger to the public good.

Not only can we remove these deviants-dissidents, but we have the capacity for almost totally discrediting them in the eyes of the population. By discrediting a person, we discredit his message and thereby avoid a confrontation with what might well be valid and meaningful criticism. By declaring the person "deviant" and focusing on the way he expresses his concern rather than his message, we can remain relatively comfortable about the discrepancies in our society. Consider, for example, the campus radical. We tend to be so repulsed by his appearance and by the unfortunate rhetoric that seems to be part of his style that without qualms we classify him as deviant. If we listen to what he is saying, however, we may find to our surprise that he is actually defending the conventionally expressed ethical standards of the older generation against current institutions and social practices that actually represent a defection from these standards. We seem to be more concerned about his life style than about what he might be trying to say to us. By labeling him "deviant," it becomes a simple task to dismiss everything about him.

I would like to close this with some random thoughts about deviance, particularly concerning drug abuse. It is quite clear that we have a great deal of emotional investment in viewing drug abuse as a root cause of many of the problems of young people. Drugs are implicated in the soaring crime rate, the rejection of traditional values, the increase in the number of admissions of adolescents to psychiatric facilities, the loss of character or of moral fiber, etc. What seems to be forgotten in our concerns is that drug abuse, just like any deviant behavior, is a symptom rather than a cause. We seem instead to have developed a "demonology" concerning drug abuse, in that the user is looked upon as someone who has signed a pact with the devil. As in the case of all labeled deviants, a person so identified finds that his character has taken an immediate slide downward, and that he has also taken on all the attributes of a dope fiend—robbing, raping, and killing as he continues his precipitous descent into degradation and eventual death. Worst of all, he seems to be actually enjoying his vice and is not at all shamed by it, as we would expect if he were involved in other kinds of deviant behavior.

Moreover, once adopting the drug scene and its attendant style of life as his own, he seems impervious to our pleas and threats and even to the stringent penalties he will face if he is apprehended. Thus it is easy to see the drug abuser as obtaining a certain degree of power because of his drug use, since he tended to be relatively docile and easily manipulated by his parents previous to his involvement with drugs. The "power" therefore must reside in the drug itself. We have, in response to this, developed a sort of pharmacologic demonology, which attributes more devil per milligram to certain drugs than to others. Thus the hallucinogens and the opiates are seen as infinitely more dangerous than medically sanctioned drugs, such as the amphetamines and barbiturates, and are certainly a more highly publicized threat than alcohol. This does not make too much sense, either pharmacologically or in terms of the actual social harm involved in the abuse of these substances.

It is obvious that in terms of highway deaths, assaults, murders, loss of occupational status, downward mobility, etc., alcohol is the number one "bad" drug, while in terms of death due to overdosage, the barbiturates kill more people per year than all of the so-called illegal drugs. Further, it can be said that our true "drug problem" resides not in the young, but in the middle-aged woman who is multi-dependent on a variety of minor tranquilizers, sleeping and sedative medications, diet pills and so forth. Yet we continue to emphasize the serious threat to our society that youthful drug involvement poses and have poured large amounts of money into preventative, rehabilitative, and remedial programs that up to now have provided more publicity than results.

One would wonder why this is so. A number of factors seem to enter into this. First of all, we have a tremendous investment in our youth, and drug abuse is seen as a threat to these vulnerable people. Second, we are also mistrustful of our youth, and see them as capable of committing a variety of atrocious acts against society. Therefore, if we can attribute all blame to drugs, we should be able to rehabilitate these wayward youth and mount a massive campaign against drug abuse to prevent others from following in the same path. Probably of more significance is the fact that those involved with drug abuse are also loudly and clearly declaring their independence and emancipation from our dominant value system.

That is, it is not so much that many of our young use drugs, but what seems to go along with this act. The implication of sexual license, provocative hair styles and clothes, a denial of the value of traditional means to success in our society, a refusal to participate in the highly structured, competitive job market, a clear and vocal challenge to the rightness of our political system and its "just" wars, a refusal to even consider "playing the game" even in the face of rewards, all contribute to our horror about those involved in the drug scene. It is interesting to note that the abusers of other drugs, particularly alcohol and amphetamines, tend, in general, to be upholders of the status quo. They are "super straights" and while they cannot function too well within the system, they certainly have adopted the dominant value system. The interaction on a psychiatric ward between a group of long-haired, dope-using hippie-types and the group they lovingly refer to as "booze freaks" highlights this dichotomy. There is constant friction, which occasionally explodes into violence, as they loudly debate the value of their different life styles. I think we do not come down so hard on the alcohol and amphetamines-barbiturate abusers because they are seen as accepting the traditional and dominant life style, although they are clearly as dysfunctional as the teenage drug abuser. At least they do not rub our faces in their deviance, while the drug abuser does.

I also think we have not recognized the positive aspect of the drug scene. There are a limited number of ways to achieve status in the adolescent subculture. One can, without fear of reprisal or sanction, become a good student, a good athlete, an active politician, or gain the reputation of being fairly effective with the opposite sex. However, all these activities presuppose a certain degree of natural ability, good genetic endowment, or, at least, long and arduous practice. Others can achieve some degree of status through use of automobiles, as Professor Klein has mentioned. Such means of achieving status are denied the majority of students. There is, however, one other means of achieving status, or perhaps infamy, without having either the requisite genetic endowment or the willingness to pursue a goal that involves some degree of difficulty. Merely by having the ability to swallow, or to inhale, or in extraordinary circumstances, the ability and stomach to be able to hit a vein with a needle, one may gain entrance into a supportive peer group. The initiation into this group

is remarkably simple for the inept adolescent who has refused familial support. Further, once joining, he immediately obtains a uniform, ready-made mythology—a we-they dichotomy—and finds that almost all forms of deviance are acceptable. The group is quite receptive to all comers. Few are turned away. Another advantage of joining this group is that one can savor the exhilarating feeling of being able to hassle with parents, school officials, and other authorities with minimal effort.

Thus, the drug group has all the makings of an ideal family group, where sanctions are minimal, where status is easily achieved, where all the traditional, old-fashioned and highly prized virtues are at least verbally practiced (e.g., love, involvement, concern, commitment, sharing), and where one can also have a great deal of fun. The risks are there, but somehow this enhances the fun aspect, since the risks are much less than the population at large believes them to be. Further, if one makes the decision to break away and return to the fold, he will probably be treated like a prodigal son and find himself in great demand to tell his story at PTA meetings, service club gatherings, and school assemblies. Thus, the social rewards are many, both for joining and getting out of the scene, particularly at an age when such rewards are minimally available.

Another aspect of drug abuse I would like to discuss is the fact that, as Professor Klein reports, illegal drug use is deviant consumption. It is no wonder that drugs have become a major symptom of deviance in our society. As has been frequently reported, we are a drug-oriented and drug-using society. It is also obvious that the types of drugs most frequently prescribed and those available legally as non-prescription medications are, for the most part, agents that are clearly taken for psychic distress. With the young person constantly reminded by the advertising media that "relief is just a swallow away," and with his own parents as models, is it any wonder that he accepts the message and attempts to mediate his distress and attain relief through the use of drugs? The middle-class adolescent drug abuser likely has at least one parent who abuses drugs, and here I include alcohol as a drug.

One aspect of our society and, subsequently, of drug abuse, is that we tend to be "done in" by our technology. During our last "drug

epidemic" (1949-51) drug abusers were faced with a simple choice: They could choose marijuana or heroin, the only two abuse drugs popularly available. Amphetamines, while available, were then almost entirely the drug-of-choice of truck drivers or overweight housewives. Most who experimented with drugs chose marijuana, since they knew what might happen with heroin. In the past 10 years or so we have seen a proliferation of "in-between" drugs, such as the hallucinogens, and a whole series of new agents has become available. Through the use of such chemicals, one is able to modify his mood and experience in the manner he desires. Further, just as in our other advertising, these drugs are widely touted as means of achieving certain self-enhancing ends. One now is able, if the advertising is credible, to achieve any psychic state he wishes, at a relatively low cost. Given our present situation, and the direction we seem to be moving, we will certainly witness a variety of newer, more potent drugs, which will have even more profound and potentially unpleasant side effects. Just as we have produced automobiles with greater performance capabilities and marketed them to individuals with poor judgment, so we have produced, and will continue to produce, a whole series of very potent chemicals for the same population. The consequences of these technological advancements are quite evident.

It is also obvious that our "drug education" prevention programs have not as yet been particularly effective. In fact, we have by our approach *contributed* to the problem. We continue to deal with drug education in an essentially negative manner, stressing the dangers and consequences of drug use, often in as lurid a manner as possible. We infer genetic injury, irreparable damage to the brain, the degradation that is involved in addiction; that is, the negative physical, social, psychological and, whether we consciously wish this, the moral consequences of drug use. Yet our presentation is essentially less concerned with providing useful and pertinent information than with having an emotional impact. And by so doing, we tend to provide a picture of events that rarely occur. Only a small percentage of marijuana users ever move to the more potent agents; few who experiment with LSD ever "freak out" to the extent that they need psychiatric intervention, and so on. The kids know this and any time a so-called expert emphasizes these negative aspects he is essentially presenting a message that will turn off his target group, and any salient data he does

have at his disposal will be rejected along with the half-truths, exaggerations, and out-and-out lies. In our anti-drug presentations, we have lied to our adolescents, and they are well aware of this. They have come to expect that any data which points to the danger of drug abuse is sheer propaganda. Fortunately, we have not lied about all the consequences of drug use, but it becomes difficult for our target population, sensitized as it is to misinformation, to effectively distinguish between our rhetoric and what we know to be dangers. Our kids have been programmed to ignore these messages, and it is going to be extremely difficult to re-establish our credentials with them.

Finally, it seems clear that much of our deviant behavior is modeling behavior and that for many of our adolescents their first contact with drugs is the medication they lift from their parent's drug cabinet. As long as we continue to provide these models, why should we expect that they will do any differently? Thus it may be that not only does familial disruption result in a degree of distress that may lead an adolescent to seek out deviant means of alleviating such distress, but also that we provide the means, or at least the model, to achieve this deviant state. At the risk of appearing naive, I wonder if deviant driving behavior, just as in the case of deviant drug use, is not a function of models that we as parents have provided for our children. That is, I wonder if there is a chronic traffic violator in this age group who did not also have a parent who chronically violated the law, perhaps not to the extent that he would be given a citation, but rather that his own deviant behavior provided a clear-cut model for the adolescent to emulate.

Section II

Youthful Drivers As A Special Safety Problem

Leon G. Goldstein

Discussant

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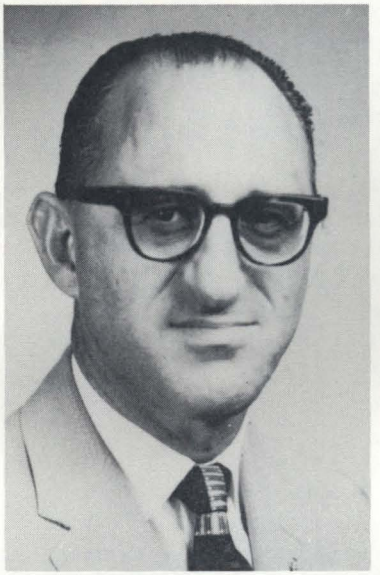

LEON G. GOLDSTEIN

Dr. Leon Goldstein is presently accident research advisor for the Bureau of Surface Transportation Safety of the National Transportation Safety Board. He was previously chief of the research grants branch, Division of Accident Prevention of the U.S. Public Health Service. His experience in accident prevention research began in 1949 with Army's Driver Research Program. He received his doctorate in psychology at George Washington University where he was a key figure in the development of that school's Driver Behavior Research Project. His research interests include driver licensing and driver training programs.

YOUTHFUL DRIVERS AS A SPECIAL SAFETY PROGRAM

*By Leon G. Goldstein**

That youthful drivers, aged 15-24, are overrepresented in accidents, fatal accidents, and in fatalities considerably beyond their proportion in the driving population has been well known for several decades (Accident Facts, 1965-1971 editions; Goldstein, 1962). Although they comprised about 21 percent of the United States driving population in 1970, they were drivers in almost 34 percent of fatal accidents, and in more than 34 percent of all accidents (Accident Facts, 1965-1971 editions). These are overrepresentations of more than 59 percent and nearly 63 percent, respectively. This has been a rather stable fact for several decades. Two studies by P. Waller (1971) in North Carolina and by Pelz and Schuman in Michigan (1971) are quite consistent with these data. A study in Canada by Brezina (1969) also shows this age group to be overinvolved.

Exposure

A prevailing question over the years has been whether the apparently worse record of young drivers could be due to greater exposure in terms of more driving or more hazardous driving, such as at night or under special conditions. Studies by Lauer (1952), by Burg (1967), and by Pelz and Schuman (1971) indicate that this is hardly the case.

Lauer's data on over 7000 drivers show the accident rate per 100,000 miles for the age group 15-24 to be considerably higher than for drivers above 25, until the age of approximately 65. Burg's data on over 14,000 drivers show a) drivers in this age range drive fewer miles per year than the older drivers, until the age of 55 for males and 75 for females, b) mean accidents per year are higher for this age group than for any other, c) mean accidents per 100,000 miles driven are also higher, until the age of 65 for males and 70 for females, and d) this age group has a higher night-time accident rate per 100,000 miles (not before the age of 75 is the night-

**The author is a staff member of the National Transportation Safety Board. Some of the same published literature which was reviewed in preparation of the NTSB report "Youth and Traffic Safety Education" is also reviewed here. Any opinions expressed are the responsibility of the author, and do not necessarily reflect views of the NTSB.*

time accident rate as high as it is for the 16-24 age males). Pelz and Schuman in their 1971 study compared annual accident rates for approximately 2000 male drivers within annual mileage brackets, and found the 16-24 age group rather consistently much worse than those 35-44, with the 18- and 19-year-olds generally the worst. Findings for violations-plus-warnings were very similar, but here we have the complicating issue of possible differential enforcement policies with respect to young drivers.

Interviews with Army drivers, reported by Schwarz (1960), showed the age group 20 and below to have an outstandingly high accident rate per 100 million miles, 2641, compared with 1478 for the 21-23 group and 1539 for the 24-28 group. (With respect to marital status and place of residence, single men living on post had much the highest rate, 1842, compared with 864 for single men living off-post.)

In addition to comparisons of young drivers with older drivers in regard to accidents and violations-plus-warnings, Pelz and Schuman (April 1971) also conducted rather extensive analyses of relationships of measures of amount and conditions of exposure with accidents and violations-plus-warnings within the age range 16-24. Data were derived from official records and from individual interviews lasting approximately one hour. A probability sample of households in southeastern Michigan was the source of more than 2000 young drivers. (Young drivers living away from home are probably underrepresented.) Table 1 summarizes the results.

For males, five of the six measures of *amount* of driving are significantly related to accidents in the past year, and all six are significantly related to violations-plus-warnings. (As expected, the latter relationships are consistently higher; individual violation data are characteristically more reliable—or stable—than individual accident data.) Of the *conditions* of driving, percent after midnight, percent superhighway, and percent heavy city traffic are significantly related to accidents. Percent of driving after midnight, percent during daytime, percent superhighway and percent residential street driving are significantly related to violations-plus-warnings. The multiple R's corrected for probable shrinkage, using all significant variables, are .18 against accidents, and .36 against violations-plus-warnings.

For females, only total mileage, days driving per week, and percent of driving after midnight are significantly related to accidents.

TABLE 1

Relationship of amount of driving and conditions of driving to accidents and to violations-plus-warnings during the past year, young drivers 16-24.

	Eta			
	Accidents		Violations-plus-Warnings	
	Males (1651)	Females (468)	Males (1651)	Females (468)
Amount of Driving				
Total mileage past year	.182**	.166**	.312**	.226**
Days driving per week	.130**	.174**	.239**	.158**
Hours per week for job	.123**	.109	.212**	.185**
Hours/week for fun	.103**		.200**	
Long trips last year	.096**	.076	.161**	.090
Short trips last month	—	.085	.129**	.079
Conditions of Driving				
Percent after midnight	.114**	.203**	.218**	.288**
Percent during daytime	—	—	.153**	.144**
Percent superhighway	.072*	—	.128**	.163**
Percent heavy city traffic	.067*	.081	—	.083
Percent residential streets	—	—	.133**	.106

* significant at .05 level

** significant at .01 level

From Pelz and Schuman, 1971.

Against violations-plus-warnings, total hours driving per week is also significantly related, as well as total mileage and days driving per week; percent after midnight, percent during daytime, and percent superhighway are also significantly related. The multiple R's, corrected for probable shrinkage using all significantly related variables, are .21 against accidents, and .33 against violations-plus-warnings.

It is of considerable importance that in these analyses and in the comparisons between young drivers and older drivers, the estimates of total mileage in the past year were not just gross estimates by the individuals. In the course of the interview, each driver was asked a battery of 23 questions regarding his driving, and the ultimate estimate of total mileage was based on all of this information.

As part of their study on exposure, Pelz and Schuman (April 1971) analyzed relationships of exposure factors with personal characteristics. A summary of such relationships is presented in Table 2.

For the young males, the percent who drove 10,000 or more miles in the past year is significantly related to age, to marital status, place of residence, and to number of new responsibilities; the relationship with frequency of drinking has borderline significance. The percent who drove 10 percent of their mileage after midnight is significantly related to all of the personal characteristics, including school grades, and has border-line significance with number of new responsibilities. In all but one of the cases, the personal characteristic would be expected to cause, or to influence, the quality or quantity of driving exposure rather than the reverse; in the case of school grades, the relationship could be either way. The percent of young men who drove 10 or more hours per week is significantly related to age, place of residence, school grades and frequency of drinking.

For the young women, there are fewer significant relationships, due, in part, to the fewer miles driven by women and the smaller number of cases. The percent of women who drove 4000 or more miles in the past year is significantly related to age, to marital status, and to place of residence; number of new responsibilities has a border-line significance. The percent who did one percent or more of their driving after midnight is significantly related to all of the personal characteristics except school grades and number of new responsibilities. The percent who drove three or more hours per week

TABLE 2

Relationship of exposure factors to personal characteristics for young drivers[a]

	Coefficient of Mean Square Contingency					
	Age	**Marital Status**[b]	**Place of Residence**[c]	**School Grades**	**New Responsibilities**[d]	**Frequency of Drinking**[e]
Percent of young men who:	N=1673	N=900	N=909	N=893	N=901	N=909
Drove 10,000+ miles	.38***	.07*	.15**	.05	.14**	.10′
Drove 10% after midnight	.30***	.12**	.11*	.13**	.09′	.17**
Drove 10+ hours/week	.23***	n.s.	.21**	.11*	.09	.13**
Percent of young women who:	N=483	N=245	N=250	N=248	N=244	N=250
Drove 4000 miles+ miles	.36***	.17**	.21*	.03	.16′	.11
Drove 1%+ after midnight	.20**	.32**	.23**	.04	.08	.18*
Drove 3+ hours/week	.17′	.25**	.27**	.02	.04	.06

Notes: a) For Age, the age range is 16-24; for all the other variables it is 18-22
b) Single: married
c) With parents; Roomates, dormitory; With Spouse; Alone or other.
d) Number of new responsibilities last year: 0;1;2;3-4;5+
e) Frequency of drinking in past year: Did not drink; few times; monthly; weekly; several times/week.
f) Significance levels of X^2: ***=.001; **=.01; *=.05; ′=.10

From: Pelz and Schuman, 1971.

is significantly related to marital status, and place of residence; age has a border-line significance.

