AN EXPLORATORY STUDY OF THE INTERRELATIONS AMONG DRIVING ABILITY, DRIVING EXPOSURE AND SOCIO-ECONOMIC STATUS OF LOW, AVERAGE AND HIGH INTELLIGENCE MALES

Thesis for the Degree of Ed. D.

MICHIGAN STATE UNIVERSITY

Robert W. Gutshall

1967

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presented by

Robert W. Gutshall

has been accepted towards fulfillment
of the requirements for

Ed.D. degree in Education

Donald A. Burke
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Date 2/13/67

O-169

ABSTRACT

AN EXPLORATORY STUDY OF THE INTERRELATIONS AMONG DRIVING ABILITY, DRIVING EXPOSURE AND SOCIO-ECONOMIC STATUS OF LOW, AVERAGE AND HIGH INTELLIGENCE MALES

by Robert W. Gutshall

The purpose of this study was to investigate inter-relationships among driving ability, intelligence, socio-economic status and driving exposure of males with low, average and above average IQ's.

The subjects for this study were selected from former high school students who had attended school between 1960 and 1964, had been issued a Michigan driver's license, and were, at the time of the study, residing within the city limits of Lansing, Michigan. Subjects were assigned to groups on the basis of intelligence scores recorded in their school records.

All subjects who were enrolled in the high school special education program for the educable mentally retarded and otherwise qualified for this study on the basis of the criteria listed above, were assigned to the low intelligence group. The socio-economic status of these low intelligence subjects was then determined using demographic census data.

A median socio-economic index was obtained and assignment to the high or low socio-economic group accomplished. The total number of low intelligence subjects was 72, which meant that 36 were assigned to each socio-economic group.

Subjects for the average and above average intelligence groups were selected at random from the list of prospective subjects who satisfied the criteria for selection listed above, including the added dimension of socio-economic status. The total number of subjects in the average and above average groups was 144. Initial attempts to analyze data on the 216 subjects indicated constriction of the data. In an attempt to alleviate this constriction two groups of 108 subjects each were added to the average intelligence groups. All subjects except these added 216 were interviewed.

Official State of Michigan driving records of the male educable mentally retarded subjects were compared with the driving records of subjects assigned to the average and above average intelligence groups. The interrelationships between intelligence levels, socio-economic status levels, accidents, violations and driving exposure were compared.

The original 216 subjects were interviewed to obtain estimates of the number of miles driven per year as well as the number of hours spent in a motor vehicle each day. In addition, information on participation in driver education courses while in high school was obtained by the interviewer.

Analysis of variance was used to determine if significant differences existed between group means. When significance appeared an individual comparison of means using the Newman-Keuls procedure was used. A .10 level of significance was established as the critical value of accepting or rejecting differences.

On the basis of the findings reported in this investigation the following conclusions, concerning the population under study, are made:

1. Intelligence and socio-economic status do not appear to be predictive of number of violations a driver will commit.
2. Intelligence and socio-economic status do not appear to be predictive of number of accidents in which a driver will become involved.
3. Intelligence and socio-economic status do not appear to be predictive of the total number of "points" which a driver will receive for having committed traffic violations.
4. Intelligence and socio-economic status do not appear to be predictive of the number of miles a person will drive his automobile per year.
5. As a group of drivers educable mentally retarded males have a larger total of combined convictions for traffic violations and involvement in accidents

than groups of male motorists with average intelligence scores. It should be noted that an individual's IQ score in and of itself is not necessarily predictive of driving performance.

6. Socio-economic status tends to predict the proportion of points a driver will receive for speeding violations.
7. Intelligence tends to predict the proportion of points a driver will receive for moving violations, other than speeding.
8. Intelligence tends to predict the number of hours a driver will spend per day in an automobile.

These conclusions were discussed and implications for future research were noted.

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By

Robert W. Gutshall

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF EDUCATION

Department of Elementary and Special Education

1967

G45424
8/4/67

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ACKNOWLEDGMENTS

The investigator expresses appreciation to all those who have been associated with this research. Dr. Donald Burke, chairman of the researcher's doctoral committee, Drs. Walter Freeman, Charles Mange, William Mann and Fred Vescolani have been most helpful in aiding and supporting this project through to completion.

The study would not have been possible without the financial aid of the Division of Accident Prevention, United States Department of Health, Education, and Welfare.

Valuable consultant services in specialized areas were received from Drs. Walter Freeman, William Mann and Walter Stellwagon.

Special appreciation and gratitude must go to Marvin Beekman, Director of Special Education, Lansing Public Schools, whose interest and influence motivated my professional development, thus making it possible for me to work on this project.

Acknowledgment is made, also, for the assistance given by former chairmen Drs. Henry Gottwald and Bobby Palk, who were responsible, each in their own way, for the completion of this project.

Throughout the project all agencies were most cooperative. The Secretary of State: Honorable James M. Hare, Northwestern Traffic Institute, Lansing Police Department, Michigan State Traffic Center, and the Lansing Board of Education and its related personnel have assisted beyond what one might reasonably expect. No request made to any of these agencies was at any time denied.

Appreciation is also expressed to Dr. Charles Harper who has been most helpful, not only in the statistical analysis of the data but also with general suggestions.

My wife, Peg, and children: Bobby, Peggy, Kathy, Janie and Sharon, certainly deserve platitudes for their understanding when father was busy.

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CHAPTER I

INTRODUCTION

The Lansing Public School system, since 1954, has maintained a high school special education program for the educable mentally retarded student. During the first twelve years of the program over two hundred mentally retarded students have been provided with individual programs within the specialized curriculum. The students in this program have been encouraged to participate in all school activities in which they could qualify and successfully cope with the requirements. A few of the students were enrolled in regular academic courses. However, satisfactory completion of those courses required special effort not only by the students, but also by the teachers and special education personnel. Most of the students participated in physical education, art and driver education.

The philosophy of the driver education department was based on the idea that the mentally retarded and the physically handicapped should have the opportunity to participate in driver education instruction. The driver education staff felt that these experiences, both in the classroom and behind the wheel, would help the mentally retarded students

to become enlightened pedestrians even if they should not be able to qualify for a license to drive.

Even though high school special education classes for the educable mentally retarded have existed only since 1954, driver education for all Lansing high school students, including slow learners, has been available for students since 1948. As the educable mentally retarded were admitted and integrated into the high school program various teaching methods have been used to help them obtain the maximum benefits from driver education instruction. Originally the educable mentally retarded students were taught the fundamentals of driving by enrollment in driver education classes without supportive assistance from special education personnel. However, it proved more satisfactory to modify the foregoing procedure. The first modification was a driver education class consisting only of educable mentally retarded students. The driver education instructor in that case was also certified in special education. This system did not prove adequate to meet the needs of the educable mentally retarded students and after several years the system presently in use was developed by driver education and special education personnel. The special education students were enrolled, in compliance with normal legal restrictions, in the regular driver education class. Their next class was a period where the special education teacher helped the educable mentally retarded student with the preceeding period's

assignment. The special education teacher coordinated the post driver education class activities with the regular driver education teacher's lesson plan and in this way clarified any concepts that may not have been correctly understood by the educable mentally retarded student. Often, particularly when a group had a non-reader in attendance, the special education teacher read assignments and examinations. With this amount of assistance, many educable mentally retarded students successfully completed the driver education course and became eligible to take the state driver examination at 16 years of age.

Due to the fact that at 18 years of age a Michigan resident is able to obtain a driver's license without ever having been enrolled in driver education, it is imperative that driver education for the educable mentally retarded be included in the special education program. However, the Lansing Public School driver education teachers, special education teachers and administrative personnel in both departments have some anxiety over the ability of a person with low intelligence to cope with the complexities of modern day traffic.

A recent publication of the National Safety Council (1965) presents some indication of the magnitude of the vehicle safety problem today and gives some indication of what one may expect in the future. In a recent six year period (1958-1964), the number of deaths due to automobiles

had risen from 36,981 to 47,700. During that period, the number of vehicles had risen from 68.8 million to 87.3 million, while the number of miles these vehicles traveled had risen from 665 billion to 840 billion miles with an increase of from 81.5 to 96 million drivers. Most traffic experts compute the traffic accident problem by using death rates. In the same aforementioned period, the death rate per 10,000 motor vehicles rose from 5.4 to 5.5. For each 100 million vehicle miles driven, the death rate went from 5.6 to 5.7 and per 100,000 population the rate rose from 21.3 to 24.9. The cost of the vehicular accident involvements, meanwhile had risen from 5.6 to 8.0 billion dollars.

In view of the real concerns of our society in the area of driving safety and the fact that some persons with limited mental ability will be licensed to drive, the Special Education Department of the Lansing Public Schools applied for and received funds from the Department of Health, Education and Welfare to investigate the driving habits of former educable mentally retarded students.

This study was designed to determine to what extent intelligence and socio-economic status influenced the driving ability as well as driving habits of former high school students.

Specifically, State of Michigan official driving records of educable mentally retarded individuals were

compared with the records of individuals who possessed normal and above normal intelligence. The subjects were also compared on socio-economic status as determined by official census records. In addition, subjects were interviewed to obtain an estimate of the number of miles driven each year as well as an estimate of the average number of hours spent in a motor vehicle each day.

CHAPTER II

RELATED RESEARCH

It is generally agreed that the ability to drive an automobile is dependent on many interrelated aspects of human behavior. For a number of years researchers have concerned themselves with investigating the relationship between these variables of human behavior and driving ability.

The following review of literature concerns itself with some of the more important studies in several areas, namely: the relationship between physical coordination and intelligence; the relationship between driving ability and intelligence; and the relationship between driving ability and other selected factors.

The Relationship Between Physical Coordination and Intelligence

Cantor and Stacey (1951), used 175 male mental defectives who were residents of the Syracuse State School, New York to reject the hypothesis that mental defectives had the same manual dexterity as the person with normal intelligence. The chronological ages of the mental defectives were 14-18

years and their IQ scores ranged from 42-87. The controls for the study were 865 male industrial workers and 456 male veterans. They used the Purdue Pegboard Test to test manual dexterity of both the mental defectives and the control group. Results showed that the 52 defectives making the highest IQ scores failed to compare favorably with the manual dexterity scores of the control group. However, Cantor and Stacey did observe cases of individual differences wherein a person of low intelligence had the same or equal manual dexterity as that of a person with higher intelligence.

Howe (1959), using 43 retarded children who had a mean IQ of 66.0 and an equal number of normal children who had a mean IQ of 98.7, concluded that the retarded group were inferior in a series of motor skill tests consisting of balancing, jumping and strength. Howe, also found cases of individual differences similar to those reported by Cantor (1951). No definite pattern of dexterity was evident for individuals in either intelligence group.

Kulcinski (1945), from a sampling of 54 boys and 51 girls, concluded that a positive relationship existed between various degrees of intelligence of fifth and sixth grade boys and girls in the learning of fundamental muscular skills. Boys, used in the sample, had IQ's ranging from 45-123 while the girls' IQ's ranged from 43-125.

The Relationship Between Driving Ability and Intelligence

The literature appeared to have two kinds of articles about the relationship between driving ability and intelligence; namely, statements of expert opinion and research studies. The following quotation taken from Brody (1947, p. 6) is an example of the former:

> Obviously, an idiot cannot be trusted with a car. On the other hand a high degree of intelligence does not seem to be essential to the safe and skillful operation of a motor vehicle.

Conger, Gaskill, Glad, Hassell, Rainey and Sawrey (1959), used the Information, Comprehension, Similarities and Block Design sub-tests of the Wechsler Adult Intelligence Scale to determine that 10 accident repeaters had a prorated intelligence quotient of 105.3 and the 10 non-accident subjects had a mean IQ of 106.3. The differences between the two groups were not significant.

