

Behavioral and Demographic Correlates of Responses to a Driving Questionnaire

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A driving questionnaire was administered to 1,080 students (almost all 15 years old) enrolled in driver education classes, one class from each of the 40 regular Los Angeles City high schools. The questionnaire, in effect, consisted of 220 items, and items were grouped into five response categories by a method which analyzed the correlations between items. Differences in category responses were referred to the 0.01 level. The results are as follows: (1) response differences between males and females were significant for 4 response categories, (2) response differences between drivers and pre-drivers were significant for 2 response categories, (3) response differences between students in higher and lower social areas (as based on U.S. Census figures) were significant for 3 response areas, (4) response differences between students with and without penal code violations were significant for 1 response dimension, and (5) there were no significant response differences between students with and without vehicle code violations.

• MUCH effort is directed toward determining the relationship between questionnaire responses and socially important behavior. This emphasis stems largely from the convenience of obtaining questionnaire responses, as well as from the difficulty or impossibility of measuring most socially important behavior patterns directly. Thus, the discovery of a significant correlation between questionnaire response and behavior is viewed as an opportunity for using the former as a predictor of the latter. The prediction is seldom as good as one would like, and this is certainly true with respect to driving behavior.

In predicting driving behavior from a questionnaire, it is necessary to take into account both accuracy and generality of prediction. One must usually be sacrificed at the ex-

pense of the other, and it is not always easy to determine which factor should receive the greater emphasis. This determination, however, is important, for it suggests the strategy of developing a questionnaire.

The relationship between prediction and the strategy of developing a questionnaire may be exemplified by the following three cases:

1. Accuracy is assumed of primary importance; generality of secondary importance. For example, one might wish a questionnaire to be used in predicting whether a student just entering the 12th grade in Los Angeles would be involved in an accident during the school year. A straightforward approach in the development of such a questionnaire would be to select items which show

significant response differences between accident students and non-accident students. This is a common approach, and typically the items are combined into a single scale with equal weightings and with a single score. Although the predictive accuracy of such a questionnaire may be high, the predictive generality of this questionnaire is likely to be low. The questionnaire is not likely to yield as high a predictive accuracy with 10th grade students in Los Angeles or 12th grade students in Chicago.

2. Generality of prediction is assumed of primary importance; accuracy of secondary importance. Here the strategy in the development of a questionnaire is essentially the same as in the first case. Again it is necessary to specify the population of interest, the behavior patterns to be predicted, and the time at which, or during which, the prediction is to apply. Again, items would be selected on the basis of item responses of subjects drawn from the population. More often than not, these items constitute a single scale. At the present time, a questionnaire developed in this manner is not likely to have a high predictive accuracy.

3. Predictive accuracy and generality are both assumed important. This, according to the convention of science, is tantamount to saying that the criteria of understanding are important. Although it is easy to state that understanding is proportional to the degree of predictive accuracy and generality, it is more difficult to define the relative contribution of each. For instance, each of the first two cases will contribute something to the understanding of driving behavior even though predictive generality is low in the first case and predictive accuracy in the second. Hence, the third case differs from the first two in degree only, and the principal reason for classifying it separately is to

draw attention to the greater emphasis it places on understanding.

The emphasis on understanding suggests a different strategy in the development of the prediction questionnaire. The final questionnaire should consist of many scales, each one measuring a variable thought to be related to some aspect of driving behavior. Moreover, these variables should be relatively independent of one another, or otherwise the proportion of driving variance predicted by additional variables will be too small to warrant their use. Finally, the driving variable and all predictor variables should be analyzed in relation to each other, and this suggests a multivariate approach.

The present study is a rough approximation of the third case: (a) a number of different variables are employed which are thought to be related to driving behavior, (b) these variables are relatively independent, and (c) a simple multivariate approach is employed. The predictor variables are categories of responses to a questionnaire containing items pertaining to traffic situations.

PROCEDURE

The Case and Stewart driving questionnaire was administered during the spring semester of 1959 to 1,080 tenth grade (sophomore) students. These students, nearly all 15 years old, responded to the questionnaire in a regular class session during the eighth week of a 10-week driver education course. This sample consisted of one driver education class from each of the 40 regular high schools in the city of Los Angeles. The particular class at each school was selected by the teacher in charge of the driver education program at that school.

The questionnaire consists of descriptions of 55 typical driving situa-

tions involving driver decisions. Each description of a traffic situation is followed by four alternative actions, and the student was instructed to select that alternative which best describes the action he would take as a driver in that traffic situation. Pre-drivers seemed to have no more difficulty than drivers in selecting alternatives, and, on the whole, took no more time to complete the questionnaire.