> The authors summarize this set of findings as follows:
>
> Young men aged 23 or 24, those who were married and residing with their own spouse, who had taken on several new responsibilities in the past year, and drank regularly, tended to drive more miles per year. On the other hand, single men, in their late teens, and living with roommates, did more of their driving after midnight. Also, men who had poor school records, and drank daily, spent more time in cars, and more of it at night.
>
> For women, a somewhat different pattern appeared. Although women aged 22-24 drove more miles, it was the single women, living with parents, who drove more than married women, and drove more late at night. School grades, number of responsibilities, and frequency of drinking made less difference in the driving pattern of women than of men.
>
> These results . . . suggest that some of the exposure effects may be due as much to the kinds of people who choose to drive in certain highway environments as to the inherent danger of these environments.

These results also underscore some of the complexities in driver research. Carlson (1970), in an extension of a prior "induced exposure" study by Hall on 1966-68 data in Michigan, found drivers aged 16-25 overinvolved in "responsible" crashes compared to their involvement in "non-responsible" crashes; the 16-20 group was overinvolved about 40 percent, and the 21-25 group about 10 percent. Responsibility was based on two-car crashes in which only one of the drivers was charged with a violation; single-vehicle accidents were not included. Penn (1963) estimated that in 1963 California drivers aged 15-24 were overrepresented in single-vehicle accidents by a factor of 5.15 times their proportion of mileage driven.

Inexperience, Youthfulness, and Age

A study reported nearly three decades ago (Desilva, 1942) compared the three-year fatal accident rates per 1000 drivers who were

newly licensed at various ages; mileage exposure data were not available. The newly licensed young drivers had higher fatal accident rates (per 1000 drivers) than those who were licensed at older ages; those licensed at 16-19 had the highest rates. A more recent study in the Netherlands, using moped drivers and automobile drivers, suggests that inexperience is a more important factor in accidents than age per se (SWOV, 1965). Another study in Germany analyzed traffic offenses among drivers who started driving at various ages. "Traffic maturity" as measured by traffic offenses appeared to be more highly related to years of driving than to age per se (Munsch, 1966). However, the full role of exposure in these two studies is not entirely clear, and the degree to which the information might be generalized to the American scene is open to question.

In the study by Pelz and Schuman (1971), the accident rates per year for male drivers were adjusted for the effects of several variables: mileage, number of trips last month and long trips last year, number of days and number of hours driving per week, percent of driving done during daytime and after midnight, percent of driving on superhighways and other types of roads, etc. For each age group a mean residual accident score was computed, which reflected the degree to which that group's accident rate was above or below the grand mean for the entire 16-24 age group. These mean residual scores showed that the 18- and 19-year-olds had the worst records, while the 23-year-olds had the best records (in the 16-24 age range.) A similar analysis on violations yielded very similar results.

Another analysis was done on accidents and violations of four subgroups who had learned to drive at various ages from 12 to 20. The similarity of the graphs for three of the four groups suggests that the age when he learned to drive has little effect on the quality of his driving at subsequent ages. That is, age itself seems to have the predominant effect. For reasons unknown, the group of males who learned to drive at age 15 showed a curve that was shifted upward one or two years—their records from age 16 to 18 were quite good, but at 19 or 20 their rate rose above the average for the entire group. Also, their secondary peaking for accidents was around 23 or 24 instead of 22; for violations their highest peak was at 21.

The issue of age versus inexperience in the generation of accidents is an unsettled one. Presumably, they are both important and inter-

acting variables. The influence of experience may well depend on the particular age and the nature and extent of preceding experience. It may also be related to sex. Pelz and Schuman (1971) applied their method to accident and violation scores of young women. They do not present these results for the women, but summarize:

> With exposure removed, the relatively mild effects of age became even weaker. The adjusted curve for accidents did not rise until age 20 or 22, two years later than for men. The curves for both accidents and violations remained relatively flat . . . and the relationships were no longer statistically significant for . . . 500 young women.

In comparing the analyses for the women with those for the men, it must be kept in mind that the women drive much less and are much less involved in accidents and violations. However, in the planning and operation of countermeasure programs, it would seem the height of wisdom to take account of real differences which do exist between the sexes—both inherent differences and differences in driving practices.

Brezina in Canada (1969) compared the first-year driving records of beginning drivers with the one-year averages of experienced drivers of the same ages. There were approximately 1900 beginning males and nearly 1200 beginning females. The accidents per 1000 drivers were compared for the 16-19 age groups, for the 20-24 age groups and for the 25-54 age groups—beginners vs. experienced—for males and females separately. The accident rate per 1,000 drivers for beginning drivers in their first year exceeded the average yearly rate for the experienced drivers, for each comparison and for both sexes, with the exception of males aged 16-19.

In the case of convictions per 1000 drivers, the beginning males were consistently more involved than the experienced drivers of the same age group; for females, there was practically no difference between beginners and experienced drivers. In the case of beginning males, for both accidents and convictions, the peak occurred in the 20-24 age range. The difference between the sexes was much greater for convictions than for accidents. Exposure data were not available in this study. In the case of accidents, beginners in the 16-24 age range had a higher rate than beginners in the 25-54 age range; this

was true for both sexes. For convictions, in the case of males, beginners in the age range 20-24 had a much higher rate than beginners in the 25-54 age range; but the 16-19 age group was much closer to the rate for the 25-54 group.

Coppin, Ferdun and Peck (1965) analyzed the driving records of more than 6000 teen-aged drivers in California for the year 1963. They found accident frequency per year was essentially uniform across age for both males and females. Violation frequency per year was related to age in that as age increased, numbers of violations increased. As would be expected, the younger teen-agers, 16-17, averaged fewer miles per year than the older ones, and the accident rates per mile were higher for the younger teen-agers, especially the 16-year-olds. This was particularly true for the males, but with the females the accidents per mile continued to be elevated through ages 16 and 17, and were reduced for the 18- and 19-year-olds. In general, the males at each level drove about twice as much as the females. Violations per mile were also higher for the 16- and 17-year-old males. The picture is less clear for the females, with the violations per mile for the 16-year-olds being somewhat higher than for the older teen-agers.

The authors discuss the fact that the younger drivers drove less during the year; therefore, the fact that their per-mile accident and violation rates were higher is regarded as somewhat artificial. The assumption seems to be implicit that, if the younger drivers were to drive more per year, their accident and violation rates per mile would be lower. What seems to be in evidence here is a well-known aspect of early learning, namely, that more errors are made early in the learning process than later. (McFarland and Moore, 1960; Van Zelst, 1954). It must be emphasized that the prime question these investigators addressed was whether the legal minimum age for licensing in Califorina should be changed from 16 to perhaps 17 or 18, and the question then becomes whether age as such is a determiner of good or bad performance on the highway. In order to examine the pure effect of age as such, the investigators used a "stratification procedure and analyzed the data through correlational techniques and analysis of variance." Not all of the analyses are presented, but the results are given of this "mileage-controlled" analysis: a) younger teen-aged males have a higher accident rate per year than their older

counterparts, b) no significant relationship between age and accidents per year was shown for females, and c) no significant relationship was shown between age and violations per year for either males or females.

These investigators examined the possible effect of additional exposure variables on accident frequency per year, using multiple regression analysis and testing for significance of regression weights. This procedure shows whether a particular variable makes a unique contribution to the prediction of the driving record per year, with the other variables held constant. Total miles in 1963 was, of course, significant as a (unique) predictor of accidents and violations per year for both males and females. Total hours driven per week was significant for males for both accidents and violations. Total miles per week was significant for violations for males and females. Very interestingly, miles driven at night showed no significance at all, nor did miles on freeways and expressways. Age was found to be significantly related (uniquely) to male accident frequency only. The regression analysis showed that, for the teen-age range, exposure was a more important factor than age per se in predicting accident frequency per year.

Further regression analyses were conducted in the attempt to determine the relative effects of exposure, experience, age and parental regulations. Total miles driven in life was found to make a unique contribution to the prediction of violations for males only; as experience increases, violation frequency also increases. For females, months license in force is significantly related to both accidents and violations; increased experience is associated with increased violation frequency, but with decreased accident frequency. The unique contribution of age is significant in the prediction of accident frequency for males and approaches significance in the prediction of violation frequency. The younger teen-age males have more accidents, but the older teen-age males have more violations per year. Parental regulations (as measured only by the number of ways in which parents restrict the use of a car) was related only to violation frequency of males; apparently increased violation frequency results in greater parental regulation.

Harrington (1971) published a sequel to the California study of teen-age drivers which was a follow-up evaluation of the role of human

factors in the first four years of driving. He studied more than 8000 males and almost 5800 females, aged 16-19, in California. Table 3 shows the number of accidents and convictions per 1000 drivers by sex and year. Repeated measures type of analysis of variance showed that, with the single exception of fatal and injury accidents for females, all the trends across years were significant at the .05 level. In applying a more rigorous test (Box's conservative F test), the trends in two categories just missed significance at the .05 level: partially-at-fault accidents for females, and single-vehicle accidents for males.

The accidents per 1000 drivers for males peaked in the second year and then declined; for females, accidents per 1000 drivers were almost identical in the first two years, and then declined. Convictions per 1000 drivers rose markedly for both sexes through the third year, then declined in the fourth.

Year to year trends in mileage were not available in Harrington's study, but using the mileage trend from the teen-age driver study of 1967, he concludes that the accident rate per mile shows a steady decline across the years, since accidents decreased while mileage increased; similarly, the rate of convictions per mile can be taken as declining from the third to the fourth year. Regarding conviction rate in the first three years, it clearly did not decrease. From Table 3 we see also that the number of accidents per 1000 drivers by type of accident follow a trend similar to total accidents per 1000 drivers.

The percentages of accidents which were fatal or injury accidents were as follows:

	Year				
	1	**2**	**3**	**4**	**All years**
Males	32%	31%	33%	32%	32%
Females	29%	28%	26%	33%	29%

For either sex, the trend is not significant—but the difference between the sexes for the four years is significant—with the males having a somewhat higher percent of injury or fatal accidents.

With respect to violations, speeding was the most frequent for both sexes for the four years, 31 percent of all violations for males and 38 percent of all violations for females. Yearly changes in the proportions of given types of violations were not large; for females, from

TABLE 3

Accidents and convictions per 1000 drivers by sex and years of driving — 8121 males, 5794 females

	Sex	Year 1	2	3	4	All years
Accidents	M	159	182	172	127	640
	F	96	94	84	70	345
Property damage accidents	M	109	125	116	86	436
	F	69	68	63	48	246
Fatal & injury accidents	M	50	57	56	41	204
	F	28	26	22	23	98
Partially-at-fault accidents	M	30	32	31	20	114
	F	15	11	9	10	46
Single-vehicle accidents	M	13	16	14	10	52
	F	7	4	2	4	17
Convictions	M	649	835	961	728	3,173
	F	164	204	247	215	830

From Harrington 1971

year one to year two there was an increase in the proportion of speed violations, 31 percent to 37 percent, and a decrease from 11 percent to 6 percent in right-of-way violations.

Sex

In 1970, 85.6 percent of the 67,500 drivers of all ages in fatal accidents were males (Accident Facts, 1965-1971 editions). According to Burg's data, males of all ages drive considerably more miles than females—characteristically, twice as much. In the 16-24 age group, they drive about twice as much (Burg, 1967). The latter point is also the case in P. Waller's data (1970). The mileage rate for accidents in Burg's data is as high or higher for females as for males in 11 of 14 age groupings; in the 16-24 age group the female rate is higher (Burg, 1967). However, it is predominantly the young male who accounts for the disproportionate involvement of youth in accidents and in fatalities; in the past several years, 78 percent of motor vehicle deaths of persons 15-24 have been males (Accident Facts, 1965-1971 editions). This figure excludes pedestrians. Only about 6 percent of motor vehicle deaths in the 15-24 age group are pedestrians (Accident Facts, 1965-1971 editions). The young male is also more highly involved in crime (Crime in the United State, 1970), in the use of alcohol in fatal accidents (Accident Facts, 1965-1971 editions; Kowalski, Rose, and Fiorese, 1967; Perrine, Waller, and Harris, 1971), and in motorcycle fatalities (Harano and Peck, 1968; Reiss and Haley, 1968). These are discussed in more detail below.

Violations

Violations are of interest in this discussion for two reasons. First, it is fundamental to orderly, efficient, trouble-free traffic flow that there be a set of rules by which drivers maintain and operate their cars on the highways and streets; furthermore, such rules must be known, accepted and adhered to or there is chaos. Second, interest in violations stems from the common-sense notion that non-adherence to the rules raises the probability of collision. This discussion is primarily concerned with the latter issue. How, then, do violations relate to accidents?

Violations on record and accidents on record are not highly correlated. Part of this is almost certainly due to under-reporting of ac-

cidents and under-apprehending of violators. Studies on large numbers of drivers of all ages (approximately 95,000 in the 1958 study and 148,000 in the 1964 study) and covering three-year periods of driving were reported by the Department of Motor Vehicles in California (Coppin, 1965; Williams, 1958). In the 1958 study, the correlation between citations and accidents was .26, and in the 1964 study, .27. When the latter figure was recomputed, omitting citations which were the result of an accident (properly regarded as spurious for some purposes, but in an examination of the degree to which violations lead to accidents, perhaps properly included), the $r = .23$; .22 for males separately, and .16 for females.

Correlations from a more recent study by Burg (1968) of 4897 males and 2944 females in California show that a) during the first three-year period, correlations of violations with accidents are .29 for males, .26 for females and .30 for total group, b) for the second three-year period are .25 for males, .22 for females, and .26 for total group, c) correlations of violations with accidents in the six-year period are .32 for males, .33 for females, and .35 for total group. Most interestingly, *violations* in the *first* three-year period are correlated with *accidents* in the *second* three-year period; .12 for males, .17 for females, and .15 for total group. Also *accidents* in the *first* three-year period are correlated with *violations* in the *second* three-year period: .18 for males, .13 for females, and .20 for total group. These coefficients are all significantly different from zero at the .01 level of probability, and indicate *some* degree of stability of differences between drivers in driving habits or exposure, or some combination of both.

Harrington (1971), in his study of young drivers in California in their first four years of driving—over 8000 males and almost 5800 females found accidents and convictions in the first year correlated .21 for males and .20 for females; for the full four years the correlations were .29 for males and .26 for females.

These figures are all subject to the effects of two opposing forces: a) the deflationary effect of underreporting of accidents and under-apprehending of violators and b) the inflationary effects of stable qualitative and quantitative differences in exposure of individual drivers to both accidents and police observation. The correlations are not high: correlation of any variable with accidents is limited by the well-known instability (unreliability) of accident involvement of individual

drivers (Goldstein, 1961; Goldstein, 1962). For instance, in the same study by Burg (1968), correlations between accidents in the first three years with accidents in the second three years were .13 for males, .07 for females, and .13 for total group. Convictions on record have a much higher stability. From the same study, the correlations of convictions in the first three years with convictions in the second three years were .48 for males, .34 for females, and .50 for total group. McFarland and Moseley (1954) found a significant relationship between accidents on the job and prior violations for truck drivers. This means that a violation-producing truck driver tends also to be an accident-producing truck driver, and vice versa. The data from the study by Burg show this is also true for general drivers, but the degree of contamination of these data by stable differences in environmental conditions on mileage driven is not known.

But correlation, a valuable summary statistic for many purposes, does not tell us all we need to know for purposes of accident prevention. We are dealing here with events of low probability and of multiple causation—no single cause is present in more than a portion of all accidents. The great majority of drivers in a period of three or so years of driving are both accident-free and violation-free (on the records!). Low correlation coefficients might obscure very useful information. For instance, the correlations between cigarette smoking and lung cancer derived from 14 studies ranged from .001 to .009. But the probability of lung cancer among smokers was from 1.2 to 39 times that among non-smokers. (The absolute probability is still very low; the great majority of smokers never get lung cancer) (Private Communication, Dr. Samuel Greenhouse, National Institutes of Health).

How do violations affect the probability of an accident? While we cannot answer the question in the sense of causality, there are data out of the California studies under Coppin and Williams (1965, 1958) which provide estimates of relative probabilities, thus:

Comparison of Accident Rates for Groups of Drivers with Given Numbers of Violations, Using the Rate for the Zero-Violations Group as Unity

Violations	1958 Study (N=94,935) "Spurious"	1964 Study (N=148,000) "Spurious"	1964 Study (N=148,000) "Non-Spurious"
0	1.0	1.0	1.0
1	2.2	2.2	1.8
2	3.2	3.1	2.6
3	4.1	4.0	3.2
4	4.9	5.1	4.1
5	6.4	5.6	4.6
6	5.9	5.6	4.7
7	5.8	6.9	5.8
8	6.3	6.8	5.0
9+	7.6	8.1	6.5

The study by Harrington (1971) provides comparable information on young drivers 16-19:

Accident Rates for Groups of Drivers with Given Numbers of Violations

	Males		Females	
Violations	1 Year	4 Years	1 Year	4 Years
0	.092	.287	.071	.212
1	.240	.449	.253	.398
2	.290	.572	.281	.555
3	.314	.713		.672
4	.448	.761		.642
5+	.381	.912		.970
6		.947		
7		1.048		
8		1.030		
9		1.133		
10+		1.171		

Data from a prior study by Campbell (1958) on 40,000 drivers in North Carolina, a study by O'Neal (1967) on 1.7 million drivers in Washington State, a study by Carlson (1968) in Michigan on 1071 drivers and a study by Brezina in Canada (1969) on over 30,000 drivers similarly show increases in mean accidents for drivers with increasing numbers of violations. Moreover, these studies show that not only does the relationship differ with sex, but, very importantly for this discussion, also varies with age in that, for a given number of violations, the groups of young drivers have more accidents than the older groups; the young drivers with no violations also have more accidents than older drivers with no violations.

Such figures appear to be inconsistent with the low correlations between violations and accidents. What must be realized is that *most* of the violators are accident-free. Even among the drivers in the 9+ violations group in the 1958 study above, 282 of 512, or over 55 percent of the drivers, are accident-free in the three-year period. Very interestingly, in the Harrington (1971) data, of the young males with 9+ violations, less than 40 percent are accident-free in four years. Of course, these figures are subject to the same influences (both inflationary and deflationary) as the correlation coefficients cited earlier.