Although not specifically investigating the relationship between intelligence and driving ability, Levonian, Case and Gregory (1963) were interested in cognitive variables. They tested 720 California truck drivers for: knowledge of regulations, form identification speed and form identification accuracy. They concluded that cognitive variables contributed insignificantly to the variance in recorded accidents.

McFarland and Moseley (1954) tested 67 Champion Roadeo truck drivers and found that the drivers' mean IQ score on the Otis Test of Mental Ability was 112. This finding is interesting in light of McFarland's and Moseley's (1954, p. 29) comment that: "It is possible to be too intelligent to be successful in some monotonous tasks." Even though an IQ of 112 is slightly above average such a score would classify a person in a higher category than 83% of the general population. It should be noted that less intelligent contestants may have been eliminated before they reached the Roadeo finals.

McGuire (1955), from a total of 446 military service subjects, selected 67 accident-violation free and 67 accident-violation personnel for his research. On a group basis, using the Army General Classification Test (civilian version), he found means of 108.7 for the accident-violation free group and 109.2 for the accident-violation subjects. The critical ratio for the differences between the means, was not significant.

The researchers engaged in the Eno Study (1948) did not use a standard measure of intelligence, but they did develop a "Knowledge Test for Automobile Drivers." Using that tool and 20 questions covering motor vehicle regulations and rules of the road they tested the accident and the accident-free groups, to find that the accident-free drivers had

significantly better test scores than those drivers with records of accidents.

Goldstein (1962) indicated little correlation existing between driving ability and cognitive measures in 14 studies he reviewed. His conclusion, as far as human variables are concerned, was that accidents are largely a function of age, alcohol and attitudes.

Hakkinen (1958, p. 54) stated after his review of accident studies in Europe and America, that: "it has been proven quite convincingly that the drivers who are considerably below the average in intelligence are prone to accidents." Hakkinen (1958, p. 78) further stated that: "as a general rule, accidents do not appear to be due to ignorance of traffic rules or of other things related to driving skill." The instruments he used in his research on 140 commercial drivers were a variation of the Koh's Block Design, the Pathtracing Test, and a Mechanical Comprehension Test similar to the Bennett Mechanical Comprehension Test. He did not find significant differences between the safe and accident groups in these intelligence and mechanical aptitude tests. However, he concluded that accidents show a slight tendency to increase as intelligence declines. It should be noted that on a preselected population, such as commercial drivers, one might expect not to find differences in intelligence.

Selling (1941) examined 500 referrals from the Traffic Division of the Psychopathic Clinic of the Recorders Court in Detroit and concluded that individuals with intelligence scores below 70 had more violations than a comparable grouping above that figure. Of the violators he tested at the clinic, 36% received an IQ score below 70. However, there was an obvious unreported selection factor which should probably be considered in evaluating the results, i.e., only certain offenders were selected by the judges to attend the clinic.

Brown and Ghiselli (1947) for a sample of 247 motormen found that a high score on an intelligence test had no validity for helping to predict a driver's accident experience as a motor coach operator.

Baker (1952) while Director of Research and Development for the Northwestern Traffic Institute indicated that a high grade moron with a mental age of 10 or 12 years, who is not easily distracted, is better equipped to handle an auto than smarter people. Baker stated:

> . . . the operation of a motor car is too dumb a job to command the attention of those who are particularly bright.
>
> The low mentality motorist once he is taught to drive properly, will not deviate from what he has learned. The higher mentality is inclined to experiment and also to think about things to the detriment of his driving.

Gutshall (1963) reported on 200 educable mentally retarded driver education students and found that the youngsters could function in driver education classes. Their violation experiences on the road did not appear much different from the normal students. His conclusions were based on observations of student attendance at a traffic safety school and also his experiences of teaching mentally retarded students in driver education classes.

Pappanikou and Bowman (1959, 1960) working with 5 girls and 11 boys at Pineland Hospital and Training Center, Pownal, Maine found some success in driver education for their patients. They screened the patients carefully and unless the person had an IQ of 70 with a verbal IQ of at least 60 on the Wechsler Intelligence Scale they were rejected for driver education. Also, they were required to have had a grade level of 4.0 on the California Achievement Test, Elementary Level. However, of the 16 students only one had received a drivers license at the time of the authors' report.

The Relationship Between Driving Ability and Other Selected Factors

Brody (1947) studied 26 drivers with a record of at least three reported accidents in a five year period, and a similar number of individuals whose driving records were virtually unmarred. The results on the Bell Adjustment

Inventory indicated that personality maladjustment was found to be much more common among the accident-repeaters tested, than among the accident-free. Brody (1947), after using psychological testing, also noted that observance of traffic obligations depended upon personal attitudes rather than motor skills of individual drivers.

Case, Reiter, Feblowicz and Stewart (1956) interviewed 300 Los Angeles multiple driving violators for the purpose of identifying primary personality characteristics. They concluded that 58.3% were normal in personality; 22% were classified aggressive; 17.3% were classified as conformists; 1.7% were considered as being hostile and the remaining .7% were placed in an undetermined category. The authors observed that the prototype of the habitual traffic-violator is that of a white male, between the ages of 21 and 25, employed in a semiskilled or skilled job, of normal intelligence and a normal personality. The study did not consider personality characteristics of non-violators.

Conger et al. (1959) matched 10 U.S. airmen who had two or more accidents with 10 U.S. airmen who had no reported accidents. Both a structured interview and a routine psychological examination were administered to the subjects. The psychological examination battery included the following: the Thematic Apperception Test (10 cards), the Rorschach Test, the Wechsler-Bellevue Intelligence Scale (4 sub-tests) and the Sacks Sentence Completion Test. The examiners

stated that the accident-subjects had a tendency to have less capacity for controlling hostility; were either excessively self-centered and indifferent to the rights of others or unduly concerned about the rights and feelings of others; were preoccupied with fantasy satisfactions or extremely stimulus bound; were fearful of loss of love and emotional support; and were less able to tolerate tension without discharging it immediately.

The Eno Study (1948) compared 252 accident-repeaters with a group of 261 accident-free drivers from the states of Connecticut and Michigan. Results of the Cornell Word Form Test indicated that accident-repeaters tended to have more personality maladjustments than the accident-free and that the incidence of these maladjustments tended to increase among the more serious repeaters.

McGuire (1955) employed the Minnesota Multiphasic Personality Inventory, the Bell Adjustment Inventory, the Kuder Preference Record-Personal and the Rosenzweig Picture Frustration Study to study 67 accident-violation free subjects and a matched group of accident-violation subjects. He concluded that the accident-free driver had more respect for the law, was more aware of his responsibilities on the highway, had a more tranquil childhood, got along better in school, had a more harmonious family life, saw himself as being easier to talk to, was more willing to present himself

before people, and was a serious minded individual who was willing to accept responsibility and make decisions.

Moffie, Symmes and Milton (1952) employed the Bernreuter Personality Inventory to perform research on tractor-trailer drivers. They concluded that 30 accident-free drivers had a significant tendency to be more tense, less self-sufficient and less dominant than 30 accident drivers.

The California study (Penn, 1965) involved a sample of 1,382 drivers to find factors which were useful in discriminating a group of bad drivers from a total driving population. Three variables characteristic of bad drivers were, persons who were unmarried, unsatisfactory credit rating and records of frequent job and address changes.

The Eno Study (1948) did not indicate significant differences in the socio-economic status of the accident-repeaters and accident-free. However, more accident-repeaters than accident-free persons had been arrested on charges other than traffic.

Harvard Medical School (1961-62) reported, on the basis of case histories, that in traffic accidents the driver who caused the accident was the one most likely to have had a record of conflict or poor social adjustment. They also noted that these problems were often a matter of public record.

McGuire (1955) used the Minnesota Multiphasic Personality Inventory, Kuder Preference Record-Personal, Bell Adjustment Inventory and a personal interview to obtain data on 67 accident-violation free servicemen and an equal group of unmatched accident-violation subjects. He determined that the accident and violation-free driver was more mature, more intellectual in his interests and tastes, had a higher aspiration level, tended to have a more satisfying family life, was more aware of responsibilities when driving, had a more stable approach to people and problems, was more communicative and showed a more diverse and mature kind of interest. One statement he made seems worthy of note because it summarized the general review of literature in this particular area quite well. McGuire (1955, p. 9) stated ". . . driving is an interpersonal situation and it is expected that drivers who get along best on the highway get along best with people."

One group of studies which did not fit into the categories already mentioned were those compiled by the Personnel Research Section of the U.S. Army Adjutant General's Office (1943). They concluded on the basis of a summary of 40 studies that road tests of driving skill were more reliable indicators for selection of truck drivers than multiple choice tests, previous experiences, and tests of visual and sensori-motor functions, including reaction time.

Summary

This review of related research failed to discover any single cause of accidents or violations. The review of the literature instead indicated that many factors were involved in determining whether a person was a safe driver. Psychomotor functions did not appear to be one of these factors. But, it was noted that physical coordination may be affected for persons who had received IQ scores below 70. However, an IQ score of 70 was not considered a discrete point in determining a person's lack of normal physical coordination. Rather, a 70 IQ score was a group statistical designation as some individuals below 70 IQ possessed physical motor skills equal to persons of higher intelligence. It may be that a mentally retarded person's driving record might be a reflection of his physical coordination rather than his personality and social life. However, the review of related research gave no indication that physical coordination was a factor in determining a person's ability to drive.

Intelligence did not appear as a significant factor in determining a driver's violation or accident record. But, some of the researchers stated their belief that it was an influence affecting a person's driving record.

When drivers who had been in car accidents or who had committed driving infractions were studied, it was

generally found that a driver's personality characteristics and social behavior were significantly different from those of control subjects. The driver's method of facing life issues evidently had a predispositional effect on his driving manners. It is interesting to note that according to one group of studies as reported by the Personnel Research Section of the U.S. Army Adjutant General's Office (1943) the most reliable predictor of driving ability was observing driver behavior during road tests.

It is the writer's impression from the review of the literature that researchers had a difficult time obtaining subjects for study. The problem was generally solved by using some type of captive group. These groups usually were traffic violators, fleet vehicle operators, servicemen, factory workers, hospital patients, or children in a school. It is evident that techniques used in interpreting the data were not uniform. For example, violators do not necessarily drive the same number of miles, the same time of day nor do they encounter the same degree of law enforcement.

CHAPTER III

METHODOLOGY

Definition of Terms

Intelligence as used in this study is operationally defined by English and English (1961, p. 268):

> That hypothetical construct which is measured by a properly standardized intelligence test. . . . Three concepts recur frequently in attempts to state its connotations: That of ability to deal effectively with tasks involving abstractions; that of ability to learn; and that of ability to deal with new situations.

The various levels of intelligence and corresponding IQ scores used in this study were: low intelligence (IQ 50-86); average intelligence (IQ 90-110); high intelligence (IQ over 110).

Socio-economic status refers to the relative position of a subject within the groups based on demographic data drawn by Bellamy (1963) from the 1960 U.S. census.

Driving ability refers to a driver's record of accidents, violations and points as recorded on an official Michigan driving record form (Appendix A).

Violations are driving infractions for which points were issued under the State of Michigan Conviction "Point"

system described by the Michigan Vehicle Code (1961). Violations in this study were divided into two categories: speeding and other violations.

Driving exposure refers to a subject's estimate of the number of hours spent in a car and the number of miles driven by him.

Procedures

The present study, using a sample of low intelligence male drivers matched with other drivers selected from the general driving population, was designed to investigate interrelationships among driving ability, intelligence, socio-economic status and driving exposure, all rigidly defined.

The design of this project called for an equal number of subjects in each of three intellectual categories, also equally divided on the basis of high and low socio-economic status. Consequently, six groups of subjects were needed to accomplish this investigation.

The following sections describe the procedures in the selection of subjects, data collection, and analysis of data.

Selection of Subjects

Permission was given by the Lansing Board of Education, Lansing, Michigan to use the school records of former high school students for the purpose of obtaining the names of males who were mentally retarded, of average intelligence, or of above average intelligence. This search produced the names of 163 male students who had participated in the special education program for the educable mentally retarded of the Lansing Public Schools and graduated or dropped from school during the school years 1960-1964. The individuals whose names were obtained in this fashion became potential subjects in the low intelligence classification of the study.

School records were examined to obtain individual and group IQ scores for assignment to an appropriate intellectual group. In cases where more than one IQ score was available, the average of the scores was used. Those individuals whose record indicated medical diagnosis of brain damage were excluded from the sample.

The procedures of the psychological testing program in the Lansing Public Schools insure that all individual tests, which were used in obtaining an IQ score for the low intelligence subjects, are administered by a state approved school psychologist. Group tests, which were used in obtaining IQ scores for subjects of average and above average intelligence, were in all cases forms of the California Test of Mental Maturity.

The design of the study demanded differentiation of subjects on the basis of socio-economic status. One method of determining socio-economic status of an individual is to use current census tract data. This method was used in this study and required the investigator to rate an individual's dwelling place on different socio-economic factors. The factors used in this study, based on 1960 census tract data compiled by Bellamy (1963) were: housing deterioration and dilapidation, non-white population, over-crowded housing, property value, unemployment, juvenile crimes, and median family income.

Each of the seven factors may be categorized into different levels within each factor. Each level was assigned a numerical value, with lower numbers representing more favorable conditions. In this study the sum of the seven levels is called the index value. An individual with a lower index value would be considered to be in the more favorable socio-economic situation. The classification of factors and index values assigned to each factor are listed in Table 1.

Once the potential male subjects for the low intelligence groups were identified it was possible to select potential male subjects for the average and high intelligence groups from the school records of the three Lansing high schools. Subjects of average and above average

Table 1. Classification of factors and the index values assigned to the factors, data determined socio-economic status of all subjects

Non-White Population	
(Classification)	Index Value
61%	5
41-60%	4
21-40%	3
1-20%	2

Housing Deterioration and Dilapidation: City of Lansing	
(Classification)	Index Value
60% or over	4
40-59%	3
20-39%	2
0-19%	1

Over-Crowded Housing	
(Classification)	Index Value
31%	4
21-30%	3
11-20%	2
0-10%	1

Median Family Income	
(Classification)	Index Value
$5,400-$4,300	4
$7,400-$5,500	3
$8,400-$7,500	2
$8,500+	1

Unemployment	
(Classification)	Index Value
8%+	4
6-7%	3
4-5%	2
0-3%	1

Average Property Value	
(Classification)	Index Value
$ 6,000 or below	3
$12,000-$7,000	2
$13,000+	1

Juvenile Crimes 1953-1956	
(Classification)	Index Value
Areas of high violation density	2
2 violations	1

intellectual ability were chosen utilizing a random selection process. An effort was made to match all groups according to year of graduation and socio-economic classifications. This method of random selection did not provide enough names for subjects who qualified for the above average intelligence groups. The investigator was supplied with the

National Honor Society membership lists, and names selected at random, were added to insure a minimum number of subjects at the time of final selection.

Once it had been determined that enough potential subjects existed, the final selection process was initiated. The design of the study required all of the subjects to be residents within the city limits of Lansing, Michigan and that they be licensed drivers. This information was determined through a personal interview with the potential subject. These interviews produced 72 educable mentally retarded male subjects.

The method of determining socio-economic status described above was employed by determining a median score for the low intelligence subjects. This procedure resulted in assigning those subjects with an index value of 10 or less in the high socio-economic status group. Those subjects with an index value of 11 or more were assigned to the low socio-economic group. The same median value was used in establishing the other groups required by the design.

In formulating this study a larger number of subjects in the low intelligence group was estimated than could be obtained. To compensate for this shortage it was decided to add two groups of average intelligence subjects, one for each socio-economic group. The total number of added male subjects who were selected at random from driver education

records, was 216 allowing 108 for each socio-economic group. These added subjects were not interviewed because of the limited time of the interviewers. However, each of the 216 added male subjects were determined to be presently residing in the city limits of Lansing, Michigan. This conclusion was made on the basis of current directories and in case of doubt by a personal telephone call.

The final composition of the groups used in this study is summarized in Table 2.

Table 2. Subject classification groups

Group 1:	Classified as low intelligence, 36 subjects that had an IQ below 86 with high socio-economic status, interviewed.
Group 2:	Classified as average intelligence, 36 subjects that had an IQ from 90 to 110 with high socio-economic status, interviewed.
Group 3:	Classified as high intelligence, 36 subjects that had an IQ above 110 with high socio-economic status, interviewed.
Group 4:	Classified as average intelligence (not interviewed), 108 subjects that had an IQ from 90 to 110 with high socio-economic status.
Group 5:	Classified as low intelligence, 36 subjects that had an IQ below 86 with low socio-economic status, interviewed.
Group 6:	Classified as average intelligence, 36 subjects that had an IQ from 90 to 110 with low socio-economic status, interviewed.
Group 7:	Classified as high intelligence, 36 subjects that had an IQ above 110 with low socio-economic status, interviewed.
Group 8:	Classified as average intelligence (not interviewed), 108 subjects that had an IQ from 90 to 110 with low socio-economic status.

Two group characteristics of importance in describing the subjects were age and intelligence. Values for these characteristics are contained in Tables 3 and 4.

Table 3 summarizes the information on ages of the subject.

Table 3. Mean ages of subjects

Socio-Economic	Intelligence				Total
	Low	Average (Interviewed)	High	Average (Not Interviewed)	
High	21.72	20.81	20.39	20.94	20.96
Low	21.39	21.94	21.00	20.93	21.18
Combined	21.55*	21.37*	20.69*	20.94**	21.07

*N = 72.

**N = 216.

It should be noted that the grand mean is 21.07 years of age and that the subjects of low intelligence had the highest mean age of 21.55. This is not unexpected since members of the low intelligence group more frequently repeat a grade level than the average and high intelligence students.

Table 4 contains the summarization of the mean IQ scores of the subjects.

Table 4. Mean IQ's of all subject groups according to intelligence levels and socio-economic status

Socio-Economic Status	Intelligence			
	Low	Average (Interviewed)	High	Average (Not Interviewed)
High	73.25	102.33	119.55	101.56
Low	74.38	101.27	118.72	100.23
Combined	73.81*	101.80*	119.13*	100.89**

*N = 72.

**N = 216.

Collection of Data

The design of this research required that data be collected from two separate sources. The subject's estimate of their driving exposure was to be determined through a personal interview, while driving ability was to be interpreted from official Michigan driving records.

Driving exposure.--Subjects in the original six groups of the study were interviewed to obtain information regarding their estimate of the amount of time spent in a motor vehicle and the number of miles the subject drove per year. The information obtained on these two factors was interpreted as driving exposure.

The interviews were completed by three Lansing Public School special education teachers and two school

nurses. These were personnel who were familiar with the kind of people to be interviewed. Their routine professional duties put them in daily contact with such people and it was felt they could put the interviewees at ease and would have little difficulty in establishing the rapport necessary to obtain an accurate accounting of the requested data. The interviewers were trained by two group meetings as to what information was needed and methods of obtaining the information were discussed. Their pay was on the basis of each interview completed. Three interviews could not be completed because of a subject's refusal to cooperate.

The first question the interviewers asked in determining driving exposure was: "How many miles do you drive a year?" The interviewers were free to help the subjects arrive at an estimate by asking the subject how many miles were on the odometer when the car was bought, how long had he owned the car and what was the present mileage reading. This procedure was repeated if the subject drove cars other than his own. All tabulations of this data were performed in the presence of the subject.

The second question was concerned with the amount of time each subject spent in an automobile. The interviewers asked the subject: "How many hours a day are you in the car? (total time)" The answers were recorded according to one hour or less, 2 hours or less, 8 hours or less and others. In addition to the information on driving exposure

the interviewers were requested to obtain data on each subject's enrollment in a driver education class.

Driving ability.--Once the subjects had been selected an official driving record request was obtained from the Michigan Secretary of State's office (Appendix A).

The fact that the Michigan Motor Vehicle Code (1961, p. 69) requires reporting of accidents only if there is one hundred or more dollars damage, injury or death, would be a constricting factor in this research except the Lansing Traffic Code (1958, p. 419) states:

> The driver of a vehicle involved in an accident resulting in injury or death of any person or property damage, shall immediately by the quickest means of communication give notice of such accident to the police department if such accident occurs within this city.

These two laws tended to diminish the reporting deficiencies commonly found in research using official state records as the criterion for driving ability. However, since it was assumed that, even with an efficient and reliable police department some accidents occurred which were not reported, the accident data was undoubtedly an underestimation of the actual occurrences.

Citations reported were only a minute number of all violations occurring. Most violations were not observed by a traffic officer. However, the Lansing Police Traffic Division enforcement procedures consistently result in an

enforcement index[1] of .30. While unreported violations undoubtedly occurred, the city of Lansing has a higher citation rate than is commonly found in most cities. The study has been confined to persons residing in the Lansing city limits in order to take advantage of this enforcement factor.

Accidents and violation reports were obtained from the Secretary of State and may include occurrences outside of the city of Lansing or the state of Michigan. The thoroughness of these reports cannot be considered as reliable as the violation experience in the city, and are very definitely an under-estimate of actual occurrences.

June 30, 1965 was used as the terminal date for accepting driving record data. In the case for comparing three year driving records, July 1, 1962 was the beginning date and for computing five year driving records, July 1, 1960 was the beginning date.

Information obtained from Form OC-70 as well as information obtained by the interviewers was transferred from the original records to a large work sheet. The transfer of information was performed by one secretary in order

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[1]The sum of the number of convictions with penalty obtained for the moving violations listed plus any other hazardous moving violations, divided by the sum of the number of personal injury and fatal accidents in a city over a corresponding period, indicates the enforcement index. (from an official record of Lansing Police Department).

to control uniformity of procedures and interpretation. For the statistical data that was computer analyzed the same secretary used the large sheet to punch IBM cards. She also used a verifier to insure data accuracy.

Analysis of Data

An IBM 1620 computer was used to process the punched cards to perform the statistical analysis. Computer programs were written in Fortran to specifically handle the analyses herein described.

Analysis of variance was used to determine if significant differences existed between group means. When significance appeared, the procedure was to follow the overall analysis with an individual comparison of pairs of means using the Newman-Keuls procedure as outlined by Winer (1962). F_{max} tests (Winer, 1962) were used to determine that the assumption of homogeneity of variance was met. At the onset a .10 level of significance was established as the critical value of accepting or rejecting differences. Tabled values that determined significance were obtained from Scheffe' (1959).

CHAPTER IV

RESULTS

This investigation was undertaken to explore the interrelationships of intelligence, driving ability, socio-economic status and driving exposure of former male high school students.

Driving ability was evaluated by using the number of accidents and violations as well as points recorded. This information, on each subject, was obtained from the Michigan Secretary of State's OC-70 Form. Driving exposure was determined during interviews and represents each subject's estimate of miles driven per year and hours spent in a motor vehicle per day.

The information in this chapter follows a format of first presenting the means and standard deviations of subject groups compared, then, an overall analysis of variance to determine if any differences existed between all means. In the cases where the analysis of variance indicated significant differences, an appropriate individual comparisons of group means followed. All such comparisons were treated using an F_{max} statistic and met the assumption of homogeneity of variance at the .01 level. Several comparisons of

groups which did not show significant differences, as well as significant comparisons, are included as reference points and to aid in interpretation of the data. All tables are recorded following a format of intelligence levels in columns and socio-economic status in rows. Compared first are the driving records of the subjects. These comparisons are followed by an analysis of the subjects' estimates of driving exposure, subjects' estimate of hours spent in a motor vehicle, and subjects' reported enrollment in a driver education class.