What do we know of the violations of young drivers compared to those of older drivers, apart from the fact that they generally have more? Harrington and McBride (1970) in California, using records for over 7500 drivers, compared violation rates per 100 million miles for various age groups, for specific types of violations: speed, equipment, sign, passing, turning, right of way and "major." The under-21 group had markedly higher rates than drivers 26-60 for speed, equipment and sign violations, with speed the outstanding violation of young drivers. For passing, turning and right of way violations, the under 21 group rates were also higher than for drivers 26-60, but not as pronouncedly so. For drivers under 26 males have a considerably higher rate than females for each type of violation; for all types combined, the rate for males is almost double that for females.

For violations associated with fatal and injury accidents, the rates per 100 million miles are markedly higher for drivers under 25 for speed, right of way and passing violations, with drivers under 20 having even much worse rates, and speed violations outstandingly high for young drivers. For drinking, sign, and turning violations, drivers under 25 have elevated rates, but not as extremely so.

From the graphs and tables presented by Harrington and McBride (1970), one can easily see that the particular manner of grouping young drivers makes a difference as to how the data look and what they seem to mean. For instance, on the graph for accident-violations, the drinking violation rate is the same for under 20 as for drivers 20-24, and the rates for right of way and passing are approximately three times as high for the under-20 as for the 20-24 group. When the data are combined into "under 25," drinking and right of way have the same rate, 34, and passing is somewhat lower, 31. Speed, which is 160 for under 20, and 60 for 20-24, is 86 for under-25 drivers. The need to study the records and behaviors of youthful drivers within one-year groupings seems highly evident.

It is not possible to know from the data of Harrington and McBride how enforcement policy with respect to young drivers might influence the rate of arrests and convictions for violations, and the probability of being charged with a violation in the case of an accident. The question of whether the mileage estimates obtained for the analyses are accurate is a very real one. That is, if young drivers consistently underestimate the miles they drive while older drivers are more realistic, all such comparisons of rates are suspect. The fact that data from different studies in different parts of the country and in different times are consistent is comforting but not convincing. But data in the 1971 studies by Pelz and Schuman (April 1971; June 1971; October 1971) were derived by much more elaborate means of detailed interview, and they appear consistent with other studies that show higher rates of involvement for young drivers. This increases the confidence that the analyses are not misleading.

An analysis of 1970 data for the District of Columbia showed rates by age groups as follows:

Age	Violations per 1000 D.C. Drivers Registered	Accident-Associated Violations per 1000 D.C. Drivers Registered
16-17	26.0	6.4
18-19	305.1	52.3
20-24	272.3	44.5
25-65+	Not greater than 171 for any age group	Not greater than 28.8 for any age group

From this, the 18-19 age group appears to have the worst record, with the 20-24 group a close second. One would speculate that the 16- to 17-year-old drivers drive considerably less than those just a year or so older, and are therefore considerably less exposed to opportunities for violations and accidents.

Harrington (1971) compared estimated annual rates of convictions per 1000 drivers for a) drivers under suspension or revocation, with b) drivers not under suspension or revocation. For the four-year period, the rates for drivers in class a) were nearly as high or higher than for class b), especially for males. This would indicate that suspension or revocation was very ineffectively enforced.

Coppin and Van Oldenbeek (1965) found young males, 25 and under, to have the highest mean incidence of driving while under suspension or revocation.

Alcohol

The involvement of alcohol in fatal highway accidents is now widely familiar. The degree to which alcohol is involved in highway accidents of youth is currently being determined. A study in Illinois (Kowalski, Rose and Fiorese, 1967) found approximately one third of fatalities of persons aged 15-20 with measurable blood alcohol: 33 percent of 142 car drivers, 38 percent of 95 car occupants, and 29 percent of 17 pedestrians. Of the drivers with measurable blood alcohol, over 57 percent had .10 percent or higher.

In a study of Minnesota drivers killed in 1969 (The Alcohol-Impaired Driver and Highway Crashes, 1970), data on drivers aged 16-24 showed: over 60 percent of 103 had measurable blood alcohol, and of those with alcohol, over 79 percent had .10 percent or higher. In the 16-20 age group in this study, over 50 percent of the 63 drivers had alcohol. Of those with alcohol, nearly 69 percent had .10 percent or higher. Very importantly, 93 percent of *all* driver fatalities with alcohol were males.

Perrine, Waller and Harris in a study in Vermont (1971) found that, of 42 fatal crash drivers aged 24 and younger, 25, or 60 percent, had measurable blood alcohol, and 20, or 48 percent, had .10 percent or higher. Of the 25 with measurable blood alcohol, 20, or 80 percent had .10 percent or higher.

An analysis of fatal accidents in Michigan in 1968 by O'Day (November 1970) found that, of 427 drivers aged 20-24, 50 percent had been drinking.

It appears from the data from these studies that the involvement of alcohol in highway fatalities of young people may not be greatly less than in the case of older adults. While .10 percent blood alcohol has been shown to be so high that practically everyone, including habitually heavy drinkers, is impaired, the young driver has a double hazard in that he is both an inexperienced driver and an inexperienced drinker. Certainly, he is inexperienced at combining drinking with driving. The Illinois finding of over one third of occupants (other than drivers) with measurable blood alcohol at time of death suggests the involvement of group drinking or "partying" as an important aspect of youthful tragedies on the highway.

Another analysis by O'Day (October 1970), on Michigan fatal accidents in 1968 and 1969, showed that fatal accidents peaked at age 18, but that fatal accidents *among drinking drivers* peaked at 21-22. O'Day's speculation is interesting, ". . . it takes a couple of years for the young driver to learn the driving task. Then after age 18 his fatal accident involvement record improves until he reaches the legal drinking age; it then takes a couple of years (through ages 21-22) for him to learn to drink."

Drugs

The role of drugs in accidents of youthful drivers, especially the combined action of drugs with alcohol, has hardly been studied (Nichols, 1971). A major reason for this is that it is extremely difficult to test for the wide variety of drugs which might be present in the body materials. The great increase in the use of many drugs in recent years, particularly among youth of college and high school age, would lead one to expect that such drugs must affect the driving experience of the users—if indeed they drive after using drugs. Of particular concern would be the synergistic action of such drugs and alcohol. So far, we are largely in the dark with respect to whether and how much the mind-altering drugs (other than alcohol) affect the highway accident experience of young drivers. Presently, so far

as we can tell, drugs have a far less involvement than does alcohol (Nichols, 1971).

Motorcycles

In recent years there has been a dramatic increase in the use of motorcycles, and this is a vehicle used predominantly by young people, especially males. In 1964, under a million motorcycles were registered; the number has risen to over two and one-half million in 1970 (Accident Facts, 1965-1971 editions). This is an 8.6 percent increase in registrations over 1969, but the number of fatalities of motorcycle riders increased 18.9 percent from 1,960 to 2,330 (Accident Facts, 1965-1971 editions). Information on the nature of motorcycle fatalities is meager, but what is available is very interesting. A survey (Cycle Magazine Subscriber Survey, 1967) showed that in 1965, of the 1,515 deaths of motorcycle riders, over 59 percent were in the age group 15-24. In 1966, this was just under 66 percent of 2,043 deaths. And in 1967, just under 64 percent of 1,971 deaths were in this age group. A California study (Harano and Peck, 1968) showed about two thirds of motorcycle drivers involved in accidents to be under age 25.

In the same survey in 1967, 52 percent of motorcycle owners were found to be age 24 and younger. This compares with the 59 percent to 66 percent of motorcycle fatalities in the age group under 25. Young people often rent motorcycles, and often the only requirement is that they have a license to operate an automobile. The combination of untrained, inexperienced motorcycle operators and a type of vehicle that is inherently more dangerous makes for a rather hazardous operation.

The fatality rate per mile is estimated to be five times as great for motorcycle riders as for automobile occupants generally (Accident Facts, 1965-1971 editions; Reiss and Haley, 1968). Not only are motorcycles driven primarily by youthful drivers, but the fatality rate has been shown to be highest among those with little experience with motorcycles (Barry, 1970; Reiss and Haley, 1968). Again, motorcycling is primarily a male activity and is a source of increasing numbers of highway fatalities. Consideration of youthful drivers in highway accidents must take cognizance of the burgeoning use of motorcycles by young and inexperienced drivers.

Crime

In 1970, there were nearly six million arrests for crime of persons 15 and older (Crime in the United States, 1970). The 15-24 age group accounted for 47.6 percent of these, but comprised only 24.4 percent of the total population 15 and older. This is an overrepresentation of 95 percent (Crime in the United States, 1970; Personal Communication, Mauer, HEW, 1970).

Of the arrests for crime in the 15-24 age range, 16.2 percent are female and 83.8 percent are male. This ratio of somewhat more than 5 male arrests to one female arrest is somewhat lower than the ratio for the full adult age range: 86 percent males vs. 14 percent females, or 6:1. Within female arrests for crime, 15-24 age females are overrepresented by 141.1 percent: 56.9 percent of the arrests, but only 23.6 percent of the female population 15 and older. Within male arrests for crime, 15-24 age males are overrepresented by 82.2 percent: 46.1 percent of the arrests, but only 25.3 percent of the male population 15 and older.

It is to be expected that some of the same social and personal pressures that make for a disproportionately high crime rate and high involvement with alcohol and drugs also influence the disproportionate involvement in accidents and fatalities on the highway. The figures presented above include arrests for Driving While Influenced, Car Theft and Drug Law violations. Very interestingly, of arrests of persons 15 and older for car theft in 1970, 83.9 percent were 15-24; this is an overrepresentation of 244 percent (Crime in the United States, 1970; Personal Communication, Mauer, HEW, 1970).

Types of Accidents Characteristic of Young Drivers

In a 1960 review, McFarland and Moore refer to several analyses which show young drivers to be overrepresented in particular kinds of accidents: First, National Safety Council Memo in 1951 on Ohio data showed that teen-agers were involved in 22 percent of all night accidents, but only 17 percent of day accidents; they were involved in 25 percent of accidents between 6 p.m. and midnight. Second, an analysis of California data in 1956 showed that drivers younger than 25 had a disproportionately high frequency of single-car accidents. Wisconsin data of 1955-56 showed that drivers under 20 com-

prised 8.6 percent of the driving population, but were involved in 28.6 percent of all fatal off-the-roadway accidents and in 16.4 percent of all other fatal accidents. The 21-25 year old group were also overrepresented, but to a slightly lesser extent.

According to McFarland and Moore:

> A study of single-car accidents in Ohio in 1956 . . . revealed that restrictive roadway features played a dominant role in off-the-roadway accidents for the 16-19 year old drivers and for inexperienced drivers. Highway conditions, such as poor pavement, narrow roadway widths, slippery pavements, and absence of center-line markings, were significantly related to the single-car accident experience of these drivers.
>
> A study of personal-injury accidents in Great Britain for 1953 . . . analyzed the age of the driver . . . as a function of those errors considered to be primarily responsible for the accident. Errors which sharply differentiated the younger drivers from the others included 'overtaking', 'losing control', 'swerving', 'skidding', and 'inexperience with type of vehicle in use at the time'. Teen-age drivers were also responsible for significantly more accidents resulting from being 'asleep' or 'fatigued'.
>
> An analysis of the principal faults involved in California accidents in 1956, by age group, revealed that 61.9 percent of the teen-age drivers were considered at fault in the accidents. (Present reviewer notes that this might reflect a bias on the part of officials making the decision as to fault.) This percentage was the second highest for all the age groups and was exceeded only by drivers over 70. Speeding was considered to be the prime factor in the driver-at-fault accidents, accounting for 44.4 percent of the teen-age driver faults. The next important errors of teen-age drivers were failure to grant right of way, improper turning, and driving on the wrong side of the road. The accident involvement of teen-age drivers because of these latter faults, however, was lower than that of older drivers. Excessive speed has been demonstrated by the Vermont

> Motor Vehicle Department, as well as in Great Britain, as being the major characteristic of teen-age driving accidents.

This emphasis on speed as the major fault is consistent with the data from the study by Harrington and McBride (1970), discussed earlier.

In 1966, Campbell reported an analysis on driver age and sex related to time and type of injury-producing accidents. Drivers aged 25 and younger were designated "young," 26-59 "middle age," and 60 and over "old." He found that young drivers had a higher proportion of their accidents on weekends, Saturday and Sunday—46.4 percent compared with 41.7 percent for middle-age drivers and 34.4 percent for old drivers. While this was true of both sexes, it was more characteristic of young males—47.9 percent versus 39.0 percent for females. Young drivers had a higher proportion of their accidents in the night-time period of the day, 6 p.m. - 5:59 a.m.; 58.7 percent compared with 46.6 percent for middle-age, and 24.4 percent for old drivers. Again, this is more characteristic of young males than females: 62.8 percent vs. 38.1 percent. Single-vehicle accidents are more characteristic of young drivers: 58.7 percent compared with 42.9 percent for middle-age and 28.2 percent for old drivers. And again the young males have the higher proportion, 59.9 precent vs. 52.0 percent for young females.

A study by Penn (1963) of the California Highway Patrol in 1963 showed that drivers aged 15-24 had 41.7 percent of the single-vehicle accidents in California in 1961. The estimate of the percent of mileage driven by this age group—from the 1958 Department of Motor Vehicles Study on Driver Vision—is 8.1 percent. If this percentage were the same in 1961, this young driver group was over-represented in single-vehicle accidents by a factor of 5.15 times its proportion of mileage driven. This is probably an overestimate, because the proportion of mileage driven by young drivers would be expected to have increased somewhat from 1958 to 1961.

Shuman and Pelz (1968) plotted the proportion of motor vehicle deaths involving running-off-the-roadway accidents, against age groupings, for seven years (1960-1966) of data in Michigan. The proportion was generally above 30 percent for drivers below age 30; it peaked at 20-24 and declined thereafter to age 70+, to about 10

percent. The proportion of ran-off-the-roadway fatalities can be taken as a rough index of driver responsibility for the accidents. Condition of the vehicle must also be taken into account, of course. It is interesting that the proportion for the 15-19 age group is somewhat lower than for the 20-24 group. The groupings themselves may be obscuring important differences between individual age groups.

Cars and Scholastic Work

Kavanaugh, Kemper and Klamm (1960) reported a study in 1960 on the effects of car use and ownership upon scholastic standing of 1455 junior and senior students in high school in Skokie, Illinois. They found boys to have a characteristically lower class standing than girls: 33 percent of the boys were in the lowest quarter of their class, while only 16 percent of the girls were in the lowest quarter; 21 percent of the boys were in the top quarter, but 30 percent of the girls were. When the boys who used a car to drive to school were removed from the distribution, the boys were very evenly distributed throughout the four quarters of the class. Car ownership was overwhelmingly a male phenomenon; very few girls either owned or had use of a car sufficiently to warrant analysis. Seventeen percent of the students were found to own cars, and of these car owners, 44 percent were in the lowest quarter of their class. Examining for the effect of car ownership on class standing, the class standings of car-owning juniors were compared with their class standings as sophomores prior to getting a car. This showed that 87 percent who had been in the first quarter as sophomores experienced a deterioration of grades after getting the car; 53 percent of juniors who had been in the second quarter as sophomores had a similar experience, 75 percent of those who had been in the third quarter, and 31 percent of those who had been in the fourth quarter. Further, the percent of boys in the bottom quarter of their class was shown to be directly related to the number of evenings per week a car was used. This varied from 19 percent for boys who used a car once a week to 61 percent for boys who used a car seven evenings a week.

Related to car usage was the issue of part-time jobs. It was shown that, of those job-holders working less than 12 hours per week, 60 percent were in the first quarter of their class. Of those working 12 to 23 hours weekly, 15 percent were in the first quarter; and of those

working more than 23 hours, only 6 percent were in the first quarter. Cause and effect relationships are difficult to determine from these data.

Personal Characteristics

Beamish and Malfetti (1962) made a psychological comparison of violator and non-violator male drivers in the 16-19 age group. There were 84 male violators, who had been referred to the Juvenile Court in the Greater Cleveland area, each of whom had incurred two or more traffic violations. The non-violator group were 186 males, 16-19, who held an Ohio driver's license for at least one year, had not incurred a traffic violation since receiving the license, and were chosen from the secondary and vocational school system of Cleveland. Statistically significant differences were found between means on four psychological variables: emotional stability, conformity, objectivity, and mood. Significant differences were also found on level of political activity of parents and safety attitude. From these data the authors characterize the violator group as follows: a) by accepted standards, they do not give proper thought to the implications of their behavior, for themselves and others; b) they tend to be in disagreement or conflict with others, including those closest to them, and perceive themselves as held down and imposed upon; c) they are rebellious and selfish; d) their hypersensitiveness, lack of self-confidence and feeling of personal unworthiness may lead them to over-compensate with erratic and ill-considered action resulting in traffic violations; e) their parents are relatively inactive in the community, indicating in the children a lessened sense of civic responsibility.

Beamish and Malfetti (1962) further studied differences between remediable violators (those who appeared to benefit from attendance at the Cleveland Driver Improvement School in terms of subsequent records) and non-remediable violators (those who appeared not to improve). Statistically significant differences appeared on measures of physical activity, and appreciation of literature, music and art; also measures of hostility, thoughtfulness and personal relations. The remediables rated higher on sociability, thoughtfulness and personal relations, but lower on hostility. They also rated themselves as more active in physical as well as in literary, musical and artistic pursuits. The groups further differed in dependence on home and the political

activity of their parents. The remediables rated themselves as more dependent on home, rated their parents as more active politically, and appeared to enjoy better social relations than the non-remediables.

Rommel (1959) compared personality characteristics and attitudes of youthful accident-repeating drivers with those of accident-free drivers. The first group was composed of 25 drivers known to have had two or more traffic accidents; the second group was composed of individuals matched with each of the accident-repeating cases with respect to location and length of driving time, but with an accident-free record. The groups were compared on five sub-scales of the Minnesota Multiphasic Personality Inventory and a Driver Attitude Inventory apparently constructed by the author. Two scales of the MMPI showed significant differences between the means for the groups, Psychopathic Deviate (Pd) and Hypomania (Ma). The repeater group tended to exhibit higher scores on scales which indicate an individual's disregard for social mores (Pd), and an individual's tendency toward excessive activity and enthusiasm (Ma).

The Driver Attitude Inventory (Rommel) also showed significant differences between means for the groups. Although eight of 247 individual items of the MMPI showed a differentiation, the significance levels are not given, so that it is not possible to know whether this many items could be "significant" on the basis of random sampling alone. The results on the Driver Attitude Inventory indicate that accident-repeating individuals have a tendency to be characterized by attitudes toward driving: 1) as a form of activity which relieves psychic tension; 2) as a form of behavior by which youthfulness may be compensated and the role of an adult may be assumed; 3) as a form of behavior in which a considerable amount of confidence in one's ability may be manifested; 4) which do not take into account speed as an element of danger, or if considered as dangerous, an attitude manifesting desire for danger, 5) which place greater emphasis on the power which a vehicle possesses than on either its style or utility. The author does not indicate the ages of his subjects, other than that they were drawn from various high schools in Pennsylvania, nor does he indicate anything with respect to sex of the subjects.