Driving Ability Data

Subjects were selected on the basis of measured intellectual ability and their classification grouping of socio-economic status. The information on accidents, traffic violations and points accumulated for driving infractions, by each subject, was obtained from the Secretary of State's office and was used as the criteria of driving ability. Numerical values of the driving abilities were grouped according to intellectual levels and socio-economic status for the statistical analysis. The first comparison was of the sum of violations and accidents for the groups between July 1, 1962 and June 30, 1965. This analysis was limited to one-half of the subjects, those 216 who were interviewed. Means for the groups were determined and these

means together with standard deviations for the groups appear in Table 5.

Table 5. Means and standard deviations of the sum of violations and accidents between July 1, 1962 and June 30, 1965 interviewed subjects compared on intelligence and socio-economic status

Socio-Economic Status	Intelligence			
	Low	Average	High	Total
High	M 4.75* SD 3.70	M 3.80* SD 2.72	M 3.86* SD 3.75	M 4.13 SD 3.45
Low	M 4.30* SD 4.35	M 3.19* SD 2.79	M 3.44* SD 3.99	M 3.64 SD 3.80
Combined	M 4.52 SD 4.04	M 3.50 SD 2.77	M 3.65 SD 3.88	M 3.89** SD 3.64

*N = 36.

**N = 216.

Analysis of Table 5.--Inspection of the means of Table 5 revealed that the low intelligence group had the poorest driving record. The average intelligence group had the best driving record. Comparison of socio-economic groups suggested a better driving record for the low socio-economic status groups at all levels of intelligence. To determine if the means of the groups differed significantly an analysis of variance using a 2 x 3 design with an equal

number of subjects per cell (Winer, 1962) was made. Table 6 records the results of the analysis of variance.

Table 6. Analysis of variance of sum of violations and accidents between July 1, 1962 and June 30, 1965 interviewed subjects compared on intelligence and socio-economic status

Source	df	MS	F
Socio-economic	1	13.00	.97
Intelligence	2	22.14	1.65
Soc.-econ. x intel.	2	.19	.01
Within	210	13.36	...

F .10 $(2,\infty)$ = 2.30.

Analysis of Table 6.--Although inspection of the means for intelligence and socio-economic status appeared to indicate differences in Table 5, the analysis of variance in Table 6 showed that those differences that appeared in Table 5 were not significant. The large differences in the means of the groups in Table 5 contrasted with the F value (1.65) for intelligence suggested that the analysis was restricted due to a limited number of subjects. To counterbalance this restriction, the number of subjects was doubled by adding the driving records of two groups of subjects who were not interviewed thereby making the total number of subjects 432. Of the two groups added one group was of high and one group

was of low socio-economic status. All added subjects had scores of average intelligence. Means and standard deviations for the added subjects and the original interviewed subjects, were recorded for inspection in Table 7.

Table 7. Means and standard deviation for the sum of violations and accidents, between July 1, 1962 and June 30, 1965, comparing all subjects grouped according to intelligence level and socio-economic status

Socio-Economic Status	Intelligence				
	Low	Average	High	Average (Not Interviewed)	Total
High	M 4.75* SD 3.70	M 3.80* SD 2.72	M 3.86* SD 3.75	M 3.16** SD 3.26	M 3.65 SD 3.39
Low	M 4.30* SD 4.35	M 3.19* SD 2.79	M 3.44* SD 3.99	M 3.18** SD 3.29	M 3.41 SD 3.56
Combined	M 4.52 SD 4.04	M 3.50 SD 2.77	M 3.65 SD 3.88	M 3.17 SD 3.27	M 3.53*** SD 3.48

*N = 36.

**N = 108.

***N = 432.

Analysis of Table 7.--Inspection of Table 7 appeared to duplicate the trend of Table 5. The low intelligence level group had the highest mean of violations and accidents. The means of the two added groups were lower than the means of the low and high intelligence level groups. However, the added group means were nearly equal to the mean of the group

of average intelligence level of low socio-economic status. To determine if significant differences existed, comparison of the group means in Table 7 was made by analysis of variance. The design was a 2 x 4 with unequal cell frequencies (Winer, 1962).

The results of analysis of variance for the sum of violations and accidents were recorded in Table 8.

Table 8. Analysis of variance for the sum of violations and accidents between July 1, 1962 and June 30, 1965 comparing all subjects grouped according to intelligence level and economic status

Source	df	MS	F
Socio-economic	1	8.30	.69
Intelligence	3	27.92	2.33*
Soc.-econ x intel.	3	2.61	.22
Within	424	12.05	...

*$P < .10$.

Analysis of Table 8.--The F ratio for intelligence was 2.33 and exceeded the .10 level of significance of 2.08. Because of this significance the means of the intelligence groups with combined socio-economic levels were arranged in ascending order and compared using the Newman-Keuls method. A summary of the comparison is contained in Table 9.

Table 9. Comparison of means of intelligence groups with socio-economic levels combined for the sum of violations and accidents between July 1, 1962 and June 30, 1965

Intelligence Level		Average (Not Interviewed)	Average	High	Low
	Means	3.17	3.50	3.65	4.52
Average (Not interviewed)	3.17	....	.33	.48	1.35
Average	3.50		....	.15	1.02
High	3.65			....	.87
Low	4.52				....

A schematic summary of Table 9 is as follows.--

Average (Not Interviewed)	Average	High	Low

Treatments underlined by a common line (Average Not Interviewed-Average, Average-High, High-Low) do not differ; treatments not underlined by a common line (Average Not Interviewed-Low) do differ at the .10 level of significance.

The means in Table 7 enabled comparison to be made of the driving ability of different groups. This procedure, however, did not give an indication of whether the significant differences of the means were due to a higher percentage of subjects being involved in citations and accidents or a higher frequency for individual subjects. In an attempt to determine the reasons for the differences, the proportion of subjects involved in violations and accidents was compared.

Table 10 shows the percentage of subjects in each group that were involved in violations and accidents for the three year period.

Table 10. Percentage of subjects involved in violations and accidents, between July 1, 1962 and June 30, 1965, all subjects grouped according to intelligence level and socio-economic status

Socio-Economic Status	Intelligence				
	Low	Average	High	Average (Not Interviewed)	Total
High	86.11%*	91.67%*	77.78%*	81.48%**	84.26%
Low	77.78%*	80.56%*	77.78%*	80.58%**	79.17%
Combined	81.92%	86.11%	77.78%	81.02%	81.71%***

*N = 36.

**N = 108.

***N = 432.

Analysis of Table 10.--Percentages of subjects involved in violations and accidents appeared in a small range of 13.89%. Since a disproportionate number of subjects was not observed in any group the differences between groups could have been due to the frequencies in which the offending subjects received citations and accidents.

The criterion of driving ability that had appeared to be significant in Table 8 had been composed of both

violations and accidents. To determine if one of these factors was responsible for the differences obtained, a further comparison was made of violations and accidents. Each of these two factors was analyzed independently by an analysis of variance which produced no significant differences. The means and standard deviations for these factors were included in Tables 11 and 13.

Table 11. Means and standard deviations of violations between July 1, 1962 and June 30, 1965, all subjects

Socio-Economic Status	Intelligence				
	Low	Average	High	Average (Not Interviewed)	Total
High	M 3.75* SD 3.04	M 3.02* SD 2.24	M 3.02* SD 3.41	M 2.37** SD 2.69	M 2.81 SD 2.86
Low	M 3.30* SD 3.23	M 2.36* SD 2.17	M 2.63* SD 3.36	M 2.43** SD 2.67	M 2.60 SD 2.84
Combined	M 3.52 SD 3.14	M 2.69 SD 2.23	M 2.83 SD 3.39	M 2.40 SD 2.68	M 2.71*** SD 2.85

*N = 36.

**N = 108.

***N = 432.

Table 12. Analysis of variance of violations between July 1, 1962 and June 30, 1965, all subjects

Source	df	MS	F
Socio-economic	1	6.83	.84
Intelligence	3	1.97	.24
Soc.-econ. x intel.	3	1.94	.24
Within	424	8.12	...

F .10 (1,∞) = 2.71.

F .10 (3,∞) = 2.08.

Table 13. Means and standard deviations of accidents between July 1, 1962 and June 30, 1965, all subjects

Socio-Economic Status	Intelligence				
	Low	Average	High	Average (Not Interviewed)	Total
High	M .97* SD 1.16	M .77* SD .85	M .80* SD 1.15	M .81** SD .97	M .83 SD 1.02
Low	M 1.00* SD 1.35	M .83* SD .92	M .80* SD 1.07	M .75** SD .98	M .81 SD 1.06
Combined	M .98 SD 1.26	M .80 SD .89	M .80 SD 1.11	M .78 SD .97	M .82*** SD 1.04

*N = 36.

**N = 108.

***N = 432.

Table 14. Analysis of variance of accidents between July 1, 1962 and June 30, 1965, all subjects

Source	df	MS	F
Socio-economic	1	.01	.01
Intelligence	3	.80	.73
Soc.-econ x intel.	3	.06	.05
Within	424	1.10	...

F .10 (1,∞) = 2.71.

F .10 (3,∞) = 2.08.

Analysis of Tables 11, 12, 13 and 14.--The pattern for total means of Tables 11 and 13 indicated that for violations and accidents the low intelligence level had the highest means and that the average intelligence level had the lowest means. However, Tables 12 and 14 indicate no significant differences in group means for either violations or accidents.

The information summarized in Tables 11 through 14 indicates that accidents and violations do not appear to be influenced by a person's intelligence or socio-economic status.

Another criterion that was used in determining driving ability was the points assigned to a violation according to the Michigan Vehicle Code. Total points accumulated

between July 1, 1960 and June 30, 1965 were compared for the interviewed subjects and these means and standard deviations are recorded in Table 15.

Table 15. Means and standard deviations of total points accumulated between July 1, 1960 and June 30, 1965 for interviewed subjects compared on intelligence and socio-economic status

Socio-Economic Status	Intelligence			
	Low	Average	High	Total
High	M 12.27* SD 8.62	M 10.83* SD 7.10	M 10.47* SD 11.61	M 11.19 SD 9.33
Low	M 11.63* SD 10.79	M 8.88* SD 9.58	M 7.69* SD 8.85	M 9.40 SD 9.91
Combined	M 11.95 SD 9.77	M 9.86 SD 8.48	M 9.08 SD 10.42	M 10.30** SD 9.67

*N = 36.

**N = 216.

Analysis of Table 15.--The means in Table 15 had mixed trends with higher means for high socio-economic status and also higher means for the low intelligence level. An analysis of variance with a 2 x 3 design with equal cell frequencies was performed and its result recorded in Table 16.

Table 16. Analysis of variance of total points accumulated between July 1, 1960 and June 30, 1965 for interviewed subjects compared on intelligence and socio-economic status

Source	df	MS	F
Socio-economic	1	172.44	1.84
Intelligence	2	159.22	1.69
Soc.-econ. x intel.	2	20.92	.22
Within	210	93.67	....

F .10 $(1,\infty)$ = 2.71.

F .10 $(2,\infty)$ = 2.30.

Analysis of Table 16.--Table 16 compared group means of total points accumulated for the five year period and revealed no significant differences for either the socio-economic factor or the levels of intelligence.

However, a breakdown of the total points into two groups: points accumulated for speeding and points accumulated for violations other than speeding were analyzed to see if they produced different results. These two groups were analyzed separately and Table 17 records means and standard deviations for points accumulated for speeding for the five year period.