Levonian (1969) studied over 1000 driver education students in tenth grade, using five personality measures, and records of viola-

tions. Of the five measures, expediency (oriented toward self-benefit at expense of others) was significantly related to violations, after covariance adjustments for sex, driving experience, social area (a measure of socioeconomic status), and the four other measures: determination, adaptiveness, defensiveness, and ambivalence.

Background Characteristics

Kraus, et al. in Canada (1970) compared data on background characteristics of 205 young drivers under age 21 who had recently had accidents with 205 controls who were individually matched on sex (91% of the groups were males), year of age when drivers' license was obtained, size of community of residence and (approximately) current age. The comparisons which showed significant differences may be summarized as follows:

	Percent of Group Who Had the Characteristic	
	Control	**Accident**
1. Failed one or more grades in or before grade eight	17%	30%
2. Last high school course was vocational or occupational	7%	18%
3. Either of 1 or 2 above	20%	39%
4. Became a regular cigarette smoker at or before age 16	27%	39%
5. First full-time employment, exclusive of school vacation, at or before 17 and before driving license	4%	13%
6. Had been charged with a criminal offense exclusive of those related to driving	2%	14%

It is important to note that, in five or six comparisons, the proportions of drivers who had the given characteristic, or "risk factor," were even higher for those accident-involved drivers who were in single-vehicle accidents. Presumably, any driver involved in a single-vehicle accident is responsible for that accident unless it were due to a vehicular failure or road defect. Further analyses of accident responsibility and these "risk factors" showed that of accident-involved drivers possessing any of these factors 26.6 percent were

"probably responsible" for their accidents, compared with 2.6 percent of those who did not have any of these factors. Responsibility was judged by involvement in a single-vehicle accident or being charged by the police after investigation. These were accidents sustained within six months after receipt of a driver's license.

A very interesting aspect of the findings by Kraus, et al. is that those drivers who were "probably responsible" for their accidents soon after being licensed had a *lower* proportion of drivers with *two or more* accidents than the rest of the accident group. It seems people do learn from accidents. Further, accident drivers who were characterized by one or more of the risk factors had a somewhat *lower* proportion with *two or more* accidents than the accident cases with none of the risk factors.

Kraus, et al. present estimates of relative risk of accident of drivers with and without the given risk factors. However, the present reviewer was unable to verify these estimates. It appears that possession of factor one or two in the list more than doubles the risk of accident, and 39 percent of accident drivers are so characterized; factor 6 increases the risk about three and one-third times, and 14 percent of accident drivers were so characterized.

Beginning in 1967, Pelz, Schuman, et al. have published several reports on intensive studies of young drivers aged 16-24 (Driver Motivations and Attitudes, 1968; Dangerous Young Drivers, 1968; Exposure Factors in Accidents and Violations of Young Drivers, 1971; Are Young Drivers Really More Dangerous After Controlling for Exposure and Experience? 1971; Motivational Factors in Crashes and Violations of Young Drivers, 1971; Young Male Drivers, Impulse Expression, Accidents and Violations, 1967; Mapping Young Drivers in Behavioral Space, 1968; A University- and Police-Sponsored Spring Field Trial to Reach High School Seniors in Michigan, 1970; Surveillance of Fatal Motor Vehicle Accidents in Michigan Involving Young Drivers, Utilizing Time-Series Analysis of Police Records.) The objective is to determine the attitudes, motivations, emotional factors, social pressures, involvement with cars, drinking behavior, marital experience and other factors which may influence the accident and violation experience of young drivers. Their method of investigation is primarily the individual interview, lasting from a half hour to a full hour, and relating personal data to violations and accidents.

Three sets of analyses are reported:

1) A pilot study on 287 unmarried male drivers, aged 16-24. Subjects were interviewed at locations where large numbers of young drivers were known to congregate, such as drive-in restaurants, and beaches. Respondents were selected by a systematic random process to eliminate interviewer judgment. In some cases drivers' companions remained in the car during the interview. According to the investigators, this did not appear to inhibit responses.

2) A second study was conducted on a random cross-section of licensed drivers aged 16-24 in Washenaw County, Michigan, supplemented with random samples of accident and violation lists to "ensure sufficient numbers of 'dangerous' drivers for statistical comparison." There were 352 males and 100 females.

3) A probability household sample in a portion of southeastern Michigan adjacent to Detroit was determined. All young men between 16 and 24 in these households were asked for an interview. Smaller fractions of young women were also interviewed. There were 1672 young males and 483 young females. (Over 600 older drivers were also interviewed for other comparisons, already referred to in this review.)

Results from these three sets of analyses pertaining to young drivers are summarized in Tables 4, 5, and 6, respectively. Much of this work is regarded as exploratory. The first study based on 287 drivers (Table 4) was explicitly a pilot study; hypothesis testing was not a part of the venture, and significance tests were not provided. The tests of significance shown are provided by the reviewer, based on the published data and graphs (Pelz and Schuman, June 1968; Schuman, Pelz, Ehrlich, and Selzer, 1967.) Not only were significance tests not a part of this study, but it is also apparent that the investigators were still engaged in definition of variables and determination of how to quantify them; this pertains to the personal-biographical variables and to the accident and violation variables. Drivers were classified into four accident groups: a) zero accidents, b) accidents before last year, but none last year, c) one accident last year, and d) two or more accidents last year. Classes c and d pertain to last year, but classes a and b include prior driving periods of varying duration. This must be kept in mind in attempting to interpret relationships between these classifications and interview data which generally per-

TABLE 4

Significance of relationship of interview responses to age category, accident category, and moving-violation-points category, 287 young male drivers aged 16-24, unmarried.

Interview Response	p-value of Chi-square		
	Age	Accidents	Mov.-Viol.-Pts.
Owns his own car	$<.01$	$<.01$	$<.01$
1 or more moving violations last year	$>.10$		
1 or more accidents last year	$>.10$		
Drove 15,000 miles or more last year	$>.10$	$<.001$	<0.2
Mainly employed rather than student	$<.001$	$<.001$	$<.01$
High school only (term. or dropout)		$<.001$	$<.01$
Summary: impulse expression	$<.001$	$.10>P>.05$*	$<.001$
Daredevil driving	$<.001$		
Anger in 3 or more traffic sit.	$>.10$		
Drove for relief after 2 or more problems	$<.05$		
Often took chances with friends in car	$<.02$		
Rates himself moderate or heavy drinker	$<.001$	$.10>P>0.5$	$.10>P>0.5$
Driving confidence; high on 2 or more items	$<.001$		
Dissatisfied (or mixed feelings) in re 2 or more aspects of life: draft, girls, etc.	$>.10$		
Thoughts about suicide	$>.10$		

*All zero-accident drivers vs. all with one or more accidents last year shows a difference between percentages which is significant at $p<.01$. If we use 3 groups—0-accidents, 1-accident, and 2+ accidents—the p-value of Chi-square $<.05$.
Data from: Schuman, Pelz, Ehrlich and Selzer, 1967.

tain to the recent past. In the case of the violations variable, four moving-violation-point categories are used; this is a combined measure of severity and frequency.

There are four variables in Table 4 which show significant relationships with both accidents and violation points: 1) owns his own car, 2) drove 15,000 miles or more last year, 3) mainly employed rather than student, and 4) high school only—terminal student or dropout. These four variables may be regarded as an exposure cluster, and such relationships would seem to be expected. Ownership of a car and being employed are also significantly related to age, the older drivers showing a higher percentage of ownership, but the employment variable is apparently related to age at which one graduates from high school or college. Interestingly, neither the number of moving violations last year nor the number of accidents last year is significantly related to age in this analysis, nor is the proportion of drivers who drove 15,000 miles or more last year. [In the second analysis based on 352 drivers (Table 5), both violations and accidents in the past year were highly significantly related to age. Also, the percentage of drivers who drove 10,000 miles or more the prior year was highly significantly related to age.]

The summary measure of impulse expression indicates high scores on two to six measures of anger, driving for relief, dare-devil driving, took chances with friends in the car, prefers speed not safety in car, and risky driving practices. This composite variable, and three of its components shown in Table 4, are related to age, the older drivers showing lower percentages of drivers who score high on this composite, that is, engaging less in impulsive expression through driving. Impulse expression is highly significantly related to violation points, but shows a borderline relationship to the accident variable as delineated in the four groups indicated above. However, if, instead of computing the Chi-square across the four groups—a) no accidents, b) accidents before last year, but none last year, c) one accident last year, and d) two or more accidents last year—we combine groups a and b, then the Chi-square is significant beyond the .05 level. If we combine groups a and b, and combine groups c and d, the difference between the percentages who score high on the summary measure of impulse expression is significant beyond the .01 level. [In the second analysis with N=352, "drove to blow off steam"—a part of impulse

expression—was significantly related to the accident-violation variable (Table 5), as was also "fist fight in past year," which might also be regarded as impulsive behavior.]

"Rates himself moderate or heavy drinker," while highly significantly related to age—the older groups doing more drinking (or saying so)—has only borderline significance with accidents and violation points. Again, if we combine accident groups c and d the Chi-square is significant at less than .05; groups a+b vs. c+d are not significantly different.

Driving confidence, as measured by high score on two or more measures (no thoughts of injury while driving, few close calls, drives after drinking, takes more chances, not fewer when upset) is highly significantly related to age, the older drivers having higher percentages who are "confident"; data on the relationship with accidents and violation points are not provided in the pilot study report (Pelz, March 1968). [In the second analysis (Table 5) "drives after drinking"—among those who drink—is significantly related to the accident-violation variable. Driving confidence variables are significantly related to violations+warnings, but not to crashes in the third set of analyses on 1672 males (Table 6).]

Table 5 shows the results from the second analysis on 352 male drivers (results on 100 females not shown here); tests of significance are provided by the reviewer, based on the published data and graphs (Pelz, March, 1968; Pelz and Schuman, June 1968; Schuman, Pelz, Erlich and Selzer, 1967). It is to be noted that the accident-violation groups used here in the reviewer's analysis are defined as a) drivers with neither accidents nor violations in the past two years, and b) drivers with accidents and violations or two or more accidents in the past year. While these two groups can be regarded as "very good" drivers on the one hand and "very poor" drivers on the other, if a variable does show a relationship with these two groups it is not possible to know whether the variable is related to accidents or to violations or to both, since accidents and violations are not highly correlated. The analysis would be sharper and more meaningful if violations and accidents were treated separately, but it is still of interest to see whether and how personal variables relate to quality of driving so defined.

TABLE 5

Relationship of interview responses to age category and to accident-violation category
352 young male drivers aged 16-24

Interview Response	Age Category					Accident-Violation Category*		
	16-18	19-20	21-22	23-24	p-val. of X^2	No. Acc. No. Viol.	Acc+ Viol.*	p-val. of t
Drives after drinking (of those who drink)	22%	67%	72%	70%	$<.05$	57%	80%	$<.01$
Speeds on open highway						46	65	$<.02$
Speeds inside city	53%	57%	37%	37%	$<.02$	34	58	$<.01$
Has driven motorcycle						25	46	$<.01$
Races other cars	17	20	13	10	N.S.	5	30	$<.01$
10+ hrs./wk. in cars for fun	27	41	17	16	$<.001$	15	39	$<.01$
Works on cars 1+hr./wk.						41	60	$<.02$
Feels adult pressures	47	43	26	17	$<.001$	29	42	$<.08$
Driving affected by passengers	37	24	15	12	$<.001$	58	72	$<.08$
Drove to blow off steam after argument	29	40	25	23	$<.05$	20.5	37	$<.02$
Fist fight in past year	19	27	23	10	$.10>P>.05$	6	37	$<.01$
Thoughts of injury while driving						49	73	$<.01$
1+ violations last year	42	62	53	45	$<.02$			
1+ accidents last year	38	42	27	20	$<.01$			
10,000+ miles last year	23	53	62	62	$<.001$			
Drinks	53	68	83	87	$<.001$			
2+ near-accidents last year	61	62	67	54	N.S.			

* The categories were: a) no accidents or violations for past two years versus b) accidents and violations or two or more accidents in past year.

Data from: Pelz and Schuman, June 1968, Pelz 1968 and Schuman and Pelz, October 1968.

All of the variables for which data are provided show a significant relationship with the accident-violation criterion, with the exception of two which have only marginal significance: "feels adult pressures," and "driving affected by passengers." All of the variables which are related to accidents-violations are also related to age, with the exception of "races other cars" and "fist fight in past year," which have marginal significance. Both violations in the past year and accidents in the past year are significantly related to age, with peaking occurring in the 19-20 age group. Miles driven is also related to age, older drivers driving more. Near-accidents are not significantly related to age, at least not as reported.

There is a rather interesting similarity between the two analyses for the variable "among drivers with accidents last year, percent of drivers involved in injurious accidents." The percentages for the two analyses and for the combined data are as follows:

	Age				p-val.
	16-18	19-20	21-22	23-24	of X^2
First analysis	8%	25%	31%	19%	n.s.
Second analysis	14%	29%	24%	11%	n.s.
Combined data	11%	27%	29%	14%	$\angle .02$
N with accidents	61	66	42	42	

Combining the data means combining samples of unmarried males and males regardless of marital status. This may be regarded as *some* evidence that severity of accidents peaks in the age range 19-22.

Drinking is also related to age; about 53 percent of drivers 16-18 drink, and this rises to 87 percent for the group 23-24. Driving after drinking—among those who drink—is related to accidents-violations, and this is far more characteristic of drivers above age 18 than those who are younger.

Table 6 summarizes the third set of analyses on 1672 young male drivers and 483 young females. (An additional 303 older males and 315 older females were also included for comparison purposes; results are referred to elsewhere in this review.) The correlation coefficients and indications of significance thereof are taken from the 1971 report of Pelz and Schuman. The Chi-square analyses are pro-

TABLE 6

Relationship of interview responses to age, crashes, and violations-plus-warnings in past year (adjusted for exposure), drivers aged 16-24.

	Age p-val. of X^2		Crashes r		Violations + Warnings r	
Interview response	**1672 Males**	**483 Females**	**1672 Males**	**483 Females**	**1672 Males**	**483 Females**
Hostility						
Anger—things	∠.001		.053*	.077	.095**	.077
Anger—people	∠.001	∠.001	.046′	.038	.137**	.093*
Anger—overt/covert	∠.001		.061*	.054	.138**	.114*
Rebellion index	∠.001	∠.001	.069**	.151**	.061*	.075
Peer hostility index	∠.001	∠.001	.067**	.078′	.099**	.063
Driving motivation						
Ownership of main vehicle	∠.001		.026	—.030	.036	.007
Assertive driving index	>.30	>.30	.034	.088′	.071**	.088′
Driving after argument	∠.001	>.30	.101**	.131**	.094**	.135**
Distracted driving	∠.001	∠.02	.052*	.078′	.065**	.058
Escape driving	∠.001	>.30	.059*	.102*	.125**	.077
Competitive driving	∠.001	>.30	.092**	.086′	.161**	.070
Time working on cars	∠.001		.07*(eta)	.029	.124**	.055
Life changes/past yr.						
Positive marital events	∠.001		.032	—.038	.022	—.055
Negative marital events	∠.001	∠.001	.039	.160**	.084**	.127**
Total family events	∠.001		.028	.042	.052*	.043
New responsibilities	∠.001		.014	.029	—.057*	.010
Stopped school	∠.001		—.054*	.010	.030	.069

TABLE 6 (Continued)

	Age p-val. of X^2		Crashes r		Violations + Warnings r	
	1672 Males	483 Females	1672 Males	483 Females	1672 Males	483 Females
Started working	∠.01		.015	.025	.021	.028
Changed jobs	∠.001		.041	.034	.057*	.031
Stopped working	∠.001		.036	.055	.014	—.011
Total job events	∠.001		.044′	.049	.037	.011
Interview response						
Smoking and drinking						
Amount smoked	∠.001		.018	—.027	.127**	.044
Changes in smoking	>.50		.037	.014	.119**	.048
Drinking frequency	∠.001	∠.001	.028	.125**	.062*	.059
Drinking—amt./occ.	∠.001	∠.001	.030	.079′	.098**	.076
Drinking—total amt.	∠.001					
Changes in drinking	∠.001	>.30	.029	.086′	.126**	.062
Drove after drinking once or more in past month	∠.001				.110**(eta)	
Driving confidence						
Hours driving before impaired	∠.001		—.005	.006	.058*	.009
Number drinks before driving is impaired	∠.001		—.017	.000	.112**	—.044
Seat belt usage	∠.01		.047	—.018	.142**	—.069
Independence from passengers	>.30		.002	—.042	—.066**	—.025

** = significant at p ∠ .01
* = significant at p ∠ .05
′ = significant at p ∠ .10 (borderline)
From Pelz and Schuman 1971.

vided by the reviewer. The criterion variables of crashes and violations-plus-warnings, it should be noted, were adjusted for both quantity and quality of exposure differences. The variables used in this adjustment included mileage, number of trips last month and long trips last year, number of days and number of hours driving per week, percent of driving done during daytime and after midnight, and percent of driving on superhighways and other types of roads. The personal variables in this analysis in several instances overlap with variables used in the prior two analyses. Apparently there is continuing exploration and refinement as the investigations continue. The personal interviews in this study lasted about an hour, and official files were searched for accident and violation data to supplement self-reported events. It must be noted that the method of sampling households rather than sampling people presumably resulted in successive underrepresentation of young drivers who were not living at home—those who were away at school, in the military, etc. We can only speculate as to how this may have affected the results.

For the males, all of the 32 variables listed are significantly related to age among this group of 16- to 24-year-old drivers, with three exceptions: "assertive driving index," "changes in smoking," and "independence from passengers." [In the prior analysis on 352 males, "driving affected by passengers" was highly significantly related to age.] Another feature which is readily apparent from the table is that there are many more significant relationships with violations-plus-warnings than with crashes. This is to be expected in light of the fact that numbers of violations generally have higher reliability as a measure than do numbers of crashes. It is also to be noted that in several instances the individual variables are closely interrelated in terms of the data themselves (some variables are composites of some of the others), in addition to underlying correlations among measures.

All of the hostility measures are significantly related to crashes and violations-plus-warnings, with the one exception of "anger-people" vs crashes, which has only marginal significance. The "rebellion index" includes the variable "feels pressure from adults," which in the prior analyses (Table 5) had marginally significant relationship with accidents-violations. "Peer hostility index" includes "driving after arguments with friends" or "feels pressure from friends"; it also includes "anger-people." These are related to variables in the prior analyses;

"Drove to blow off steam after argument" was significantly related to accidents-violations (Table 5); also, the variable "anger in 3 or more traffic situations" was a component of the summary "impulse expression" in the first analysis—which showed at least a marginally significant relationship with accidents (Table 4).

Among the driving motivation variables, "driving after argument," "distracted driving," "escape driving," and "competitive driving" are each significantly related to both violations-plus-warnings and to crashes. "Assertive driving index" is significantly related to violations-plus-warnings, but not to crashes. "Time working on cars" is related to violations-plus-warnings, but not to crashes. "Driving after argument" includes "drove to blow off steam," which was significantly related to the accidents-violations variable in the second analysis (Table 5). "Competitive driving" is related to "races other cars," which was significantly related to accidents-violations in the second analysis (Table 5).