Table 17. Means and standard deviations of points accumulated for speeding, from July 1, 1960 to June 30, 1965, for interviewed subjects grouped according to intelligence and socio-economic status

Socio-Economic Status	Intelligence			
	Low	Average	High	Total
High	M 4.83* SD 4.91	M 6.36* SD 4.63	M 6.30* SD 8.03	M 5.83 SD 6.10
Low	M 4.25* SD 4.65	M 4.38* SD 6.05	M 3.91* SD 6.23	M 4.18 SD 5.69
Combined	M 4.54 SD 4.79	M 5.37 SD 5.48	M 5.11 SD 7.28	M 5.00** SD 5.95

*N = 36.

**N = 216.

Analysis of Table 17.--Inspection of Table 17 revealed that the group with the low level of intelligence had the lowest mean points accumulated for speeding but that the group differences between levels of intelligence were not as great as the differences between means for socio-economic level groups. To determine if the differences were significant, analysis of variance, of a 2 x 3 design with equal cell frequencies, was made and a summary of the analysis is recorded in Table 18.

Table 18. Analysis of variance of points accumulated for speeding, from July 1, 1960 to June 30, 1965, for interviewed subjects grouped according to intelligence and socio-economic status

Source	df	MS	F
Socio-economic	1	146.68	4.12*
Intelligence	2	13.06	.36
Soc.-econ. x intel.	2	16.08	.45
Within	210	35.53	....

*P < .05.

Analysis of Table 18.--The F ratio for socio-economic status was 4.12 and exceeded the 3.84 required for significance at the .05 level. However, intelligence did not appear as a significant factor in the analysis of points accumulated for speeding.

The second breakdown, points accumulated for violations other than speeding, was also independently evaluated and the means and standard deviations are recorded in Table 19.

Table 19. Means and standard deviations for points accumulated for violations other than speeding, between July 1, 1960 and June 30, 1965, for interviewed subjects compared on intelligence and socio-economic status

Socio-Economic Status	Intelligence			
	Low	Average	High	Total
High	M 7.44* SD 5.58	M 4.47* SD 4.45	M 4.16* SD 5.04	M 5.36 SD 5.25
Low	M 7.38* SD 7.46	M 4.50* SD 5.55	M 3.77* SD 4.00	M 5.22 SD 6.05
Combined	M 7.41 SD 6.59	M 4.48 SD 5.03	M 3.97 SD 4.55	M 5.29** SD 5.67

*N = 36.

**N = 216.

Analysis of Table 19.--Inspection of Table 19 revealed that socio-economic status means were nearly the same in each of the intelligence categories and that the low intelligence level group had a higher mean than the average and high intelligence level groups. To determine if the differences were significant, an analysis of variance of a 2 x 3 design with equal cell frequencies was made, a summary of which was recorded in Table 20.

Table 20. Analysis of variance for points accumulated for violations other than speeding, between July 1, 1960 and June 30, 1965, for interviewed subjects compared on intelligence and socio-economic status

Source	df	MS	F
Socio-economic	1	1.04	.03
Intelligence	2	248.59	8.10*
Soc.-econ. x intel.	2	.87	.02
Within	210	30.68	....

*P < .01.

Analysis of Table 20.--Only the factor of intelligence appeared significant with an F value equal to 8.10 which exceeded the 4.61 required at the .01 level of significance. Because of this significance the means of the intelligence groups with combined socio-economic levels were arranged in ascending order and compared using the Newman-Keuls method. A summary of the comparison is contained in Table 21.

Table 21. Comparison of means of intelligence groups with socio-economic levels combined for points accumulated for violations other than speeding between July 1, 1960 and June 30, 1965

Intelligence Level		High	Average	Low
	Means	3.97	4.48	7.41
High	3.97	....	.51	3.44
Average	4.48		....	2.93
Low	7.41			....

A schematic summary of Table 21 is as follows.--

High Average Low

Treatments underlined by a common line (High-Average) do not differ; treatments not underlined by a common line (High-Low, Average-Low) do differ at the .01 level of significance.

Generally speaking the data presented in Tables 15 through 21 on points accumulated over a five year period seem to indicate that intelligence and socio-economic status did not influence the total number of points accumulated within the five year period. However, an inspection and subsequent analysis of the driving records indicated that subjects from the high socio-economic groups had received more points for speeding violations than the subjects from the low socio-economic groups. Further analysis indicated that subjects with low intelligence had more points for

violations other than speeding than the average and above average intelligence groups.

Driving Exposure Data

From the subjects interviewed, various estimates of their driving exposure were obtained. One set of responses was to questions relating to miles driven per year. The means and standard deviations for the responses are recorded in Table 22.

Another aspect of driving exposure was obtained in responses to questions pertaining to hours a day spent in a motor vehicle. The means and standard deviations of these responses are summarized in Table 23.

Table 22. Means and standard deviations of subjects' estimates of miles driven per year, interviewed subjects

Socio-Economic Status	Intelligence: Low	Intelligence: Average	Intelligence: High	Total
High	M 11,555* SD 9,510	M 13,944* SD 10,020	M 11,305* SD 9,010	M 12,260 SD 9,600
Low	M 12,500* SD 9,920	M 11,250* SD 9,380	M 11,361* SD 11,440	M 11,700 SD 10,300
Combined	M 12,027 SD 9,730	M 12,597 SD 9,800	M 11,332 SD 10,290	M 11,980** SD 9,960

*N = 36.

**N = 216.

Analysis of Table 22.--Inspection of Table 22 did not reveal any trends and an analysis of variance did not indicate any significant differences between groups in the miles driven per year.

Table 23. Means and standard deviations of subjects' estimates of hours a day in a motor vehicle, interviewed subjects

Socio-Economic Status	Intelligence			
	Low	Average	High	Total
High	M 2.69* SD 1.68	M 1.91* SD 1.03	M 2.38* SD 1.75	M 2.33 SD 1.55
Low	M 3.38* SD 2.22	M 1.83* SD 1.23	M 2.00* SD 1.97	M 2.40 SD 1.98
Combined	M 3.04 SD 2.00	M 1.87 SD 1.14	M 2.19 SD 1.87	M 2.37** SD 1.78

*N = 36.

**N = 216.

Analysis of Table 23.--Inspection of Table 23 revealed little variation in hours for socio-economic status, however, the low intelligence level group reported spending a higher number of hours in the car than the average and high intelligence levels. An analysis of variance was made and a summary is recorded in Table 24.

Table 24. Analysis of variance of subjects' estimates of hours a day in a motor vehicle, interviewed subjects

Source	df	MS	F
Socio-economic	1	.29	.09
Intelligence	2	26.17	8.80*
Soc.-econ. x intel.	2	5.61	1.88
Within	210	2.97	....

*P < .01.

Analysis of Table 24.--The F value for the factor of intelligence was 8.80 which exceeded the 4.61 required for significance at the .01 level. Because of this significance the means of the intelligence groups with combined socio-economic levels were arranged in ascending order and compared using the Newman-Keuls method. A summary of the comparison is contained in Table 25.

Table 25. Comparison of means of intelligence groups with socio-economic levels combined for subjects' estimate of hours a day in a motor vehicle

Intelligence Level		Average	High	Low
	Means	1.87	2.19	3.04
Average	1.87	....	.32	1.17
High	2.19		....	.85
Low	3.04			....

A schematic summary of Table 25 is as follows.--

Average High Low

Treatments underlined by a common line (Average-High) do not differ; treatments not underlined by a common line (Average-Low, High-Low) do differ at the .01 level of significance.

Generally speaking data presented in Tables 22 through 25 on driving exposure seem to indicate that intelligence and socio-economic factors did not influence the number of miles the subjects drove their vehicles. However, further analysis of the data on driving exposure indicated that the subjects within the low intelligence group had spent more hours per day in an automobile than those subjects assigned to average and above average intelligence groups.

The 216 added subjects were randomly selected from driver education records. There was a difference in the percentage of interviewed subjects who reported enrollment in a driver education course. Table 26 shows the different percentages reported by the various groups.

Table 26. Percentage of subjects reporting enrollment in a driver education course

	Low	Average	High	Average (Not Interviewed)
High SES	78%*	97%*	100%*	100%***
Low SES	89%*	92%*	97%*	100%***
Average of Group	84%**	95%**	99%**	100%****

*N = 36.

**N = 72.

***N = 108.

****N = 216.

The low intelligence group reported less enrollment in driver education classes. The differences that exist may have been due to two factors. One, is that they do have a lower incidence of enrollment in driver education classes. The second reason may have been caused by the subjects desire to suppress a failure which they have experienced.

Evidence to support this view was that 25% of the low intelligence, high socio-economic status group did not wish to reply to a question relating to enrollment in a driver education course.

Summary of Findings

At the onset, a .10 level of significance was set for accepting or rejecting differences. Those comparisons made according to intelligence levels and socio-economic status which indicated no significant differences are as follows:

1. Sum of violations and accidents during a three year period for one-half the subjects (those interviewed) was not significantly different between the groups (Table 5).
2. Number of violations only, during a three year period for combined subjects indicated no significant differences between the groups compared (Table 11).
3. Number of accidents only, during a three year period, for combined subjects were not found significantly different between the groups compared (Table 13).
4. Total points accumulated for all violations during a five year period for interviewed subjects were not significantly different between the groups (Table 15).

5. Responses to questions concerning the miles driven per year by subjects resulted in no significant differences between the groups compared (Table 22).
6. Points accumulated for violations other than speeding during a five year period for interviewed subjects indicated no significant differences between socio-economic status groups (Table 19).

Other comparisons made according to intelligence levels and socio-economic status which did indicate significant differences are as follows:

7. Sum of violations and accidents (comparisons two and three) during a three year period for combined subjects, indicated significantly more violations and accidents for the low intelligence levels than for the average (not interviewed) intelligence level (Table 9).
8. Points accumulated for speeding during a five year period, comparing groups of interviewed subjects, indicated significantly more speeding points for the high than the low socio-economic status classifications (Table 17).
9. There were significantly more points for violations other than speeding for the low intelligence group than for the average or the high intelligence levels (Table 19).

10. Responses to questions about the number of hours per day spent in a motor vehicle resulted in significantly more hours being reported by the low intelligence level than both the average and high intelligence levels (Table 23).

CHAPTER V

SUMMARY, DISCUSSION AND RECOMMENDATIONS FOR FUTURE RESEARCH

Summary

The purpose of this study was to investigate inter-relationships among driving ability, intelligence, socio-economic status and driving exposure of males with low, average and above average IQ's.

The subjects for this study were selected from former high school students who had attended school between 1960 and 1964, had been issued a Michigan driver's license, and were, at the time of the study, residing within the city limits of Lansing, Michigan. Subjects were assigned to groups on the basis of intelligence scores recorded in their school records.

All subjects who were enrolled in the high school special education program for the educable mentally retarded and otherwise qualified for this study on the basis of the criteria listed above, were assigned to the low intelligence group. The socio-economic status of these low intelligence subjects was then determined using demographic census data.

A median socio-economic index was obtained and assignment to the high or low socio-economic group accomplished. The total number of low intelligence subjects was 72, which meant that 36 were assigned to each socio-economic group.

Subjects for the average and above average intelligence groups were selected at random from the list of prospective subjects who satisfied the criteria for selection listed above, including the added dimension of socio-economic status. The total number of subjects in the average and above average groups was 144. Initial attempts to analyze data on the 216 subjects indicated constriction of the data. In an attempt to alleviate this constriction two groups of 108 subjects each were added to the average intelligence groups. All subjects except these added 216 were interviewed.

Official State of Michigan driving records of the male educable mentally retarded subjects were compared with the driving records of subjects assigned to the average and above average intelligence groups. The interrelationships between intelligence levels, socio-economic status levels, accidents, violations and driving exposure were compared.

The original 216 subjects were interviewed to obtain estimates of number of miles driven per year as well as the number of hours spent in a motor vehicle each day. In addition, information on participation in driver education courses while in high school was obtained by the interviewer.