Among the "life changes" variables, only one is significantly related to crashes, "stopped school"; the negative sign is puzzling, since in an earlier analysis the "high school only" group had *more* accidents. Four of these variables are significantly related to violations-plus-warnings: "negative marital events," "total family events," "new responsibilities" and "changed jobs."

Among the "smoking and drinking" variables, none is related to crashes significantly, but all of them are significantly related to violations-plus-warnings. Among the "driving confidence" variables in Table 6 none is related significantly to crashes, but all are related significantly to violations-plus-warnings.

For the females results are also summarized in Table 6. Chi-square analysis versus age is provided (by the reviewer) only for those variables which are at least marginally related to crashes or to violations-plus-warnings. There are fewer significant relationships for the female drivers than for the males. In part, this is attributable to two factors: women generally drive less, and the number of cases is less than one third as great, so that it takes larger r's to meet the same significance levels.

Among the hostility variables, "anger-people" and "anger-overt/covert" are significantly related to violations-plus-warnings, and the

former is related to age. "Rebellion index" is significantly related to crashes, and "peer hostility" is marginally related to crashes; both are related to age.

Among driving motivation variables, only "distracted driving" is related to age. "Driving after argument" is significantly related to both crashes and to violations-plus-warnings. "Escape driving" is significantly related to crashes only. "Assertive driving index" is marginally related to crashes and violations-plus-warnings. "Distracted driving" and "competitive driving" are marginally related to crashes.

Among life changes, "Negative marital events" is highly significantly related to age, crashes, and no violations-plus-warnings; none of the other variables shows significance. Among smoking and drinking variables, "drinking frequency" is related to crashes and to age. "Drinking—amount/occasion" is marginally related to crashes, and is highly related to age. "Changes in drinking" is marginally related to crashes, but not to age. None of the "Driving confidence" variables showed significant relationships with crashes or violations-plus-warnings.

From the three sets of analyses some inferences may be drawn with respect to young drivers. The criterion of crashes adjusted for exposure used in the third analysis is the most clearly interpretable. In drawing conclusions from this third set of data, we must bear in mind that it is young people who live at home who are primarliy represented; those who do not live at home are away at school or in the military, etc., and are underrepresented.

It seems clear from Table 6 that there is a cluster of personal variables which are correlated with crashes among young male drivers, labeled by such terms as anger, rebellion, hostility, argument, distraction, escape and competitiveness. These variables are also related to violations-plus-warnings. There is some support for these results from the first analysis (Table 4), in that the composite of impulse expression, which includes daredevil driving, anger in traffic situations, driving for relief, and taking chances with friends in the car, also showed at least borderline significance against accidents, and high significance against moving violation points. The second analysis (Table 5) also provides some consistency in these findings. Driving after drinking, speeding, racing with other cars, driving to blow off

steam after argument, fist fights and thoughts of injury while driving, are related to the accident-violation classifications.

Data from the third analysis which have not been presented here show clearly that these variables are much more characteristic of the age group 16-24 than of the older group 35-44. All three analyses show variation within this young age group, and in general there appears to be a lessening of personal turbulence with increasing age the 23-24 age group appears to be well on its way through the storm and stress period.

The data on females in the third analysis are in fair agreement with these findings, and for the females negative marital events are also significantly related to crashes and to violations-plus-warnings, and drinking frequency is significantly related to crashes.

The measures of smoking and drinking and of driving confidence are all related to violations-plus-warnings for males, but are not related to crashes. Apparently, these measures characterize young males who can violate traffic laws without getting into crashes—a phenomenon worthy of further study.

Harrington's Young Driver Follow-Up Study, published in 1971, includes a major effort to relate biographical data to accidents and convictions in the first four years of driving.* There are two major parts to this effort: 1) correlating data obtained by questionnaire, from school records, or from license records, against accidents and convictions in the first four years of driving; these determinations utilized from 3000 to 8000 males and from 3000 to 5800 females, 2) interview data were obtained from high- and low-accident drivers, defined as follows: high-accident males had three or more accidents in the four years (N=175); high-accident females had two or more accidents in four years (N=210); low-accident drivers were those with zero accidents in the four years, 177 males and 182 females.

The table of correlation coefficients between biographical variables and four-year accidents and convictions by sex is reproduced from the report as Table 7 here. Of 84 variables in the table, for males 52 were significantly related to accidents at the .05 level, and 70 to convictions; 42 were significant for females with accidents, and 62 with convictions. Correlations with convictions are characteristically higher, and the males generally have higher correlations than the females,

presumably because they drive more and have more accidents and convictions. It is to be noted that the criterion here is *number* of accidents and convictions in the *four years,* without adjustment for mileage exposure or other exposure. The regression equations developed to predict four-year accident records will not be reviewed here*, other than to mention that the multiple R against accidents was .25 for males and for females .23; using non-driving predictor variables only, the R's were .19 for males and .21 for females.

*The reviewer regrets that this report became available only very recently, and time did not permit a more thorough review of this major study.

TABLE 7

Correlation coefficients between biographical variables and four-year accidents and convictions by sex

Variable	Accidents 1-4		Convictions 1-4	
	Male	Female	Male	Female
Fresno county	—039*	—045*	—001	031*
Sonoma county	017	—020	—023*	—046*
Sacramento county	007	001	—151*	—134*
Stanislaus county	—010	—025	—014	—046*
Los Angeles county	022*	064*	153*	153*
Height	—019	007	—048*	018
Weight	004	020	—016	034*
Single orig license	005	—006	—019	—034*
Drive test score	—024*	—012	—046*	—047*
Age licensed	—055*	—021	—013	016
Length inst permit	030*	—025	—075*	—098*
Instruction permit	018	012	—071*	—027*
Traffic density	030*	072*	102*	104*
Birth location	—010	022	—040*	—010
Home status	—006	021	088*	047*
Year left school	—042*	031*	—248*	025
Transfer	011	—007	139*	009
Dropout	040*	—037*	201*	044*
College transcript	—032*	012	—210*	—037*
Driver training grade	057	034	—020	—070

TABLE 7 (Continued)

Variable	Accidents 1-4		Convictions 1-4	
	Male	Female	Male	Female
Grade point average	—128*	—071*	—373*	—197*
GPA trend	—040*	—028	—082*	—027
Citizenship grade	—153*	—123*	—436*	—264*
Absences	077*	071*	301*	146*
Non-language IQ	—052*	—016	—160*	—050*
Achievement test	—056*	—019	—227*	—090*
IQ discrepancy	—004	—004	002	017
Achievement index	—120*	—082*	—342*	—213*
Rural school	—025	—039*	—068*	—076*
Quest response date	045*	035*	120*	046*
Attitude	067*	018	225*	112*
Driver training safety	056*	056*	101*	087*
Driver train quality	050*	019	020	056*
Driver education	—011	003	—036*	—009
Driver ed quality	032*	021	—017	007
Mileage work	061*	054*	106*	086*
Mileage errands	055*	039*	095*	090*
Mileage other	066*	071*	126*	152*
Annual mileage	087*	078*	158*	161*
Total mileage	091*	106*	204*	200*
Prior mileage	030*	043*	111*	052*
Mileage T score	085*	096*	189*	175*
Vehicle weight	026	—052*	053*	—026*
Vehicle year	031*	048*	—062*	020
Vehicle mileage	088*	105*	158*	181*
Equipped seat belts	016	022	—093*	—016
Wear seat belts	—050*	—016	—115*	—081*
Married	066*	—048*	150*	—037*
Divorced/separated	026	024	079*	049*
Number of children	047*	—030*	131*	—026
Number of brothers	—009	—043*	071*	—009
Number of older sibs	018	—012	059*	013
Parents alive	—031*	003	—038*	—043*
Parents married	—062*	—026	—122*	—106*

TABLE 7 (Continued)

Variable	Accidents 1-4		Convictions 1-4	
	Male	Female	Male	Female
Student	—115*	—040*	—228*	—073*
Housewife	000	—022	000	—040*
Grade completed	—111*	—061*	—305*	—110*
Occupational goal	—047*	—039*	—194*	—076*
Social mobility	—040*	—045*	—028	—028
Unemployed	044*	008	086*	037*
Social activities	—006	030*	—044*	—004
Academic activities	—070*	—004	—134*	—071*
Student activities	—019	—016	—097*	—043*
Intramural activities	009	007	—029*	033*
Varsity letters	—032*	000	—065*	000
Non-varsity letters	—018	000	—055*	000
Safety self-rating	132*	092*	120*	104*
Drinking	030*	057*	058*	092*
Number of cigarettes	103*	110*	184*	157*
Number of jobs	078*	080*	219*	113*
Year own car	—082*	—091*	—179*	—094*
Hours driving	072*	075*	109*	124*
Percent motorcycle	023	028	108*	044*
Armed forces service	—026*	000	—046*	000
Response bias	005	022	071*	050*
Driver train not offer	014	—004	—025*	—007
Driver train not taken	007	034*	116*	063*
Driver train taken	—014	—031*	—100*	—057*
Driv train taken w off	—010	—036*	—117*	—065*
Parents occupation	—028*	026	—088*	004
School data missing	020	030*	075*	066*
Length license gap 1-4 OL	—092*	—063*	—019	—034*
Quest data missing	—006	017	076*	058*
Single lic renewal	—057*	036*	—157*	036*

*$p < .05$.

Note.—Decimal points are omitted.
From: Harrington (1971).

The highest correlation with accidents and with convictions for both sexes was with the variable citizenship grade, which was a measure of work habits, cooperation and class-room behavior, generated essentially by teachers. For male accidents, the r is —.153; for female accidents —.123; for male convictions —.436, and for female convictions —.264. Higher scores on the DMV license driving test were associated with lower accidents for males and lower conviction rates for both sexes. The older a male was at licensing, the lower his accident rate (in contrast with findings in the earlier teen-age driver study). Coming from a broken home was associated with increased convictions for both sexes. For males there was a steady decline in the number of accidents and convictions with increased schooling. High school graduates had only half as many convictions as those who left school in the eighth or ninth grades. Dropping out of high school was associated with increased accident and conviction frequency for males; for females, the dropouts had more convictions, but fewer accidents. Grade-point average was one of the important variables. There were decreases in accidents and convictions with better grades. The more frequent the number of absences from high school, the higher the accident and conviction rates. In general, better school or social adjustment was correlated with better driving records. Married males had more accidents and convictions than single males; single females had a worse record than those married. Those who were divorced or separated had worse conviction records than others. The more children a man had, the worse his driving record; the more children a female had, the fewer accidents she had. Frequency of cigarette smoking is related with both accidents and convictions for both sexes.

Results from the interview study of high- and low-accident drivers are summarized on the basis of statistical significance tests as follows:

Compared to the low-accident males, high-accident males:

1) had more convictions, 2) less often thought that old people drove too slowly, 3) drove more miles, 4) smoked more cigarettes, 5) less frequently were college students, 6) more frequently wanted to be a race car driver, 7) began dating at an earlier age, 8) rated their driving skill at ages 16-17 lower, 9) completed less education, 10) played hooky in high school more often, 11) had their own car

with speed and custom accessories more often at ages 16-17, 12) got along less well with their parents at ages 16-17, 13) received less parental approval of the group they hung around with at ages 16-17, 14) had mothers who lost her temper more easily and who babied him more, 15) the last time they drank before driving, they spent more time drinking, 16) more frequently had known someone who smoked marijuana, 17) were more frequently in trouble with the police after age 20, 18) had more injury accidents, not counting auto accidents in which they were driving, 19) more frequently had their parents restrict their driving in some way, including suspension, 20) more frequently indicated that having been in an accident had improved their driving, 21) more frequently thought they might be being interviewed because of poor driving record, 22) more frequently drove when worried, attended car races when 16-17, drove to get away from other people when 16-17, enjoyed driving on winding roads when 16-17, and drove recklessly when 16-17, 23) rated themselves (adjective sort) as more enterprising, aggressive, self-dissatisfied, generous, affectionate, lively, adventurous, sensitive, emotional, modest, sophisticated, assertive and tough.

Compared to low-accident females, high-accident females: 1) had more convictions, 2) had their own motorcycles more frequently, 3) honked their horns less frequently when someone cut in front of them, 4) drove sports cars more frequently, 5) drove more miles in their lifetime, 6) belonged to more clubs, 7) felt like smashing things less frequently, 8) took behind-the-wheel driver training less frequently, 9) had poorer relations with their teachers in high school, 10) played hooky more often in high school, 11) received less parental approval of their friends, 12) had their parents restrict and suspend their driving more frequently, 13) improved their driving more because they had been in an accident, 14) appeared to the interviewer to be less frank and honest, 15) more frequently reported missing seeing a stop sign until it was too late, 16) when 16-17 years of age, more frequently attended car races, drove to

think about problems, drove to get away from other people, drove to cool down after an argument with someone, enjoyed driving on winding roads, liked to drive, and admitted driving recklessly, and 17) described themselves as more conventional, persevering, polished, self-controlled, friendly, decisive, orderly, sophisticated, and less frank.

(The author warns of the possibility of spuriousness since over 300 variables were tested, and some of the significances may be attributable to random sampling.)

It is of considerable interest that information on the role of marital status is rather meager in this review. The only major effort to assess its relationship to accidents and violations appears in one of the California studies (The 1964 California Driver Record Study, Part 5, 1965). The authors very properly call attention to the fact that their information pertains to each driver's reported status as of the issuance date of his current license at time of coding of the data. Further, this status would be expected to change, particularly for the younger age groups, where most marriages first occur, and especially during a period as long as three years. Also, divorced or widowed drivers were coded as single. Fotunately, analyses for a one-year period are also presented, in which these confounding effects are less worrisome. Data for the age groups of special interest here are shown in Table 8.

We see here that married males under 20 have a higher annual rate of accidents than do single males—40 percent higher. For those aged 20-24, singles have a somewhat higher rate than those who are married, and for the 25-29 group, the rates are almost identical. (From this point on, until age 74, single males have the higher annual accident rates, in the California data.) The pattern for violations is rather similar. Married males under 20 have the higher annual rate—by 21 percent—and thereafter the singles have a somewhat higher rate.

The females show a different pattern. The singles have a higher annual accident rate for all age groups (through age 74). The violation rates are the same for those under 20, and thereafter (until over age 74) the singles have a higher rate.

From the studies by Pelz and Schuman (April 1971) we have some data on the relationship between marital status and amount and kind

TABLE 8

Mean accidents and violations by age groups, sex and marital status, one-year period

		Accidents				Violations			
Age	N	Married	Male Single	Female Married	Single	Married	Male Single	Female Married	Single
Under 20	4845	.244	.174	.069	.085	.823	.679	.178	.179
20-24	9973	.118	.128	.047	.075	.545	.590	.136	.252
25-29	10,740	.107	.111	.039	.082	.406	.436	.099	.252

Source: The 1964 California Driver Record Study, Part 5.

of driving, shown in Table 2 and discussed earlier. In addition to the remarks summarized there, the authors go on to say:

> Married men drove more miles than single men, but single women drove more than married. Particularly, single women spent more *time* driving. An obvious interpretation is that when a young woman marries, her husband takes over much of the driving she used to do; his mileage increases while hers drops . . . single men and single women did more driving after midnight than their married counterparts.

Interestingly, positive marital events, in the Pelz and Schuman studies (October 1971) showed no relation to crashes or to violations-plus-warnings (Table 6), but negative marital events were related to both crashes and to violations-plus-warnings for females, and to violations-plus-warnings for males; the greater the number of such events the higher the crashes and violations-plus-warnings (adjusted for exposure).

Harrington's analyses (Table 7) show positive correlations between "married-single" and male accidents and convictions, but negative correlations for female accidents and convictions (married was coded one and single zero). This would seem to be consistent with Pelz and Schuman's interpretation that the single girl's driving is taken over by her husband when she marries. Divorced/separated was not related to accidents for either sex, but was related to convictions for both sexes, divorced or separated drivers having more convictions than those who were single, widowed or married. In these data the marital status of the drivers could have changed during the four-year period of the study, but the report on marital status pertains to a given point in time. In Harrington's interview study of high- and low-accident drivers, marital status did not appear as a significant variable.

Driver Education

Since the literature on driver education and driver improvement is reviewed elsewhere (Goldstein, 1969; Kaestner, 1969), such a review is not a part of the present effort. However, Harrington's recent study on the young driver (September 1971) presents an extensive and

intensive analysis on driver training (behind-the-wheel in California) and driver education (classroom instruction in California). His findings are very relevant to the subject of the present review.

The special features of Harrington's analyses are a) detailed driving records on the first four years of driving after licensing, b) sizable numbers of cases—for males, minima of 1761 vs 3025; for females, minima of 1647 vs 2503, in the analysis on driver training, c) data on large numbers of variables that could be used in covariance adjustments—50 for males, 29 for females in the driver training analysis, d) several methods of covariance adjustment.

Findings for driver training, before covariance adjustment, were as follows:

Males with driver training had significantly better accident records in the first year than those without, but there were no significant differences in the next three years; the conviction record was better in all four years for the driver training group.

Females with driver training had significantly better accident records than those without during the first and fourth years, but very similar records in the second and third years; the conviction record was better in the first three years, but not in the fourth year.

For both accidents and convictions, and for both sexes, the driver training group had significantly fewer accidents and convictions for the total four years combined.

But there were 50 variables on which the males with and without driver training differed, and 29 variables on which the females with and without driver training differed. Seven different methods of analysis of covariance were used, using different degrees of freedom, different sets of covariates, different computational techniques, and different sets of subjects. Results as to the statistical significance of the adjusted differences were uniform with the exception of male convictions. Harrington cautions the reader that various limitations, such as missing data and the limitations of the analysis of covariance, preclude conclusive and precise results, but with these caveats, the findings are as follows:

1. Driver training appeared to reduce fatal and injury, partially-at-fault, and single-vehicle accidents for females. The reduction is esti-

mated to be from 9 to 11 fatal and injury accidents per thousand drivers in the first year. The cost of driver training for females is approximately repaid by the savings from reduced fatal and injury accidents, assuming that the effects are causal.

2. Evidence with respect to males was less firm. The adjusted means were not significantly different. Very interestingly, there was some evidence for differential effectiveness for different types of persons and programs: a test on the homogeneity of slopes of regression lines showed them to be different.

3. With respect to convictions, the findings for the adjusted means for males, using different methods, were not consistent. This was also true for females. The author emphasizes that limitations of the method preclude drawing definite conclusions, and he properly emphasizes that any future driver training research should use a randomized groups experimental design.

A smiliar kind of analysis was carried out on driver education (classroom instruction), but with fewer cases. This analysis appeared to be less satisfactory to the investigator himself, and appeared to this reviewer to be less clearly reported. Driver education appeared to reduce fatal and injury accidents among females, at a considerable saving in accident costs, but appeared to have little or no effect on accidents for males. Other findings were less firm due to methodological limitations.

It is not clear from the analyses presented what the effects of the combination of driver training and driver education might be, when adjusted for the effects of differences in biographical variables.