Analysis of variance was used to determine if significant differences existed between group means. When significance appeared an individual comparison of means using the Newman-Keuls procedure was used. A .10 level of significance was established as the critical value of accepting or rejecting differences.

The following is a summary of the results of the comparisons made in this investigation.

1. Sum of violations and accidents during a three year period for one-half the subjects (those interviewed) was not significantly different between the groups (Table 5).
2. Number of violations only, during a three year period for combined subjects, indicated no significant differences between the groups compared (Table 11).
3. Number of accidents only during a three year period, for combined subjects were not found significantly different between the groups compared (Table 13).
4. Total points accumulated for all violations during a five year period for interviewed subjects were not significantly different between the groups (Table 15).
5. Responses to questions concerning estimates of the miles driven per year by subjects resulted in no significant differences between the groups compared (Table 22).

6. Points accumulated for violations other than speeding during a five year period for interviewed subjects indicated no significant differences between socio-economic status groups (Table 19).

Other comparisons made according to intelligence levels and socio-economic status which did indicate significant differences are as follows:

7. Sum of violations and accidents (comparison two and three above) during a three year period for combined subjects, indicated significantly more violations and accidents for low intelligence level subjects than for the average (not interviewed) intelligence level (Table 9).
8. Points accumulated for speeding during a five year period, comparing groups of interviewed subjects, indicated significantly more speeding points for the high than the low socio-economic status classifications (Table 17).
9. There were significantly more points for violations other than speeding for the low intelligence group than for the average intelligence level (Table 19).
10. Responses to questions about the number of hours a day spent in a motor vehicle resulted in significantly more hours being reported by the low intelligence level than both the average and high intelligence levels (Table 23).

Discussion

The review of related research pointed out the difficulty researchers have had in identifying factors which would be useful in predicting driving behavior of the potential driver. In fact, the literature seems to indicate that it is unrealistic to expect that any one behavioral or environmental factor could be completely reliable in predicting driving behavior. Generally, the procedures employed by previous investigators were confined to looking at one factor, such as intelligence, and its relationship to driving behavior. The present study was designed to look at driving behavior and its relationship to the intelligence and socioeconomic status of the individual. This design in driver behavior research produced some interesting findings, some of which are worthy of additional discussion.

1. The results indicate that drivers of low intelligence tend to receive more citations for moving violations, other than speeding, than drivers of average or above average intelligence.

   Perhaps lower intellectual ability becomes a vital factor in complex traffic situations and the lack of ability to handle the myriad number of driving problems which arise in the course of driving results in a greater amount of citations for individuals in this group. Another explanation is that

persons in the low intelligence group tend to do more driving in the area of their residence. In a city such as Lansing, where there is a high violation enforcement index reported by the police department, this could result in more citations for violations other than speeding. However, the investigator is inclined to believe both factors, poorer driving ability and more driving in a high traffic enforcement area, are together a plausible explanation for this significant finding.

An implication of this finding for the driver education program is that the student might find it more profitable, in terms of developing acceptable driving habits, to spend more time in complex, actual driving experiences, rather than theoretical classroom situations. For example the driver education student who is certified as educable mentally retarded may profitably spend a greater amount of his training time behind the wheel of an automobile practicing driving in an urban rather than rural or suburban area. This would not only minimize the student's potential driving weakness but would also utilize a recommended method in teaching the low intelligence person, i.e., learning by doing.

2. The findings indicate that low intelligence drivers tend to be involved in more accidents and violations than drivers of average or above average intelligence. Accidents and violations are factors which may contribute to the total number of points on a driver's record. However, an interesting point is that the percentage of drivers involved in accidents and violations is approximately the same for all groups regardless of level of intelligence. This means that the overall poorer driving record of the low intelligence group can be attributed to a higher incidence of accidents and violations for certain individuals within the group. In one way it may be said that when a person of low intelligence is a bad driver (a number of citations for accidents and violations) they are in fact a poorer driver than a bad driver of average or above average intelligence.

The above statement has implications for driver re-examining agencies. The usual driver re-exam consists of an interview with the traffic violator and then the interviewer making an evaluation of the subject's capacity to change his driving pattern of committing traffic violations. The low intelligence traffic violator should not only be required to submit to a personal interview but should also be required to perform actual driving maneuvers in

normal traffic conditions. It may be possible that the low intelligence violator cannot drive in a manner differing from his established pattern. This difficulty may not be apparent in an interview but might be discernible to an examiner observing the subject drive.

3. Interview data indicate that the subject estimates of the number of miles driven per year do not appear to be different among the groups. Number of hours spent in a motor vehicle reported by the low intelligence group was significantly more than reported by the average and above average intelligence groups. It is possible that this can be attributed to poor judgment of time by the low intelligence group. A more likely answer is that the use of a car reflects a cultural pattern for these young low IQ adult males. This may be their way of expressing emancipation from the home and/or it may be compensation for an inadequate self-concept. Automobiles in our culture may be used by many young people to express their independence from parental influence and the low IQ person may use this device to escape from parental ties much more than the other groups studied. Automobile manufacturers have spent huge sums of money to create a public image of their product that includes such factors as power, speed,

status, youth or manliness. Operation of an automobile symbolizes a personal acquisition of one or more of these factors. Therefore, the low IQ group may have found that the use of an automobile is the most convenient way to show they are as good as anyone else--by borrowing the status or public image of the car as their own.

The implication for the special education and driver education teacher is that they should help provide the student with some other means by which low intelligence subjects can further enhance their self-concept without the dangers inherent in traffic. Parents too, should be helped to understand the procedures a youth utilizes in becoming independent from his parents. They then could more adequately help their young adults assume the role of independence from the parents.

4. The results of this study suggest that drivers from the high socio-economic groups tend to have more citations for speeding than drivers from the low socio-economic groups. The higher the incidence of citations for speeding by the high socio-economic group may be a manifestation of antisocial reactions for violators within this group. Hollingshead (1958, p. 231) reported a greater tendency of neurotic antisocial behavior among persons having a

high socio-economic status than for persons having a low socio-economic status. However, there is the possibility that subjects in the high socio-economic group drove a more expensive and powerful automobile and exceeded the speed limit in an unintentional manner. But if speeding is a manifestation of anti-social behavior for the high socio-economic offenders, then the concept of traffic law violations as a sub-species of folk crime as suggested by Erwin O. Smigel and developed by H. Laurence Ross (1961) has additional support.

The finding that people in the high socio-economic group receive more citations for speeding has the same implication for the driver education teacher, the law enforcement officer and the religious counsellor. The author believes that speeding is generally a willful act. The findings indicate that drivers in the high socio-economic groups may not view this behavior as improper. The author also feels that economic sanctions, which are usually employed by traffic courts, while a detriment to speeding, are not as effective as instilling in the driver a sense of responsibility to his fellow driver. The driver education teacher, the enforcement officer, and the institutions they represent should promote a morality of driving in their

contacts with students, the public, church congregations *et al*. For example, the driver education teacher should stress not only the mechanical and physical aspects of driving but also the social and moral implications of improper driving. The enforcement officer and judge might incorporate in their treatment of traffic offenders a moralistic implication for traffic violators antisocial acts.

On the basis of the findings reported in this investigation the following conclusions, concerning the population under study, are made:

1. Intelligence and socio-economic status do not appear to be predictive of number of violations a driver will commit.
2. Intelligence and socio-economic status do not appear to be predictive of number of accidents in which a driver will become involved.
3. Intelligence and socio-economic status do not appear to be predictive of the total number of "points" which a driver will receive for having committed traffic violations.
4. Intelligence and socio-economic status do not appear to be predictive of the number of miles a person will drive his automobile per year.

5. As a group of drivers educable mentally retarded males have a larger total of combined convictions for traffic violations and involvement in accidents than groups of male motorists with average intelligence scores. It should be noted that an individual's IQ score in and of itself is not necessarily predictive of driving performance.
6. Socio-economic status tends to predict the proportion of points a driver will receive for speeding violations.
7. Intelligence tends to predict the proportion of points a driver will receive for moving violations, other than speeding.
8. Intelligence tends to predict the number of hours a driver will spend per day in an automobile.

Recommendations for Future Research

The results of this investigation seem to warrant additional research. Specifically,

1. What factor(s) in the high socio-economic group resulted in their accumulation of "points" for speeding violations?
2. What specific factor(s) resulted in the low intelligence group receiving more "points" for moving violations, other than speeding?

The significance discovered by comparing partitioned types of violations may further understanding of factors contributing to accidents and violations. Answering the two aforementioned questions would analyze violation and accident data according to some constituents. Serviceable research groupings for use in the above questions might be according to conditions existing during an event such as: (1) type of injuries, (2) number of fatalities, (3) extent and type of property damage, (4) driving rule violated, and (5) relationship to other vehicles or people. Such categories could define driving weaknesses in a manner which would permit development of accident avoidance techniques for use in driver education classes and more judicious law enforcement by traffic enforcement agencies.

3. It would appear to be of considerable value to duplicate the procedures used in this investigation utilizing a larger number of subjects to enable a more thorough analysis of the constituent factors uncovered in this investigation. With a more accurate defining of the population through larger numbers significant findings might result between more intelligence groups.

4. The correlation between personality factors and intelligence was not examined by the researcher. If there is a correlation of these factors a new insight into driving behavior may be possible.
5. The possibility exists that the factors investigated could be analyzed using multiple correlation analysis and produce significant indicators of driving ability.
6. Finally, this research was confined to males only. Further research to determine if the same results would occur for female subjects should be undertaken since females are becoming involved in more business and social activities that require that they drive an automobile.

Research designed to clarify issues identified by this investigation should strive to eliminate the inherent limitations of the present study. Specifically,

1. The fact that two types of intelligence tests were used in determining the subjects utilized in this research remains a procedureal limitation. However, the specific tests used in the Lansing Public Schools minimized this factor. The California Test of Mental Maturity was employed for the group test, while the Revised Stanford-Binet Scale and Wechsler Intelligence Scale for Children were used as individual

tests. In regard to the California Test of Mental Maturity, Freeman (1959, p. 437) states in Buros Fifth Mental Measurements Yearbook:

> On the whole, the coefficients resulting from these validating studies, which were carried out by investigators other than the authors of the scales, are satisfactory or even high, especially in the case of the Stanford-Binet and Wechsler Scales.

Further, Haworth states in Buros (1959, p. 547): "Correlations between the WISC and Stanford-Binet range from the .60's to .90's." The mean intelligence quotient for all three tests was 100 and the standard deviation reported for the WISC (Buros, 1959, p. 558) is 15, for the Stanford-Binet the standard deviation is, according to Buros (1959, p. 547), 16.4. The same source (Buros, 1959, p. 436) states that the California Test of Mental Maturity has a standard deviation of 16. This evidence tends to reduce the limitation of using different types of tests.

2. Using a demographic basis for determining socio-economic status may have resulted in a subject being placed in an improper socio-economic classification due to intra-block differences. The census data is based on a block average and any particular subject may have deviated to the extent of actually

being in a classification other than that of the block norm.

3. Not all driving violations are registered by police officers, therefore the Secretary of State's record undoubtedly represents less than actual driving infractions of the subjects. Violations which result in accidents are also more strictly noted on the driver's record than those which are not associated with accidents. Therefore those violations which do not cause accidents may not be truly represented in the driving record of a traffic violator.
4. Since interviews are subjective the data obtained by this method is probably not as uniform as might be obtained through an objective technique. The interviews, although conducted by professional personnel who were instructed in a uniform approach to the subjects, undoubtedly varied the interview procedure when interpersonal reaction demanded variation. This variance of interview techniques may have resulted in a variance of interpreting and recording the data concerning hours spent in a car per day or miles driven per year. Also, validation of these findings on driving exposure is not possible through any practical means now available to the researcher.

5. Several important factors must be considered in evaluating the results of this research. These include the subjects, all of whom were residents of Lansing, Michigan, where public transportation and its use are on the decline while the population and area of the city are on the increase. The result is a need and a custom or habit for these subjects to drive more miles than would be expected in a location where public transportation is more readily available. Also, an inestimable influence on the research is the favorable economic condition in Lansing, Michigan which provides for reduced financial restrictions on driving vehicles not only for the subjects but for other drivers in the area. It is conjectured that there is greater driving exposure for the subjects under more congested driving conditions than during unfavorable economic periods thus producing more vehicular interaction. An observer might validly question whether the results obtained in this research are equally valid in areas where there is not as much traffic.

APPENDIX A

REQUEST FOR MICHIGAN DRIVER RECORD INFORMATION, OC-70

Lansing Public Schools
c/o Robert W. Gutshall
Lincoln School
Lansing, Michigan

State Dept. Account No.

License No. (Important) | | | | | | |

Name
First Middle Last

Address

Birth Date | oper. lic. expires on 19__ birthday | chauf. lic. expiration date

This space for use of company submitting request

FINANCIAL RESPONSIBILITY RECORD

CASE NO.	Conviction or Accident Date	Reason for F.R. Action	Location	Date Action Lifted

Probate Court Finding or Conviction Date	Arrest Date	Accident Date	Location	Offense, Accident, or Dept. Action

LOCATIONS

1. Detroit
2. Highland Park
3. Lincoln Park
4. Livonia
5. Dearborn
6. Grand Rapids
7. Kalamazoo
8. Lansing
9. Flint
10. Saginaw

(All others written)

A. Speeding
B. Ran red light
C. Ran Stop sign
D. Improper left turn
E. Improper right turn
F. Improper passing
G. Reckless driving
H. Interfering with traffic
I. Failure to yield right
J. Basic speed

(All others written)

APPENDIX B

PERTINENT BASIC DATA USED IN THE PROJECT

Group 1: Classified as low intelligence, 36 subjects that had an IQ below 86 with high socio-economic status, interviewed

Subject's No. 1-36	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
1	22	63	1	8	A	2	1	0	5
2	21	67	1	5	A	6	0	6	8
3	21	68	5	1	A	1	0	0	3
4	21	82	2	4	A	3	3	4	4
5	24	77	2	10	A	2	0	10	6
6	20	86	3	35	A	6	1	12	12
7	24	75	1	1	B	7	2	5	21
8	21	80	5	35	A	14	3	7	25
9	20	73	2	1	A	6	0	9	7
10	21	68	1	18	A	5	2	7	10
11	20	68	4	5	B	5	1	0	10
12	23	61	2	1	A	5	1	6	8
13	23	74	2	10	A	6	1	24	5
14	23	64	1	1	A	0	0	0	8
15	24	67	1	7	C	1	0	0	2
16	22	71	3	15	A	7	0	14	13
17	22	66	4	2	A	1	0	3	2
18	20	71	4	6	A	2	2	0	4
19	22	81	5	32	A	3	0	3	4
20	21	73	1	10	A	1	0	3	0

Group 1--Continued

Subject's No. 1-36	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
21	24	74	1	17	A	3	4	3	7
22	22	78	3	5	A	0	0	0	0
23	25	76	1	5	B	0	0	0	2
24	24	82	9	25	A	5	0	3	12
25	19	74	3	6	A	1	1	2	0
26	18	80	2	8	B	0	0	0	0
27	18	72	2	5	A	4	3	4	7
28	19	77	3	12	C	7	1	2	6
29	21	72	3	20	B	9	1	9	18
30	23	74	2	21	A	0	0	0	10
31	21	77	5	25	A	3	0	4	3
32	21	68	3	10	A	7	4	7	9
33	21	70	1	4	A	6	1	7	11
34	25	77	4	15	A	5	1	7	10
35	24	70	2	16	A	1	1	8	9
36	22	81	3	15	B	2	1	5	7

Group 2: Classified as average intelligence, 36 subjects that had an IQ from 90 to 110 with high socio-economic status, interviewed

Subject's No. 101-136	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
101	20	99	2	25	A	5	1	10	2
102	18	106	1	3	A	1	0	4	0
103	21	110	2	8	A	1	0	3	0
104	19	110	1	13	A	2	0	6	0
105	19	105	3	20	A	4	1	6	4
106	19	109	3	20	A	7	3	9	8
107	20	106	2	15	A	2	1	3	2
108	21	101	2	8	A	7	2	10	7
109	18	103	2	10	A	3	0	6	2
110	23	90	3	10	A	5	0	9	7
111	20	110	1	10	A	7	1	3	16
112	20	98	2	13	A	4	2	5	5
113	24	99	1	15	A	3	0	18	0
114	20	91	2	3	A	0	1	0	0
115	23	99	2	25	A	0	0	0	13
116	23	99	2	12	A	3	0	11	3
117	23	90	2	50	A	4	1	19	8
118	21	110	1	8	A	2	0	3	2

Group 2--Continued

Subject's No. 101-136	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
119	21	96	1	10	A	2	1	0	5
120	22	100	1	4	A	1	3	7	3
121	19	105	2	6	A	6	1	12	7
122	23	98	1	7	A	0	0	6	4
123	19	102	2	1	B	1	1	0	2
124	22	106	1	20	A	1	0	5	3
125	21	104	2	16	A	2	0	6	0
126	23	107	3	35	A	5	2	13	10
127	19	96	1	15	A	3	1	6	3
128	21	108	1	1	A	2	2	4	4
129	21	109	4	24	A	3	0	6	5
130	20	105	2	5	A	6	1	11	4
131	20	102	1	10	A	8	1	10	19
132	21	97	1	18	A	2	1	2	2
133	21	110	2	5	A	1	0	3	3
134	21	98	1	30	A	1	0	4	0
135	21	104	3	12	A	0	0	0	0
136	22	102	6	15	A	5	1	9	8

Group 3: Classified as high intelligence, 36 subjects that had an IQ above 110 with high socio-economic status, interviewed

Subject's No. 151-186	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
151	20	111	2	6	A	0	0	0	0
152	19	116	1	1	A	3	0	10	0
153	19	114	3	17	A	13	1	22	12
154	21	117	2	12	A	0	0	0	0
155	22	114	4	30	A	2	2	3	2
156	19	123	1	1	A	2	1	6	0
157	20	113	2	5	A	5	2	7	4
158	20	122	4	13	A	3	2	6	2
159	23	115	8	27	A	1	0	18	4
160	21	115	3	20	A	4	0	6	9
161	19	123	2	6	A	7	4	0	16
162	21	135	1	4	A	0	0	0	0
163	20	115	2	5	A	1	1	2	2
164	20	120	1	11	A	2	5	0	4
165	19	114	1	5	A	4	0	9	2
166	23	115	1	1	A	3	1	6	2
167	22	115	2	18	A	1	0	3	2
168	19	113	2	1	A	1	0	0	3

Group 3--Continued

Subject's No. 151-186	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
169	20	125	2	6	A	4	0	4	4
170	22	112	6	30	A	5	2	26	4
171	19	119	1	5	A	2	1	0	6
172	22	125	1	5	A	0	0	3	0
173	19	123	2	2	A	1	1	0	2
174	20	115	2	10	A	4	1	6	4
175	20	119	2	20	A	0	1	0	6
176	22	114	2	10	A	15	0	35	22
177	23	117	2	6	A	2	2	6	13
178	20	116	1	5	A	0	0	0	0
179	22	122	3	20	A	5	0	14	4
180	19	134	1	16	A	0	0	0	0
181	19	142	1	5	A	1	1	3	0
182	21	113	6	5	A	5	0	9	5
183	22	123	2	21	A	0	0	0	0
184	21	122	7	28	A	8	1	12	12
185	18	130	2	10	A	5	0	11	4
186	18	123	1	10	A	0	0	0	0

Group 4: Classified as average intelligence (not interviewed), 108 subjects that had an IQ from 90 to 110 with high socio-economic status

Subject's Number 501-608	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
501	19	104	A	3	3	6	2
502	23	101	A	2	0	7	0
503	19	107	A	5	0	7	4
504	21	98	A	5	2	13	6
505	23	104	A	6	1	13	4
506	23	102	A	0	0	0	2
507	19	106	A	4	1	6	4
508	19	97	A	6	1	6	9
509	20	94	A	0	0	0	0
510	19	101	A	2	1	0	4
511	20	107	A	1	1	0	2
512	20	100	A	4	1	5	6
513	19	91	A	1	2	0	3
514	21	106	A	4	0	12	2
515	23	105	A	1	1	2	2
516	23	91	A	0	1	0	0
517	21	90	A	1	0	2	0
518	23	93	A	1	0	7	0
519	21	106	A	0	0	0	0
520	20	108	A	0	0	0	0
521	21	106	A	0	0	0	0
522	23	96	A	1	1	0	2
523	21	94	A	5	0	12	4
524	21	105	A	0	0	3	0
525	21	104	A	4	3	9	4
526	22	107	A	8	3	17	19
527	20	109	A	3	1	3	5
528	21	103	A	0	0	12	0
529	22	101	A	5	0	10	5

Group 4--Continued

Subject's Number 501-608	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
530	22	104	A	2	0	10	6
531	23	108	A	2	1	5	4
532	21	94	A	1	1	0	7
533	23	106	A	1	0	4	0
534	23	97	A	2	0	4	2
535	23	109	A	2	1	11	2
536	22	108	A	5	3	11	7
537	19	103	A	4	1	6	4
538	19	98	A	0	2	0	0
539	23	97	A	1	1	8	2
540	21	104	A	17	3	24	41
541	19	106	A	7	2	15	6
542	19	107	A	1	0	0	2
543	20	97	A	0	1	0	0
544	20	100	A	0	0	0	0
545	21	99	A	0	0	0	0
546	20	105	A	1	0	2	0
547	20	106	A	4	2	5	5
548	19	102	A	0	0	0	0
549	20	97	A	0	0	0	0
550	20	103	A	1	0	0	3
551	21	110	A	0	0	0	0
552	20	102	A	2	0	4	0
553	21	99	A	5	1	3	14
554	19	105	A	0	0	0	0
555	24	90	A	12	2	34	19
556	20	92	A	0	0	0	0
557	20	110	A	1	1	2	0
558	21	97	A	7	2	12	5

Group 4--Continued

Subject's Number 501-608	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over a 5 Yr. Period
559	21	107	A	4	1	3	11
560	20	100	A	1	0	2	0
561	19	97	A	1	0	0	3
562	21	96	A	2	0	9	0
563	21	101	A	6	1	8	9
564	23	108	A	0	1	4	2
565	19	108	A	0	0	0	0
566	21	106	A	4	2	3	7
567	21	97	A	4	2	7	2
568	21	94	A	5	1	20	6
569	21	90	A	0	0	9	2
570	22	106	A	2	1	4	2
571	22	107	A	3	0	9	5
572	20	109	A	1	0	4	0
573	20	110	A	6	2	16	2
574	21	99	A	5	2	6	7
575	19	106	A	0	2	0	0
576	20	99	A	1	0	3	0
577	20	109	A	1	1	2	0
578	23	107	A	5	0	7	4
579	22	97	A	2	2	10	4
580	22	110	A	1	0	0	9
581	22	100	A	0	1	0	5
582	22	95	A	3	0	14	0
583	20	102	A	0	0	0	0