An interesting outcome that appears in the tables (but is not discussed in Harrington's report) is that the standard deviation of accidents and violations, for both sexes, is generally smaller for the driver training group than for the group with no driver training. It would be interesting to speculate why this might be so, and what it means.

Summary and Suggestions

It is not news that youth is a time of turbulence. It is not news that learners of a task make more errors, have less dependable skill and judgment and foresight than older, experienced hands. In the past

several years, the problems of youth and their dissatisfactions and frustrations have made national headlines. It is well recognized that a loaded gun in the hands of a troubled person represents grave danger, to himself and others. The danger of a modern motorcar in the hands of a troubled and inexperienced person is also a serious matter. This is not to say that all young people are involved in personal and social turbulence of a severe sort, or that all constitute a danger to society. But the age range 15-24 is disproportionately characterized by difficulties of many kinds. Many youth are experiencing considerable storm and stress. They need help.

By any measure, young drivers in the age range 15-24 are involved in trouble on the highway far beyond their numerical share or their miles of driving. They have more than their share of fatal accidents and fatalities, as drivers and occupants of the motorcar. Very few, only about 6 percent in this age group are killed as pedestrians; 94 percent are operators or occupants. Young drivers have more than their share of single-vehicle, run-off-the-highway accidents in motorcars. Driving and riding motorcycles is a youth-type of activity; the fatalities are characteristically young people. Alcohol is involved to a suprising degree in the fatalities of young drivers and passengers. This age group is greatly overrepresented in arrests for crime, to the extent of almost twice their share of the population. And it is overwhelmingly the young male who is over-involved in highway fatalities, in alcohol-involved fatalities, in motorcycle fatalities, and in arrests for crime. The behavior of youth on the highway is a part of their more general behavior. Their highway accident problem is embedded in a matrix of social, personal, economic, educational and other problems. It would be easy to say that if we solve our broader social problems we would solve the highway accident problems. This appears a long way off, and we must consider what might be done to keep young people from killing themselves and others on the highway while they are working out the adjustments and solutions to their broader problems.

Many people have long sought the simple solution to the highway safety problem. The prospect of an injury-proof motor vehicle has excited many. Considerable strides in this direction have been made, in terms of improved windshields, dash padding and dash design, energy-absorbing steering columns, incursion-resistant side bars,

energy-absorbing bumpers, and others. The air cushion restraint holds high promise. These developments are all certainly to the good, and their benefits will increase as more cars are so equipped, but we are still faced with the behavior of the human being who controls the car, and the disproportionate failures in this connection that characterize the young beginning drivers.

It seems abundantly clear from the research reviewed here that personal characteristics, background characteristics, and the stresses of life characteristic of this age group play an active role in the highway accidents of youth. It also seems clear that very considerable driving experience is required—after driver education and after licensing—before a young driver achieves dependable know-how, skill and judgment in the driving task. And while this learning and maturing and "settling down" go on, any single driving error might be fatal. What can be done to help the new young driver to speed up this process of learning and maturing?

There are three kinds of programs currently in operation which offer considerable potential for improvement of the driving behavior of new young drivers: driver preparation, driver licensing, and driver improvement programs. An improved, scientifically based licensing operation appears central to an upgrading of current driver education programs. To the student, one primary purpose of the formal course is to prepare him to pass the license exam. It would seem inevitable that improved driver education courses would follow from improved standards for licensing. The students and the public in general would demand better preparation for higher standard exams. Licensing examinations need to be extended in coverage and designed to serve a diagnostic-remedial purpose. The commonly used 20-item multiple-choice test, and a five- or ten-minute drive around the block or on the driving range, with demonstration of parking ability, seem woefully inadequate. A successful applicant, after a brief and cursory examination, is presented a document which declares that he is now a qualified licensed driver, competent to drive anyhere in the USA, almost anytime. Surely, this must be misleading in a great number of cases; the high accident rates of new young drivers are too serious to be taken lightly.

It is possible to develop diagnostic tests that provide a profile of an examinee's strengths and weaknesses, so that he may be coun-

seled with respect to shortcomings in knowledge, skills, attitudes, perceptive abilities, or other relevant characteristics. The orientation would not be to select or reject applicants. Virtually everyone drives eventually. But the point is to help them, to help them achieve the highest competence practicable before they take to the road. The counseling based on the diagnostic tests would be a step toward amelioration. The means by which to improve must also be developed and made available. These are objectives which appear well within the present capability of behavioral scientists, given the opportunity and resources.

To be effective for these objectives, the tests should be developed on the basis of a probabilistic rationale. Only those items or tasks should be included in the examinations which can be shown to be causally related to an increased or decreased probability of accidents. The logic here is illustrated by findings on cigarette smoking and lung cancer. In fourteen studies, the correlation between the two ranged from .001 to .009, but the probability of lung cancer among smokers ranged from 1.2 to 39 times that among non-smokers. The similarity here is that both lung cancer and highway accidents have multiple causes and are rare events. The correlation coefficient does not tell us all we need to know for purposes of prevention, however useful it is in the selection situation.

To illustrate further, let's look at the two by two scatterplot below:

	Acc.	**No Acc.**	
C	10	40	50
No C	50	900	950
	60	940	1000

Here we have a hypothetical random sample of 1000 drivers from the general population of drivers. Only 60 of 1000, or 6 percent, have had accidents in this year; 94 percent are accident-free. Of the 1000, only 50 have the given characteristic under study, or 5 percent; 95 percent do not have the characteristic. Ordinarily, we ask the question: what is the correlation between having this characteristic or not and having accidents or not? The phi coefficient in this case comes to .135; less than 2 percent of the variance of these two

variables is in common. This is not much of a basis on which to initiate a prevention program. And this is about the size of correlation one gets between single variables and accidents in general. However, if we look at the relative accident rates, or relative probability of accidents, for drivers with the characteristic and drivers without the characteristic, we find that 10 of 50, or 20 percent, of drivers with the characteristic had accidents, compared with 50 of 950, or 5.25 percent, of those without the characteristic who had accidents. The relative probability of accident among those with the characteristic is almost four times as high as for those without it. At this point we must face the fact that only 5 percent of the driving population has this characteristic, and of that 5 percent only 20 percent have accidents. Is it worth launching a program aimed at reducing the accident risk for drivers with this characteristic—since there are so few? This depends on the cost of such a program and its effectiveness with such drivers. On the one hand we must recognize that such a program cannot have a large impact on the overall accident total. But if a group can be shown to have an accident risk that is nearly four times the average, does not society owe this group some help in reducing its risk of accidents?

We do not stop here. We need to do the research required to identify the presumably large number of such characteristics, each of which pertains to only a small portion of the total driving population, but in sum can have a considerable impact. The term "characteristic" is perfectly general. It might be knowledge of a given item of information, or having the habit of driving after drinking alcohol, or color-blindness, or high blood pressure, or an unrealistic assessment of his own ability, or an undesirable attitude, etc. The research of Pelz and Schuman, of Harrington and of Kraus et al. furnish many good suggestions.

The research required to implement this diagnostic approach is considerably more expensive than the conventional item analysis, because it requires very large samples and a great deal more manipulation of the data. With the availability of computers, this should pose no great problem. What is required is very large numbers of cases on which we have both information with respect to the item under study and the record of driving history. A comparison needs to be made of the accident rate for the group with the characteristic and the

group without it, when relevant factors are appropriately controlled. And we need to constitute such a pair of groups for every item or characteristic under consideration.

The development of diagnostic-remedial programs as suggested and their implementation will be considerably more expensive than the systems currently in use. But if sufficiently successful, they could pay for themselves many times over in reduced accidents, reduced violations, and improved traffic flow.

Precisely the same diagnostic-remedial approach needs to be taken with respect to driver preparation, or driver education, whether it be in public schools or commercial schools. Surely all students do not bring the same backgrounds and needs to the courses. Some already have considerable information, and, especially in rural areas, some even have some driving experience. Some have personal characteristics which will affect their driving behavior, their drinking behavior, and their use of drugs, for instance. It seems wise in this area as in other areas of human development to structure the programs around the needs of individuals, whatever they are. Very importantly, the information generated in the development of the kinds of examinations suggested would throw light on what is fundamentally important or critical in accident-free driving, and this information could readily be fed into the curricula of the formal courses.

The development of a diagnostic-remedial approach based on the probabilistic rationale indicated offers considerable promise for increasing the effectiveness of driver improvement programs also. Again, the processes and procedures should be developed around the needs of individual drivers, rather than the notion that it is all good for everybody. But such programs need to be developed on the basis of research, conducted by trained and experienced behavioral scientists, who are at home in psychometrics, in research methodology, and in statistics, and who know the substantive area. This is not an area where good common sense can suffice. As well as means to determine individual needs, we need research to develop optimal methods for meeting the individual needs at costs that are justifiable by the benefits.

The approach has promise, but only rigorous research can determine just how useful it is, and whether the costs of developing and

operating diagnostic-remedial programs will be justified by the benefits in highway safety and improved traffic flow, in the short run, and in the long run. Since a few years beyond formal instruction appear to be necessary for development of dependable competence, an extended period of supervision after licensing seems eminently desirable.

All of these points would seem to be equally applicable to both automobile drivers and to motorcycle drivers, whose numbers are increasing rapidly.

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DISCUSSION

D. J. Moffie

From 1945 until 1955 Dr. Moffie was Chairman and Professor of Psychology in the Department of Psychology at North Carolina State University. He was Vice President, Industrial Relations, Hanes Hosiery Mills in Winston-Salem, North Carolina, from 1955 until 1962. Since 1962 he has been a professor in the school of Business Administration at the University of North Carolina, Chapel Hill.

Dr. Moffie's present interests are in general management problems and in occupational safety.

• • •

Almost twenty years have passed since I last engaged in a highway safety research project—not because I lost interest in this area but because I have become involved in other areas of management research and development. Some have been closely related to accident research, others quite different. Basic to both areas, however, has been theory, hypothesis testing, experimental and field research designs, data analysis and plain good research.

Since so many new developments have occurred, I am somewhat dismayed to find that we are still talking about descriptive data, correlational studies and the like. And it appears that Dr. Goldstein's paper is written much in this vein. I should like to propose that it is time we move into more sophisticated designs and more sensitive statistical methods for anaylsis of data. The programming and computer facilities available today make possible the kinds of things we would like to have done twenty years ago.

It appears to me that we need to start out with more basic theory and hypothesis testing if the field of highway research is to progress as a discipline of study. Cause and effect relationships must be determined. Our descriptive techniques, or correlational analyses, will not give a cause and effect relationship. Can we assume, for example, that age is a direct factor in its relationship to the incidence of accidents or that there are rival causes highly related to age that bring about this realtionship? Even the most sophisticated correlational techniques cannot provide these answers.

I should like to direct my attention to the following topics in response to Dr. Goldstein's paper:

I. Theory and hypotheses
II. Correlational designs
III. Time series
IV. Experimental designs
V. Threats to validity (internal and external)

I. Theory and hypotheses:

Theory is basic to all research. A theory is simply a set of interrelated constructs that are used to explain a phenomenon. It is not conjecture or loosely related facts. The constructs must be clearly defined, and before any kind of research can take place these constructs must be made operational. This is where we very often fall short in research. From theory we generate hyoptheses. It is the individual hypothesis or hypotheses that we investigate.

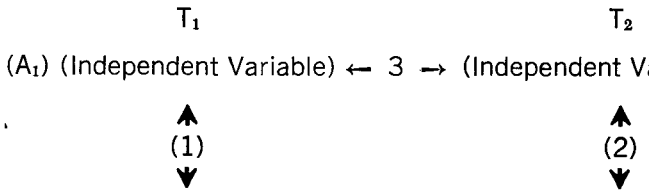
There is little doubt that hyoptheses are necessary in scientific research. There are three reasons for this. The first is that a hypothesis evolves from theory, and it generates other hypotheses. The second reason is that we can manage testing a hyopthesis. It is a declarative statement and can be made operational and, finally, hypotheses can be tested, and we can either reject or accept them.

It is my impression we have not done enough of this kind of thinking in accident research.

II. Correlational Designs:

As was pointed out in the previous section, the desired way of determining whether two variables are causally related is to do an experiment, whether it is in the laboratory or in the field, in which one variable can be manipulated in order to observe its effect on another. Designs are available to determine the effects of varying more than one variable at a time and observing the effects on one or more dependent variable. There are, however, many problems that do not lend themselves to these models. The designs for these types of problems are quasi-experimental in nature since they allow causal relationships to be manipulations.

One of these designs is a cross-lagged panel correlational design. The cross-lagged correlational model may be shown as follows:



The logic in this method is based on the time lag that normally exists between the independent variable and the dependent variable or, considered another way, the time lag that exists when one variable has an effect on another.

The rationale is that if A_1 causes B_1, then A_1 should be more highly related to B_2 than to B_1. Accordingly $^{r}A_1B_2$ should be higher than $^{r}A_1B_1$. By comparing the relative sizes of the correlations in the cross-lagged panel, it is possible to determine whether the hyopthesis $A \rightarrow B$ or $B \rightarrow A$ is more tenable.

These models can be dynamic to parcel out rival hypothesis and provide stronger evidence with respect to causality.

It would appear that the usual correlational studies in accident research could be extended to include some of these concepts.

III. Time Series:

Campbell published an excellent article in the American Psychologist in 1969 entitled, "Reforms as Experiments" in which he showed extensive use of time series in accident research[1]. He used the Connecticut crackdown on speeding in 1955 and its subsequent effect on traffic fatalities. At the end of the a year of enforcement in Connecticut there were 284 traffic deaths as compared to 324 the year before, a reduction of 12.3 percent. Campbell illustrates these changes graphically but also points out the numerous threats to internal validity in using such a time series and possible ways by which these threats can be parceled out or wholly removed. Reference is made to threats of maturation, instability in the time series, and regression effects. This is an excellent article to begin with for anyone interested in time series as a method of research.

Gottman, McFall and Barnette in 1969[2] wrote an interesting and informative article on time series, and their emphasis is directed to the elimination of static, or noise, in the time series by the use of exponentially weighted moving averages. They also illustrate a test of significance based on residuals before and after a given time period.[3]

This technique could be applied to accident data which are available for a number of years. When a new countermeasure, such as the use of chemical breath tests, is introduced, it might be possible to identify the kinds of crashes the countermeasure would be expected to affect. Then the frequency of such crashes could be plotted for the years preceding the introduction of the countermeasure, as well as since its use was begun. The introduction of any new technique could conceivably be evaluated using the time series method. It is recognized that accidents represent a conglomerate of many factors, and to detect an effect of a countermeasure it would be necessary to define clearly the particular subset of accidents that would be expected to respond to the countermeasure in question.

IV. Experimental Designs

Many experimental designs have evolved over the past twenty years. And now to mention a few of these and their possible use in accident research:

1. Solomon Four-Group Design. This design is an extension of the usual control-group design. Symbolically it can be shown as follows:

Experimental Group	O_1	X	O_2	O-Observation
Control Group	O_3		O_4	X-Experimental Variable (Manipulation)
Experimental Group		X	O_5	
Control Group			O_6	

This design allows for a number of comparisons and controls for instrumentation and treatment effects on the results.[4] It does pose the problem of having two experimental and two control groups.

2. Orthogonal designs. A number of designs are available that provide fragmentation of many combinations. For example, if one tried to vary three variables at two levels, he would have eight possible combinations to study; five variables at five levels would yield 3125 combinations. For both of these designs, one could reduce the number of combinations and still generate equations to explain the behavior of the model with a high degree of accuracy. For the latter design only 32 combinations are needed to explain the behavior of 3125 combinations.

For both of these designs, I am sure situations in accident research can be found where application is possible. The Solomon Four-Group design would be particularly useful in evaluating the effects of any new educational program. For example, if funding could be obtained for special driver education classes in which simulators, instrumented vehicles, and off-road courses are used, it should be possible to evaluate the newer methods by use of this design.

V. Threats to validity:

The researcher over the past decade has become aware of many threats to internal and external validity. These obviously need to be controlled. A few of these are maturation, effects of instrumentation, statistical regression, effects of testing, biases due to selection, experimental mortality, and a number of others. A brief description of each of these is in order:

Maturation—a function of time; growing older, more tired, etc.

Instrumentation—changes in instruments produce changes in obtained measurements.

Statistical regression—operates because people or subjects have been selected on the bases of extreme scores.

Testing effects—the effects of taking one test on the scores of another.

Biases due to selection—differential selection biases for the comparison groups.

Mortality—loss of participants in a study.

In addition to these biases, we have placed considerable emphasis on experimenter and subject bias where both of these variables need to be controlled.

In conclusion, I should like to point out that many advances in designs, data analysis and computer utilization have resulted over the past twenty years. Utilization obviously needs to take place. I see a definite need for this in accident research.

FOOTNOTES

[1]Campbell, Donalt T. Reforms as experiments, *American Psychologist,* 1969, pages 409 - 429.

[2]Gottmam, John M., McFall, Richard M., and Barnette, Jean T. Design and analysis of research using time series, *Psychological Bulletin,* 1969 72, pages 299-306.

[3]One assumes that the model for period I is the same for period II and proceeds to forecast observations for period II calculating a residual sum of squares SS_1, where $SS_1 = \epsilon\ (x_t - x_t)^2$ were x_t is the forecasted value of x_t. One then fits a model to period II separately and calculates a residual SS_2. One then computes

$$F = \frac{(SS_1 - SS_2)/df_1}{(SS_1 + SS_2)/df_2} \quad \text{where} \quad \begin{array}{l} df_1 = 2 \text{ (Two parameters involved)} \\ df_2 = N_2 - 2 \text{ (N_2 is the number of observations in period II)} \end{array}$$

One can then determine in the time series where the maximum F occurs and then by consulting the intervention or treatment schedule one can develop hypotheses for the shifts. These hypotheses can then be tested by replication or by a multiple time-series experiment.

[4]The following analyses are possible with the Solomon Four-Group design:

(1) $0_2 > 0$, (2) $0_4 > 0_2$, (3) $0_6 > 0_5$, and (4) $0_5 > 0_3$

(5) Measurement of treatment effects —

$$0_5 - \frac{0_1 + 0_3}{2}$$

This measurement parcels out a control for the interaction bias of 0_1 on X

(6) Measurement effects —

$$(0_4 - 0_3) - \left[0_6 - \frac{0_1 + 0_3}{2} \right]$$

Measurement effects would show up on $(0_4 - 0_3)$ in contrast to $\left[0_6 - \frac{0_1 + 0_3}{2} \right]$. If $(0_4 - 0_3)$ is greater than $\left[0_6 - \frac{0_1 + 0_3}{2} \right]$, then there is a measurement bias — 0_4 as affected by 0_3

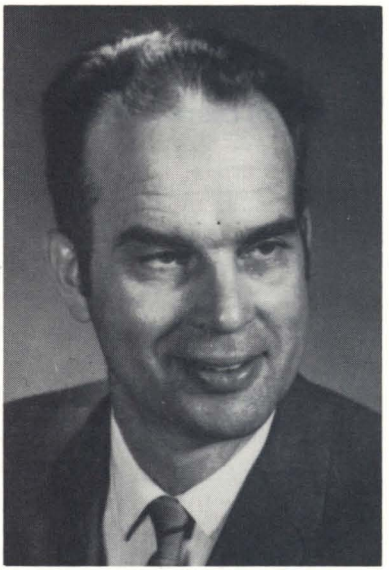
Section III

The Young Problem Driver

Donald H. Schuster

Discussant

William Laurens Walker



DONALD H. SCHUSTER

Dr. Donald H. Schuster is a professor in the Department of Psychology at Iowa State University. A specialist in electronics, he teaches classes in educational and engineering psychology and conducts research on traffic safety, stress, and programmed instruction. Dr. Schuster received his doctorate in psychology at the University of California at Los Angeles, where he worked as a research associate and directed the Traffic Project. The Project led to the development of a test, the Driver Attitude Survey, which has a low but useful predictive validity for driving accidents and moving violations.