Group 4--Continued

Subject's Number 501-608	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
584	21	107	A	0	0	0	0
585	21	99	A	3	0	8	2
586	22	104	A	1	0	2	0
587	19	100	A	1	1	3	0
588	23	95	A	1	1	2	3
589	21	105	A	8	2	22	5
590	20	92	A	2	0	5	0
591	19	105	A	0	1	0	0
592	23	104	A	3	1	0	6
593	20	94	A	2	2	2	2
594	21	109	A	2	2	0	8
595	19	96	A	5	1	0	10
596	22	104	A	3	0	4	2
597	21	105	A	1	2	4	8
598	23	98	A	1	0	0	3
599	22	101	A	0	0	0	2
600	20	103	A	2	3	2	2
601	21	94	A	0	0	0	2
602	23	103	A	1	0	12	4
603	22	110	A	6	2	5	13
604	23	103	A	0	1	0	0
605	19	93	A	2	1	6	0
606	20	90	A	3	0	5	3
607	20	100	A	1	0	0	2
608	23	104	A	1	0	10	3

Group 5: Classified as low intelligence, 36 subjects that had an IQ below 86 with low socio-economic status, interviewed

Subject's No. 51-86	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
51	23	72	1	8	A	5	0	7	13
52	18	75	3	15	A	3	0	3	4
53	21	85	1	2	B	0	0	0	0
54	22	70	1	1	B	4	0	3	14
55	22	75	1	1	A	1	0	0	10
56	21	83	6	21	A	5	1	3	9
57	25	60	2	21	A	0	0	0	0
58	23	60	6	14	A	0	1	0	3
59	20	76	5	10	A	0	0	0	0
60	21	75	1	10	A	5	1	8	5
61	23	79	7	26	A	10	3	12	28
62	21	84	5	5	A	3	1	5	2
63	20	78	4	2	A	0	0	0	0
64	21	61	2	5	A	3	0	0	6
65	22	80	2	5	B	2	0	2	10
66	20	77	2	15	A	2	0	0	2
67	18	77	2	15	A	0	0	0	0
68	20	83	2	7	A	3	1	5	11

Group 5--Continued

Subject's No. 51-86	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
69	22	78	2	25	A	2	1	3	4
70	21	74	5	25	A	2	0	6	0
71	21	83	6	20	A	7	4	13	10
72	24	63	8	30	A	11	3	17	12
73	19	78	2	8	A	0	0	0	0
74	23	63	3	10	B	4	0	4	26
75	21	73	8	1	A	1	0	4	0
76	21	82	1	2	A	9	3	15	13
77	21	75	4	18	A	6	5	10	7
78	20	72	3	30	A	10	2	9	15
79	23	66	1	12	A	2	2	2	2
80	22	65	6	6	A	7	3	6	14
81	21	82	4	8	A	0	0	0	0
82	23	78	8	14	A	2	1	9	16
83	23	80	3	43	A	1	0	0	2
84	22	74	1	3	A	8	3	5	21
85	21	72	2	2	A	1	1	2	7
86	21	70	2	10	A	0	0	0	0

Group 6: Classified as average intelligence, 36 subjects that had an IQ from 90 to 110 with low socio-economic status, interviewed

Subject's No. 201-236	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
201	20	106	1	12	A	0	0	0	0
202	20	91	1	10	A	1	0	0	3
203	21	103	1	8	A	2	1	2	2
204	19	102	4	7	A	2	1	2	3
205	20	106	1	5	A	0	0	0	0
206	23	93	1	10	A	1	2	13	6
207	21	107	1	25	A	4	2	3	7
208	19	103	1	5	A	2	2	3	2
209	22	93	1	12	A	0	0	0	2
210	23	99	3	1	A	0	0	0	3
211	22	105	5	20	A	3	2	5	2
212	22	108	2	20	A	6	1	31	2
213	20	110	5	7	A	5	3	8	4
214	20	97	3	10	A	4	1	7	5
215	22	92	1	5	A	2	0	0	8
216	19	97	1	52	A	7	2	5	9
217	22	97	3	16	A	0	0	0	0
218	19	105	4	6	A	1	0	2	0

Group 6--Continued

Subject's No. 201-236	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
219	20	102	3	3	A	1	0	0	0
220	21	102	1	5	A	3	2	8	7
221	22	106	1	24	B	2	0	11	2
222	22	97	1	4	A	1	1	3	0
223	20	109	2	21	A	1	0	0	0
224	23	108	1	15	A	3	1	5	11
225	25	93	1	15	B	0	1	0	0
226	22	98	1	10	A	2	0	3	2
227	20	97	1	10	A	0	0	0	0
228	21	99	1	11	A	4	1	2	6
229	18	99	2	3	A	3	0	6	3
230	20	102	1	1	A	3	1	4	5
231	22	104	1	1	A	7	1	13	18
232	20	108	1	3	A	0	2	0	0
233	18	99	4	10	A	4	0	2	8
234	28	100	1	10	B	0	0	0	0
235	22	104	2	18	A	8	3	6	22
236	22	105	2	10	A	3	0	14	20

Group 7: Classified as high intelligence, 36 subjects that had an IQ above 110 with low socio-ecnomic status, interviewed

Sub-ject's No. 251-286	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
251	19	116	3	65	A	19	3	28	17
252	22	113	1	25	A	1	0	0	2
253	19	114	8	10	A	2	2	0	5
254	23	118	2	15	A	5	0	20	6
255	20	114	6	1	A	5	1	5	9
256	19	122	1	5	A	6	1	15	3
257	20	118	1	15	A	5	0	8	7
258	19	118	1	3	A	3	1	0	10
259	21	118	1	1	A	0	1	0	0
260	19	115	1	9	A	0	0	0	0
261	23	128	2	19	A	1	1	6	6
262	20	124	9	10	A	0	0	0	0
263	19	119	1	4	A	6	1	3	11
264	20	124	1	6	A	1	0	0	2
265	23	111	1	12	A	2	0	3	3
266	20	111	5	30	A	2	0	5	3
267	22	114	2	4	A	4	2	3	6
268	21	120	2	20	A	5	3	0	11

Group 7--Continued

Subject's No. 251-286	Age As Of 1-1-66	IQ	Hrs. In Car Per Day	Miles Per Yr. Driven (Per 1,000)	Driv. Educ. A=Yes B=No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speed. Over A 5 Year Period	Points For Other Violat. Over A 5 Year Period
269	20	119	1	10	B	4	0	0	8
270	23	117	1	5	A	1	0	8	0
271	21	120	1	16	A	3	0	0	6
272	21	117	1	10	A	1	1	0	2
273	21	120	1	10	A	0	0	0	0
274	20	111	1	5	A	2	1	2	2
275	19	124	4	2	A	0	0	0	0
276	18	120	1	8	A	0	0	0	0
277	23	118	1	5	A	0	0	0	0
278	22	125	1	13	A	0	0	0	0
279	21	119	1	10	A	3	0	2	4
280	20	139	1	4	A	1	2	0	2
281	20	111	1	1	A	4	1	7	2
282	22	125	2	5	A	0	1	2	0
283	20	117	1	10	A	2	0	3	3
284	21	113	1	10	A	4	4	8	2
285	22	113	1	6	A	0	0	0	0
286	23	129	3	25	A	3	3	13	4

Group 8: Classified as average intelligence (not interviewed), 108 subjects that had an IQ from 90 to 110 with low socio-economic status

Subject's Number 301-408	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
301	19	95	A	2	0	4	0
302	23	108	A	2	2	12	6
303	19	108	A	1	3	2	0
304	22	107	A	5	3	3	17
305	22	103	A	9	0	13	13
306	21	106	A	9	2	3	23
307	19	106	A	2	0	4	0
308	22	103	A	1	0	2	12
309	19	104	A	1	1	3	0
310	22	91	A	0	0	0	0
311	22	101	A	4	1	8	2
312	23	93	A	3	0	0	6
313	20	108	A	6	0	11	6
314	20	92	A	3	1	2	6
315	19	109	A	5	2	9	4
316	21	103	A	1	0	6	0
317	23	97	A	5	1	21	8
318	23	104	A	0	0	4	3
319	20	98	A	0	0	0	0
320	23	101	A	1	0	0	3
321	23	96	A	1	0	0	2
322	24	97	A	3	0	8	2
323	20	104	A	1	1	3	3
324	20	92	A	1	0	2	0
325	19	101	A	3	0	9	0
326	19	106	A	0	1	0	0
327	20	95	A	1	1	0	3

Group 8--Continued

Subject's Number 301-408	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
328	20	95	A	5	1	5	7
329	20	103	A	3	0	6	2
330	21	95	A	0	0	0	0
331	22	104	A	1	0	0	2
332	22	101	A	2	0	2	2
333	20	106	A	1	0	4	0
334	23	107	A	2	0	3	5
335	20	103	A	0	0	0	0
336	20	91	A	5	1	13	2
337	21	108	A	3	0	5	2
338	21	97	A	1	1	5	0
339	21	90	A	2	1	6	0
340	21	96	A	2	1	2	2
341	21	96	A	0	1	0	0
342	23	97	A	0	0	13	0
343	23	104	A	3	2	5	2
344	19	102	A	0	1	0	0
345	20	107	A	6	4	4	9
346	21	100	A	0	2	0	3
347	21	87	A	2	1	5	0
348	21	107	A	8	2	17	8
349	20	110	A	2	2	9	0
350	21	94	A	8	1	20	2
351	23	92	A	1	0	12	0
352	22	109	A	0	0	0	0
353	21	109	A	11	3	12	18
354	22	95	A	2	0	6	6

Group 8--Continued

Subject's Number 301-408	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
355	21	96	A	2	0	3	2
356	19	106	A	0	1	0	0
357	21	94	A	3	1	0	7
358	19	90	A	4	2	6	4
359	20	98	A	0	0	0	0
360	19	104	A	0	0	0	0
361	19	104	A	1	0	2	0
362	19	95	A	1	1	0	2
363	21	106	A	5	1	6	9
364	19	109	A	1	0	2	0
365	20	107	A	4	1	10	0
366	19	93	A	2	1	0	8
367	22	93	A	0	0	6	6
368	20	99	A	0	0	0	0
369	22	99	A	2	0	7	0
370	22	104	A	3	1	7	0
371	22	102	A	1	1	3	2
372	23	99	A	1	0	3	0
373	21	95	A	4	1	10	13
374	20	100	A	3	1	4	2
375	20	108	A	3	4	6	3
376	21	101	A	1	0	2	0
377	19	99	A	6	0	9	6
378	21	96	A	0	0	0	0
379	21	99	A	7	4	4	11
380	21	110	A	0	0	2	5
381	21	97	A	0	0	0	0

Group 8--Continued

Subject's Number 301-408	Age As Of 1-1-66	IQ	Driv. Educ. A = Yes B = No C=No Answer	Violat. Over A 3 Year Period	Accid. Over A 3 Year Period	Points For Speeding Over A 5 Yr. Period	Points For Other Violat. Over A 5 Yr. Period
382	22	92	A	0	0	0	2
383	22	96	A	4	1	11	12
384	19	102	A	0	0	0	0
385	22	103	A	1	0	0	2
386	19	104	A	0	1	0	0
387	23	97	A	0	0	0	3
388	20	95	A	0	2	0	0
389	21	93	A	10	2	32	13
390	21	105	A	2	0	2	7
391	23	105	A	4	0	7	2
392	19	92	A	14	3	16	16
393	22	92	A	3	1	2	6
394	21	91	A	5	1	7	5
395	23	105	A	0	0	9	5
396	21	108	A	4	1	5	4
397	23	105	A	0	0	0	0
398	19	92	A	2	0	4	0
399	22	100	A	1	0	9	0
400	20	105	A	1	0	0	3
401	20	102	A	3	2	0	7
402	23	99	A	4	1	13	9
403	22	107	A	6	1	12	11
404	22	95	A	0	0	0	0
405	21	105	A	1	0	2	5
406	22	106	A	2	0	8	0
407	19	96	A	0	0	0	0
408	20	97	A	2	2	0	4

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