THE YOUNG PROBLEM DRIVER

By Donald H. Schuster

The first purpose of this paper is to review and identify characteristics of the young problem drivers. The second purpose is to review studies aimed at improving the driving behavior of young drivers and to summarize their results.

Youthful drivers have been defined in some instances as under 21 and under 30 in others. For this presentation, I will use the definition 'under 30'.

A problem driver likewise can be defined in several ways. Involvement in a high number of accidents or accruing many citations for moving violations (or both) is one way. Another is to define youthful drivers in terms of the high insurance premiums paid for liability insurance. A person who has experienced a greater than average number of driving accidents and/or moving violations is, for the sake of definition, a problem driver.

Finally, we come to the task of defining the young problem driver, which logically involves the intersection of the two previous definitions. That youthful drivers are also typically problem drivers is documented by the repeated finding that drivers under 25 years of age have 30-50 percent more accidents while driving than their frequency in the general population would indicate (Brooks, 1968; Goldstein, 1964; Harrington et al., 1970; Lamberto, 1971; Waller, 1970). However, there are a few young drivers that are not problem drivers, according to this definition, because they do not become involved in accidents while driving nor do they get traffic citations. Conversely, some problem drivers are not youthful, although the majority is. For example, the average age of problem drivers in a California study was 32 vs 39 for all drivers (Schuster, 1969). Thus, it becomes relevant now to look at the characteristics of young and problem drivers to identify and predict youthful problem drivers and help them to improve their driving.

As reviewed in the literature, young drivers typically also are problem drivers. Brooks (1968) reported that the largest percentage fatalities occurred among younger drivers, particularly young males. Harrington, et al. (1970) reported that speed equipment and major

violations decreased with increasing age. Violations concerned with signs, turns and passing showed a U-shaped relationship with age, with both the young and old drivers having more violations than the middle-aged drivers. Goldstein (1964) reported that two age groups contributed disproportionately to the accident total: drivers under 25 and those above 65. The typical violator is male. Pelz and Schuman (1971) reported that young drivers were more dangerous than older drivers even after controlling for the effects of exposure and driving experience. A peak was found at 18 and 19. Schuster, et al. (1964) reported that the number of accidents decreased monotonically to zero as years of driving experience increased. Waller (1970) suggested that the major problem of the youthful driver may be his inexperience, rather than youth itself. The question, then, boils down to this: Why do young drivers get into trouble? What are the characteristics of young drivers who get into difficulty versus those who do not?

METHOD

Characteristics of young problem drivers were compared with those of both older problem drivers and average drivers. Unfortunately, there is little research that bears directly on this subject. Therefore, existing data on problem drivers from California and Iowa were reanalyzed and the samples are discussed below.

The California sample of problem drivers (n=670) was obtained in Los Angeles in 1959 and 1960. The operational definition of problem driver was set forth as a person whose driving record was sufficiently poor to warrant being called in for a personal improvement interview by the California Department of Motor Vehicle authorities. Data on these drivers were obtained at the end of the interview or during a driver improvement class, which they voluntarily attended as a result of the interview (Schuster, 1969). The median age for these drivers was 28.2, but ranged from 17 to 83. To get data on young problem drivers, the sample was split at this median; young drivers (n=330) were defined as 28 or under as of date of testing and older drivers (n=340) as 29 or over. A previous study (Schuster, 1964) provided a stratified random sample of average California drivers (n=400) matched to statewide data on age, sex, violations and accidents. The driver characteristics studied are described in detail in previous reports by the author.

The Iowa sample of problem drivers (n=370) was obtained in 1963 and 1964 as drivers were called in for an improvement interview. The data were obtained at the end of the interview (Wilkes, 1967). The median age for these Iowa problem drivers was 20.1, considerably lower than the California median age of 28.2. Their ages ranged from 16 to 65. Perhaps the advice of Horace Greeley facetiously could be rephrased, "Go west, young problem." The Iowa sample was split at this median age, making a group of younger problem drivers (n=181) with an age of 20 or under, and a group of older problem drivers (n=189) defined as 21 or older as of the date tested. A comparison sample of representative Iowa drivers (n=200) was provided, stratified by age, sex, and residence to match statewide norms. The driver characteristics studied are reported in detail in the studies by Wilkes (1967) and by Schuster (1967).

RESULTS

The California samples' data are shown in Tables 1 and 2. Results concerning validity of "problem drivers" are mentioned first. The driving records of both young and older problem drivers were obviously worse than those of average drivers. Similarly, both groups of problem drivers were more ascendant, showed lower interpersonal relationships, lower aesthetic appreciation, drove more miles annually, and had more black drivers as compared with average California drivers.

Next we focus on characteristics of the younger problem drivers that were significantly different from both the older problem drivers and average California drivers. The younger problem drivers were less stable emotionally, less objective, more adventuresome, less self-reliant, felt more need for precision, had higher violations and accident attitudes, had had more employers in the last two years, had less car insurance and did more night driving than the other two groups. Several other significant characteristics reflected on the validity of "younger" in the definition of younger problem drivers. Thus, the young problem drivers had been driving significantly fewer years, were more often single, had fewer dependent children, had had less military service, were at a lower occupational level, more likely had had driver education, and of course, were considerably younger than older problem drivers or average California drivers.

TABLE 1

Averages and standard deviations for attitudinal and driving characteristics of older (n=340) vs younger (n=330) problem drivers vs average (n=400) drivers in California.

Characteristic	Driver group					
General Attitude Survey	**Older prob.**		**Younger prob.**		**Average Cal.**	
	Ave.	**S.D.**	**Ave.**	**S.D.**	**Ave.**	**S.D.**
Ascendance	6.19	2.36	6.15	2.57	5.65*	2.39
Sociability	7.74	1.83	7.16	2.07	6.97	2.22
Emotional stability	9.00*	2.54	8.12	2.80	8.79*	2.75
Objectivity	10.36*	2.76	9.60	2.92	10.20*	3.00
Friendliness	11.81*	3.45	10.96	3.29	11.47	3.34
Thoughtfulness	9.17	2.43	9.02	2.58	8.90	2.55
Personal relations	10.18	3.08	9.55	3.01	10.50*	3.00
Need for attention	4.55*	2.71	5.56	2.82	5.14	2.69
Adventure vs. security	4.00*	2.48	5.96	2.89	4.54*	2.66
Self-reliance	9.87*	2.58	9.28	2.57	10.02*	2.60
Aesthetic appreciation	5.52	3.38	4.94	3.47	4.36*	3.24
Cultural conformity	8.26	2.71	7.73	2.57	8.02	2.42
Need for freedom	5.96	2.33	5.92	2.31	5.99	2.09

TABLE 1 (Cont)

Characteristic (Cont)	Driver Group					
	Older prob.		Younger prob.		Average Cal.	
	Ave.	S.D.	Ave.	S.D.	Ave.	S.D.
Reality thinking	10.57*	2.88	9.44	3.19	10.10	3.01
Need for precision	2.92*	2.53	3.44	2.57	2.89*	2.42
Spiritual values	9.54*	3.48	8.64	3.42	9.05	3.32
Ambitiousness	6.62*	3.13	7.38	3.17	7.01	3.17
Driver Attitude Survey						
Faking attitude	10.62	3.35	10.00	3.29	10.13	3.14
Misses attitude	5.04*	1.96	4.08	1.90	4.38	2.01
Violations attitude	9.09*	2.79	10.85	2.68	7.79*	3.04
Accident attitude	6.28*	2.48	7.84	2.24	5.49*	2.58
Driver record						
Previous violations/3y	7.08	2.74	7.36	3.13	2.58*	3.43
Previous accidents/3y	1.09	1.17	1.25	1.19	0.61*	0.99
Follow-up action/3y	1.62	1.37	1.99	1.39	0.48*	1.06
Follow-up violations/3y	3.25	2.79	3.58	2.69	1.19*	1.85
Follow-up accidents/3y	0.61	0.87	0.62	0.89	0.22*	0.54

* Significantly different from younger problem drivers at the 1 percent level.

TABLE 2

Averages and standard deviations for biographical characteristics of older (n=340) vs younger (n=330) problem drivers vs average drivers (n=400) in California.

Characteristic	Driver group					
	Older prob.		Average		Younger prob.	
	Ave.	S.D.	Ave.	S.D.	Ave.	S.D.
Years of schooling[1]	3.39	1.03	3.37	0.78	3.49	0.94
Years driven[1]	4.14*	0.85	2.85	0.67	3.93*	1.00
Annual miles driven[1]	3.28	0.94	3.22	0.85	2.95*	0.79
No. dependent children	2.44*	1.39	1.63	1.09	2.32*	1.35
No. non-driving accidents/5y	1.40	0.82	1.53	1.00	1.48	0.96
No. employers/2y	2.24*	0.97	2.74	0.98	2.25*	0.79
Car condition[1]	2.28	1.04	2.43	1.20	2.44	1.06
Amount rural driving[1]	3.86	1.24	3.90	1.20	3.90	1.12
Amount rush hour driving[1]	3.04	1.26	3.07	1.23	3.18	1.21
Amount night driving[1]	3.76*	0.95	3.45	0.89	3.84*	0.80
Age in years	41.90*	10.66	23.25	4.50	37.43*	12.81

TABLE 2 (Cont)

Characteristic (Cont)	Driver Group					
	Older prob.		Younger prob.		Average	
	Ave.	S.D.	Ave.	S.D.	Ave.	S.D.
Full car insurance	54%*	—	43%	—	62%*	—
Health problems	10%		12%		8%	
Married	54%*		36%		72%*	
Military service, under 2 y	58%*		67%		50%*	
Professional, managerial, office	52%*		42%		53%*	
Driver education course	8%*		19%		8%*	
Truck usually driven	14%		14%		9%	
Black (race)	19%		18%		6%*	
Visual restriction to drive	13%		12%		16%	

* Significantly different from younger problem drivers at the 1% level

1: Coding employed: Years of schooling: 1- 4 or less, 2- 5 to 8, 3- 9 to 12, 4- 13 to 16, 5- over 16; Years driven: 1- under 1, 2- 1 to 4, 3- 5 to 11, 4- 12 to 24, 5- over 24; Annual miles driven: 1- under 1600, 2- 1600 to 4999, 3- 5000 to 15,999, 4- 16,000 to 49,999, 5- 50,000 and over; Car condition: 1- perfect, 2- excellent, 3- very good, 4- good, 5- fair; Rural, Rush and Night driving: 1- 93 to 100%, 2- 70 to 92%, 3- 31 to 69%, 4- 8 to 30%, 5- 0 to 7%.

Turn now to Iowa data and consider the problem driver validity data first. Table 3 shows that the driving record of young and old problem drivers in Iowa was worse than that for the average Iowa driver.

TABLE 3

Averages and standard deviations for characteristics of older (n=189) vs younger (n=181) problem drivers vs average (n=200) drivers in Iowa.

Characteristic	Driver group					
	Older prob.		Younger prob.		Average Iowa	
Driver Attitude Survey	**Ave.**	**S.D.**	**Ave.**	**S.D.**	**Ave.**	**S.D.**
Deviance attitude	1.02	1.27	1.14	1.28	1.04	1.29
Faking attitude	11.85	3.38	11.49	3.50	12.39*	3.11
Misses attitude	4.84	1.49	4.30	1.59	4.85*	1.85
Violations attitude	8.60*	2.09	10.28	2.19	7.89*	2.51
Accident attitude	11.97*	2.80	13.91	2.54	10.66*	3.33
Alcoholic attitude	2.01	1.61	1.67	1.32	1.79	1.53
Driver record						
Previous action/3y[1]	0.99*	1.72	0.55	1.36	—	—
Drunk driving charges/6y	0.05	0.30	0.01	0.07	—	—
Previous violations/3y	3.88	1.56	3.55	1.38	0.49*	1.05
Previous accidents/3y	1.09	1.02	1.03	0.88	0.34*	0.64
Interview action/3y[1]	0.88	1.31	0.99	1.40	—	—
Follow-up violations/3y	1.55*	1.92	2.10	2.19	0.30*	0.60
Follow-up accidents/3y	0.54	0.75	0.66	0.80	0.19*	0.45

TABLE 3 (Cont)

Characteristic (Cont)	Driver group					
	Older prob.		Younger prob.		Average Iowa	
	Ave.	S.D.	Ave.	S.D.	Ave.	S.D.
Biodata						
Annual mileage[1]	3.48	0.81	3.06	0.74	2.77*	0.97
Age in years	28.50*	9.07	18.46	1.06	35.52*	13.22
Resident city size[1]	1.80*	1.07	2.32	1.12	—	—
Night driving, ⅓ or more of all	49%	—	57%	—	30%*	—
Married	60%*	—	12%	—	73%*	—
Professional, managerial, office	17%*	—	35%	—	37%	—
Male sex	96%	—	99%	—	59%*	—
Truck drivers	30%*	—	13%	—	11%	—
Health problems	5%	—	5%	—	4%	—
Dependent children, 1 or more	55%*	—	4%	—	59%*	—
Visual driving restriction	12%	—	14%	—	—	—

* $p<.01$ vs. younger problem drivers. — Not available.

1: Coding employed: Previous & Interview action: 0- none, 1- warning letter, 2- probation, 3- 5 to 30 days suspension, 4- 40 to 150 days suspension, 5- 180 or more days suspension or revocation; Annual mileage driven: 1- 0 to 1,599, 2- 1,600 to 4,999, 3- 5,000 to 15,999, 4- 16,000 to 49,999, 5- 50,000 and over; Resident city size: 1- 100,000 & over, 2- 27,000 to 99,000, 3- village to 26,000, 4- rural.

Not all personality measures were obtained in both California and Iowa. Of those available, the two driving attitudes (Violations and Accidents) were higher in both Iowa and California for the young problem driver vs. the other two groups. For the variable of amount of night driving, Iowa data partially corroborated California data: young Iowa problem drivers drove significantly more at night than the average Iowa driver, but only non-significantly more than older, Iowa problem drivers. (Note that the direction of the variable was reversed by different coding in the two states.)

The following biodata, significant in differentiating the young Iowa problem driver from both the other groups, reflect age primarily, being single and having few dependent children as well as being younger.

Let's focus a little more sharply on the young problem driver's characteristics vs. those of the average driver. It was suggested that it would be better to compare young problem drivers with young average drivers rather than with *all* average drivers. Accordingly, this was done by selecting a group of average drivers whose age distribution was similar to that of the young problem drivers. This drastically attenuated the size of the young average group in Iowa (n=41), but other groups were available for this selection in California so that the young average group in California was larger (n=268).

The results of comparing the young problem driver with young average drivers were as follows. In both states, the driving records were significantly different (by definition). In California the young average drivers had significantly lower Violations (Ave=9.84) and Accidents (Ave=7.18) attitude scores as well as a lower Sociability (Ave=6.63) score than did the young problem drivers. These young average drivers also had more military service (Ave=2.94), fewer employers in two years (Ave=2.54), fewer blacks (6 percent in the group, fewer truck drivers (8 percent) and drove less annual mileage (Ave=2.89) than did the young problem drivers. In Iowa the driving record also differentiated these two comparable age groups of drivers. The only significant discriminating variable at the 1 percent level was that of sex ratio for the young average group, which was 66 percent male. Annual mileage (Ave=2.73) achieved significance at the 2 percent level (defensible here due to the lowered group size).

The interpretation of these results is complicated. In both states, exposure as measured by annual mileage apparently contributes to the poor driving record of problem drivers, young or old. The California data suggest that, even when chronological age is controlled, an immature attitude sets the young problem driver apart from the young average driver. Unfortunately, this second conclusion is not supported by the Iowa data, leaving the issue in doubt. Perhaps the lack of verification in Iowa was due to the pruning process and resultant small number of young average drivers.

DISCUSSION

Youth is an important variable related to moving violations and driving accidents. Little (1966) and the National Safety Council (1966) have provided excellent reviews that cover the relationship between age of drivers and their moving violations and accidents. A finding reported in many studies is that teenage male drivers have the highest accident rate per capita. When annual mileage is controlled, research indicates that high accident experience for young drivers may be due in part to their extensive driving. But experience is also part of this factor as Schuster (1964) observed: the highly experienced and professional driver actually has fewer accidents per mile driven than does the average non-professional driver. Waller (1970) indicated that the youthful male driver's problem is probably due to inexperience rather than youth itself. But even so, there are many questions yet to be answered concerning the seriousness of the problem and the circumstances under which young drivers get into accidents. Further, Gallagher (1969) reported that inexperience, maturity and temperamental characteristics of the youthful driver get him into trouble and that research in the area of attitudes and personality adjustments should be done. Pelz et al. (1971) reported a study to control for the effects of exposure on accidents and driving experience. Whether mileage was controlled or not, accidents for male drivers appeared to peak at the age 18-19. The effect of driver education was to delay the peak a year or two.

Adams (1970) reviewed personality variables associated with traffic accidents. He reported that personality plays both active and passive

roles in accident causation. He concluded that safe drivers are characteristically more conforming or controlled persons when exposing themselves to accident hazards. They also tend to avoid exposure to hazard in the first place. Individual differences in susceptibility to accidents are in part attributable to personality differences. Traffic collisions may be thought of as symptoms of either a hidden destructive intent or an inability to adjust to hazards.

Goldstein (1958) reported that competitiveness (such as competitive speed) or aggression was related to violations and culpable accidents. These characteristics are inversely related to age. Schuster et al. (1964) reported that the following personality variables were involved in problem drivers: general activity, restraint of impulses, ascendance, sociability, emotional stability, cultural conformity and adventuresomeness. Typically, these characteristics are related to age; for example, general activity decreases with age. Correspondingly, safety attitudes can be predictive of driving accidents and violations (Schuster, 1967). Kunce et al. (1966) reported that students with a record of high school accidents scored higher on the Aviator scale of the Strong Vocational Interest Blank than did students with no accidents. Presumably this reflects the interests in glamour and risk-taking, both decreasing with age. In contrast, Malfetti et al. (1962) reported on the characteristics of safe drivers; they were loyal, dependable, sober employees as well as nonaggressive individuals with a high level of impulse control. Adolescents in our society have trouble with control of aggression and impulse.

The results reported here on young problem drivers lend objective data to these age-related musings reported above. To repeat, these characteristics differentiated young problem drivers both from older problem drivers and average drivers: emotional stability, objectivity, adventuresomeness, self-reliance, need for prescision, job changing and driving attitudes. The direction of the difference is as one would guess from the literature except for the variable of need for precision—young problem drivers have a higher need than the others. By contrast, the insignificant results reported here tend to sharpen the picture of young problem drivers since all such characteristics examined have been reported in the literature to be involved in problem driver charactristics, but not necessarily youthful ones.

Psychosocial characteristics are next considered briefly. Crousse (1970) reported that drivers under 21 who had been involved recently in an accident had failed an elementary grade significantly more often, had been a regular cigarette smoker before 16, had been employed full-time before 17, or had been charged with a criminal offense. Carlson et al. (1970) found that the youthful traffic offender had a father with a similar record of traffic convictions and crashes. The inadequate familial socialization of the young traffic offender also was supported by his poorer academic performance than that of similar drivers without conviction and by the fact that he was involved in more non-moving vehicle offenses than similar students.

Drinking and driving by young drivers is reviewed next. Waller (1969) reported that drinking was involved in fatal highway crashes most often for younger drivers, drivers responsible for two-vehicle crashes, and drivers of old cars. However, Kaestner (1969) reported that in Oregon most of the drivers convicted of driving under the influence of alcohol were male with an average age of about 40. Pollack (1969) also reported that the convicted drinking driver tends to be about the same in age as the average driver, but that he had had less education, was lower in socio-economic status, held a skilled or unskilled job, and was often a non-caucasian. Kelleher (1971) reported that the social drinker rather than the alcoholic accounts for about 80 percent of the drinking drivers. Waller (1969) suggested that both the pharmacological effect of alcohol (intoxication) and personality factors of drivers who drink alcohol contribute to the initiation of highway crashes. Barmack et al. (1961) reported that drinking alcoholic beverages was important in leading to accidents for young drivers in the U.S. Air Force. Drinking drivers involved in accidents also were reported to have a higher incidence of a disrupted home life and more military discipline than others. Waller (1968) pointed out that a special high-risk group is composed of young persons who are inexperienced in both drinking and driving. While adult drivers may be experienced in controlling their drinking and driving, young drivers are not. This was borne out in a study reported by Caples (1969): young drivers involved in fatal accidents had significantly less alcohol in their blood than older drivers so involved. Thus, a special information and educational program concerning drinking hazards seems warranted for young drivers (Waller, 1968).

Level of driving skill is a factor in accidents. Greenshields, et al. (1967) found that both the inexperienced driver and the driver with the poor record generally made considerably more reversals of steering, braking, and gas feed controls as compared with experienced drivers with few accidents. This confirms the commonly held belief that drivers with more than their share of driving accidents somehow are deficient in driving skills. Schuman (1967) reported that the specific characteristics of impulsiveness and inexperience were associated with driving accidents in young male drivers. Barry (1970) reported inexperience to be important in motorcycle crashes.

Visual perceptual skills also are important in driving accidents. In his integrative theoretical model, Caples (1969) considers perception as the basic cause of accidents. Alexander, et al. (1967) reported that perceiving the immediate traffic situation and responding appropriately is intermediate between the immediate needs of controlling car speed and tracking, and the long term goals of trip planning and direction finding while driving. This task analysis locates the place of visual perception in the overall driving hierarchy of tasks. Adams, et al. (1965) found that drivers with high errors of visual interpretation of a pictured hazard had markedly higher accident rates than drivers with lower visual perception scores. Burg (1967) reported that dynamic visual acuity, or its lack, was a consistent contributor to the prediction of driving accidents and traffic convictions. Harano (1971) found that a driver's perceptual style (rigidity vs flexibility significantly correlated with accidents.

Other perceptual characteristics also are important in the driving task. Brauenstein (1964) reported that the phenomenon of following too closely might be due to the relatively poor ability of drivers to detect small changes in speeds while traveling at a high speed upon expressways. Snider (1966) investigated the ability of drivers to estimate their vehicles' velocity directly, and found that, with training via information feedback, they improved quickly. Hazlett (1969) reported that the visual ability to see pedestrians at night is affected by the reflectance of the pedestrian's clothing as well as by the driver's blood alcohol level. As blood alcohol rose above 0.04 percent all subjects had a significant decrease in the distance at which pedestrians were first visible. Matanzo et al. (1967) reported that lower illumination

levels of the road under night time driving conditions caused the driver to slow down and center his vehicle in the roadway.

Distraction and stress may affect driving performance of young drivers. Brown et al. (1969) investigated the effect of a secondary task, responding to a light, upon the primary task of driving a car. Differences in skill and controlling the car between the experimental distractor stress condition and without it were not significant, in contrast to previous results. Walker et al. (1964) found that a distractor stressor was quite effective in interfering with a primary task of tracking. They reported that the distractor task of auditory shadowing or repeating random numbers was as effective in impairing complex activity as was getting shot at with live ammunition. Levonia (1967) reported that information imparted to driver education students from a traffic safety film was learned differentially under conditions of high and low arousal, measured physiologically by skin resistance measures. Information presented during high arousal showed poor short term retention but enhanced long term retention; conversely low arousal states of the students were associated with enhanced short term retention and poor long term retention. The implication is that long term retention of driving habits should be fostered by emotional states of high affective arousal such as produced by a distractor stressor.

Alertness and distractor stress also affect a driver's performance. Brown, et al. (1969) found that drivers who had to answer a telephone request for information reduced their driving speed but their driving perceptual judgments were not impaired by the secondary task. Driver errors and response time on the secondary task of telephoning increased. The authors concluded that the telephone had a small effect on automatized driving skills, but that perception and decision making could be critically impaired by the distractor task. Sussman et al. (1971) reported that drivers made more position errors (location of car within the road way) after several hours of being exposed to high acoustical noise.

Brief note needs to be taken of the physiological effect of stress during driving. Lauda (1968) reported that both heart beat and galvanic skin response were affected by stress and length of time driving. Hunt, et al. (1969) reported that certain driving conditions consis-

tently produced stress in drivers as indicated by increased heart rate. Ellis et al. (1971) developed a physiological arousal model to relate a driver's physiological characteristics to vehicle operations. Useful parameters were blood pressure, body temperature, breathing rate, and galvanic skin response. McBain (1969) reported that lack of alertness in monotonous driving situations could result from lowered physiological arousal brought on by a restricted and repetitive driving situation, such as line driving. Specifically, accidents of one type were predicted by driving task errors. Teichner (1968) provided a very extensive review of the interaction of behavioral and physiological stress reactions. He defined a stress effect as one in which both the activity of the reticular activating system of the brain and diffuse cortical stimulation were increased. He concluded that a critical variable was the stimulus information input rate. Either a high rate of information input or information with a large number of possibilities is needed to get a performance decrement. His work may explain the fact that many divided attention studies show no decrement with high input rate. Finally, Wilson (1967), in a factor analysis of autonomic reaction patterns, concluded that there are three dimensions of autonomic activity: sustained activity, reactivity, and nonspecific variablity.

A summary of characteristics of young problem drivers follows. Based on the above reviewed studies and data presented, the following characteristics appear to be typical of the young problem driver: 1. a personality pattern of psychological immaturity, which is evidenced in aggressiveness and lack of emotional control; 2. inexperience in avoiding accidents; 3. inexperience in controlling drinking and driving; 4. better psychophysical characteristics, such as vision and reaction time, than the older and average driver. Both immaturity and inexperience are involved.

Driver Improvement

Research indicates that it is difficult but not impossible to induce problem drivers to change their driving behavior. Summaries of this aspect of the traffic safety picture are reviewed by A. D. Little (1966) and Schuster (1970) and in symposium proceedings edited by O'Day (1968). Little emphasis has been given to helping the young problem driver; therefore, the following reviews will cover driver education and driver improvement studies in general.

A few studies have shown some bright spots in the driver improvement picture. Kaestner, et al. (1967) found that a structured driver improvement interview conducted on an individual basis was effective in helping problem drivers improve their subsequent driving performance. Specifically, interviewees typically drove longer before they had another traffic violation vs. drivers in a control group, but no effect was observed upon accidents incurred while driving. Vilardo et al. (1968) found that a defensive driving course was effective in helping adult drivers improve their driving knowledge and driving attitudes. However, the beneficial effect disappeared in 6 to 12 months after the course. As a word of caution, this study evaluated driving knowledge and attitudes only rather than actual driving performance. In contrast, Schuster (1970) evaluated attitude changes as a result of attending a driver education class for beginning drivers and found conflicting results: Surface safety attitudes improved significantly as a result of the driver education class but the underlying attitudes and personality characteristics correlated with accidents did not change as a result of the class in comparison with a control group without a driver education class between test-retest intervals. Marsh (1969) reported that young male problem drivers exposed to perceptual training to spot accident hazards subsequently had a lower accident rate than did a control group.

Based on California and New York programs, Scott (1969) concluded that for persistent violator drivers there was a definite lack of effectiveness of group rehabilitative sessions as measured by improvement in driver performance. He reported little or no difference in driving performance as measured by subsequent violations and accident involvements, whether drivers had gone through the driver improvement clinic or had simply been left alone as a control measure for a similar amount of time. Henderson, et al. (1967) sounded a slightly more optimistic note in reporting that fewer subsequent violations while driving occurred among drivers who had attended the New Jersey driver improvement clinics compared with drivers who had not been processed through the clinics. However, young drivers and drivers involved in a fatal accident benefited least from the clinic experience. Schuster (1966) evaluated the effectiveness of driver improvement classes in California for problem drivers and concluded that probably the 18-hour driver improvement class had had no sig-

nificant effect upon the subsequent driving behavior of drivers who had attended the class vs. those who had not. Schuster (1967) came to a similar conclusion in evaluating the effects of a driver improvement course for military drivers; that is, military drivers receiving driver education classes did no better than a control group not receiving the driver education. Tillmann, et al. (1964) concluded that group psychotherapy for drivers previously involved in two or more accidents was not effective in changing their subsequent driving accidents as compared to a control group without psychotherapy. Quintela de Bajac, et al. (1966) in a study involving pedestrians crossing streets found that TV publicity was not effective in reducing the number of pedestrians crossing against a red light and that a traffic officer supplementing traffic light commands was effective only for one week in reducing pedestrian infractions.

High school driver education has come under attack. Powell (1965) evaluated driver education favorably, but Asher (1967) felt that driver education does not produce drivers with an increased ability to avoid accidents and moving violations. To date, research has been largely negative, but inconclusive, concerning the benefits of high school driver education.

Psychologists are fond of psychotherapy and have applied it to changing driver behavior. Kleinknecht, et al. (1968) reported that contingent negative reinforcement was effective in getting moving violator drivers to cut down on their moving violations as compared to a control group. Tillmann, et al. (1964) pessimistically reported that group psychotherapy was not effective in reducing the number of driving accidents for a group of drivers who had been exposed to group psychotherapy vs. a control group not so exposed.

Modified academic approaches have been used to try to get drivers to cut their accidents and moving violations. Jacobs, et al. (1966) utilized a series of tests and provided feedback of the test results to the individual drivers with the hope that improved self-knowledge would lead to reduced accidents and violations. The data did not support this hypothesis. The writer has a study in process using programmed tests in an attempt to "teach" older drivers' experience in hazard perception and accident avoidence to inexperienced drivers; results will not be available for several years. McPherson, et al. (1968) reported that student drivers' ability to perceive hazards could be im-

proved by appropriate simulator instruction, but this perceptual instruction was not replicated on the road. McKnight, et al. (1966) reported that simulators for beginning drivers were not well-suited for experienced drivers, such as youthful problem drivers. Miller (1971), using a special safety simulator, found that safety *attitudes* of college student drivers could be improved significantly. Barmack, et al. (1963) concluded that a highly touted training system for professional truck drivers, which emphasized the development and training of visual perceptual habits, was not effective in reducing the subsequent accident rates or accident costs of drivers so trained as compared with drivers not so trained. Schuster (1971) reported that a group technique of teaching young drivers to analyze their own near misses is promising, even though results were insignificant compared to a control group. The simulator, but not class training, appears to be effective in perceptual learning to avoid accidents.

Driving simulators have been used in training beginning drivers. Hayes (1966) reported that students taking part of their driver training on a simulator usually had fewer student errors in their practice driving than students with either no simulator training or a large amount of simulator training. The simulator did not appear to produce a significantly better attitude toward driving than did the use of a dual control car. McKnight, et al. (1966) found that student drivers trained on the simulator, compared to those trained on the regular car, had a better performance on those aspects of driving emphasized in the simulator program. Conversely, there was no improvement in driving habits not emphasized in the simulator program, i.e., driver opinions, reports of driving behavior or knowledge about driving. Bishop (1967) found that driving habits learned on a simulator transferred to the actual driving situation; specifically, simulator-trained drivers watched an intersection more closely for hazards and watched their speed more closely in general than students not trained on the simulator. Thus the simulator is effective in training beginning drivers in specific skills. Unfortunately, standard simulators apparently lack reliability and validity in retraining problem drivers (Schuster, 1971).

A few studies have examined the drinking and driving problem. Caples (1969) pointed out that inexperience in both drinking and driving was implicated in the higher fatality rate of young male drivers in urban driving at night. A recent study (Schuster, 1971) reported

that one promising countermeasure technique for teaching young male drivers how to control their drinking and driving proved to be ineffective when compared with a control group. Stewart (1971) reported a similar educational effort in Arizona to educate the drinking driver about his behavior. The informal evaluation of this program has been encouraging but full experimental evaluation on subsequent driving record has not yet been done. A special word needs to be said about the Department of Transportation's alcohol countermeasures program (Howell, 1970). This project has objectives of identification, control, rehabilitation and surveillance of the problem drinker and problem driver. Drinking and then driving accounts for about half of the driving fatalities each year in this country. Unfortunately, no large scale treatment has yet appeared effective in dealing with it.

Improving driving behavior by the mass media has been attempted with conflicting results. Haskins (1970) reported that fear or threatening messages tend not to be effective, particularly where people can turn off or tune out the propaganda. However, he did point out that the optimistic two-sided approach as mouthed by a highly credible spokesman increased the effectiveness of the media. Williams, et al. (1970) reported that attitude change in the laboratory was associated significantly with the driver's authoritarianism and need for social approval. He also reported that factual material was remembered better when presented in print rather than over the radio. Quintela de Bajac (1966) reported that television publicity was ineffective in reducing pedestrian infractions. Hutchinson, et al. (1969) reported that driver errors shown on T.V. resulted in significantly reduced errors by local drivers. After each error presented on T.V. the corresponding correct driving procedure was illustrated.

Action taken officially against an individual driver apparently influences behavior. Wilkes (1967) reported that for beginning problem drivers, severe action at the end of an official driver improvement interview was associated with reduced improvement subsequently as compared with more lenient action. Schuster (1971), elaborating on these results in a controlled experiment, reported a similar finding: If a driver originally had been accorded lenient action officially and at his subsquent official driver improvement interview was also accorded lenient action, his record subsequently tended to improve more than if he had been accorded severe or conflicting action over the two

times. Ben-David (1971) reported on the results of a controlled study in Israel. Letters sent out by a private safety research organization to offending drivers resulted in their subsequent improvement compared to a control group. A subsequent interview and a letter listing the full record of driving errors also gave additional significant reduction in driving violations. A contingent reinforcement scheme was used by Kleinknecht (1968) to make driving privilege in the immediate and near future depend upon immediate past performance. In comparison with the control group, violations were delayed significantly in the six-month follow-up for this experimental group.

CONCLUSION

In conclusion, the following techniques appear to be effective in improving the driving behavior of (young) problem drivers: 1. perceptual training to spot accident hazards, 2. individual driver improvement interviews, 3. personalized warning letters, 4. showing and discussing local driver errors on television, 5. giving lenient action officially but expecting improvement, and 6. making official action and driving restrictions contingent upon immediate past driving performance.

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DISCUSSION

William Laurens Walker

Professor William L. Walker is on the faculty of the University of North Carolina School of Law. He graduated from Davidson College and received a J.D. from Duke University and an S.J.D. from Harvard. He is currently collaborating on laboratory research to examine some of the problems arising when psychology and law merge in today's culture. His concern about various kinds of deterents and whether they achieve their desired effects have especial relevance for the case of the young driver.

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Volume IC of the General Statutes of North Carolina contains, beginning at page 277 and concluding at page 550, the statute law of North Carolina relating to the operation of motor vehicles in the State of North Carolina. These bound pages are supplemented with another 111 pages relating to motor vehicles and are found in the "pocket part" at the rear of this volume. These statutes, which form the core of the normative law of North Carolina relating to motor vehicles, were written largely, if not exclusively by lawyers, and were enacted by a General Assembly, which in any given session will be about one-half made up of persons who are attorneys in private life.

Furthermore, the necessary elaboration and refinement of the policy expressed in these statutes is supplied by the several appellate courts of North Carolina. The judges of these courts are all attorneys. The number of court opinions abstracted in the General Statutes indicates that this process of elaboration by judges is a very active and important part of the development in North Carolina of rules relating to the operation of motor vehicles.

When these statutory and judicially developed norms are violated, information relating to the incident is turned over to a solicitor, who is an attorney. The person charged usually turns to another attorney for assistance, and in most cases the controversy is resolved by these two attorneys and the trial judge, who is almost always, of course, an attorney.

Certainly this is enough to suggest to you that the subject of this seminar and indeed the subject of any seminar relating to highway safety deals with a major legal problem.

Professor Schuster's paper causes me to take time today to make this point, because it seems to me the data he reports so well is a splendid example of information that ought to be influencing members of my profession in the development of public policy *now*. Sadly, I doubt that any person who had a hand in producing the three hundred or four hundred pages of the General Statutes relating to motor vehicles knew about work discussed here today or of any other empirical data of similar quality. Perhaps this unfortunate situation is further illustrated by the fact that I am the first lawyer to appear this year as a participant in the symposium and as I read the record, I believe that I am the first attorney to participate in the history of this important series conducted at Chapel Hill.

What is the explanation for this state of affairs? It is undeniable that lawyers have been suspicious of empirical research and have preferred to go about their very important business guided largely by their intuitions. This may have been indeed a good practice in the 16th century when the social sciences were underdeveloped or non-existent, but today, in the 20th century, there is little excuse for such attitudes.

I am happy to report that now there are signs of a major change ahead. The law schools of the country and their faculties are turning to empirical research in such a widespread way that I believe in five years time there will be no respectable legal research that does not take into account what is actually occurring in the world of sense impression.

In light of this development, I want to urge all of you, including Professor Schuster, to involve members of your local law faculties, and indeed members of the particing bar, in your research efforts. If the techniques of scholars such as Professor Shuster could be focused in the formative stages of research on the issues posed by the law, then this resource could be used to shape public policy in a way that would bring enduring good to the public interest.

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