The questionnaire responses were analyzed by an evaluation of the correlations between items, with each alternative considered as a dichotomous item. The 220 items (4 alternatives to 55 driving situations) required the computation of 24,090 correlations. The phi coefficient was used, and all computations were performed twice. The intent of analyzing the questionnaire was the derivation of a few relatively independent response dimensions as revealed by the correlations between the 220 items.

The questionnaire analysis procedure is described subsequently, but the result was a grouping of 83 of the items into five response dimensions. A dimension score was computed for each subject based on the number of his positive responses to the items within each dimension. A positive response to an item was considered as that response (agreement or absence of agreement) indicative of the positive end of the dimension. For each item the positive response was determined by the sign of the correlations between items within its dimension.

In addition to the questionnaire responses, additional data were obtained for each student on five variables: sex, driving experience, social area, vehicle code violations, and penal code violations. The last four variables require some explanation.

Driving experience was based entirely on the student's statement as to whether he had any driving experience. Because some of the 40

teachers failed to instruct their students to indicate whether they had any driving experience, the driving experience variable was trichotomized: pre-drivers, unknowns, drivers.

Each of the 40 high schools was assigned to a social area, lower or higher than average, and each student in that high school was categorized accordingly. The dichotomization was based on values of social rank (0-100) assigned to each of the nearly 600 census tracts (3), values computed on the basis of the 1950 census figures in the manner described by Shevky and Williams (4). Values of social rank were computed essentially on basis of occupational status, educational level, and income of the inhabitants of a census tract. The present study utilized only the 40 values pertaining to the tracts which contained the 40 high schools. The average of these 40 values was the criterion by which each high school, and hence each student, was assigned to the lower or higher social area category.

Vehicle code violations were obtained from the Los Angeles County central juvenile index. The 56 types of violations were grouped into six logical categories: pedestrian (hitchhiking, crossing), mechanical (lights, muffler), legal (no license, failure to appear), speeding, moving other than speeding, and auto theft. No distinction was made among students whose records placed them within a category.

Penal code violations were also obtained from the same source, and the 20 types of violations were grouped into four logical categories: minor miscellaneous (loitering, truancy, swearing, curfew), major miscellaneous (immoral behavior, rape, narcotics, concealed weapon), theft (shoplifting, burglary), and violence (assault, battery).

Analysis of the questionnaire dimensions involved the determination of (a) means and standard devia-

tions of the questionnaire dimensions, (b) correlations between variables, and (c) tests of significance of differences in questionnaire scores.

Means and standard deviations of the five questionnaire dimensions were determined for the entire sample, both sexes, pre-drivers and drivers, both social areas, the six categories of vehicle code violations, and the four categories of penal code violations.

Next, product-moment correlations between the questionnaire dimensions were determined, and phi correlations between sex, driving experience, and social area were also computed. For the purpose of computing the point correlations, the trichotomous driving experience variable was dichotomized by randomly assigning those students with unknown driving experience to the pre-driver or driver categories according to the proportion of students in those categories.

Finally, determinations were made of the critical ratios of the sex differences for each of the five questionnaire scores. A similar procedure was followed for driving experience, social area, the six categories of vehicle code violations, and the four categories of penal code violations. All tests of significance throughout this study were referred to the 0.01 level, two-tail. Critical ratios based upon driving experience utilized pre-drivers and drivers only, and did not include those with unknown driving experience.

RESULTS

The analysis of the questionnaire responses involved the following seven steps:

1. The phi correlations between the 220 items were computed.

2. Correlations between the four items within each traffic situation

were reduced to zero, a procedure necessitated by the format of the questionnaire. The questionnaire consisted of descriptions of 55 traffic situations with four alternatives. A given item must be negatively correlated with the other three alternatives in the same traffic situation, but this same degree of spurious dependence does not exist with respect to the correlations of the given item with the remaining 216 items. Hence, the correlations between the four items within each traffic situation were considered to be zero.

3. An item was removed from the correlation table if it failed to correlate significantly with any four items, all of whose intercorrelations were significant. This procedure was intended to eliminate from further analysis an item whose variance was fairly specific with respect to the remaining items. Before considering the removal of items, each item was ordered according to the number of its significant correlations, and an item was considered as a candidate for removal according to this order, beginning with that item with the fewest number of significant correlations. Upon the removal of each item, the correlation table was revised accordingly. After all items had been considered, the remaining items were successively reconsidered. Eventually 81 items were eliminated.

4. An item was eliminated if it correlated significantly with more than 25 percent of the remaining items. The intent was to eliminate from further analysis an item whose variance was sufficiently common to the remaining items as to increase the correlation between the response dimensions which would emerge from the analysis. Items were removed in order, beginning with that item with the highest number of significant correlations, and the table was revised to reflect each item elimination. In all, 18 items were eliminated by this criterion.

5. The remaining 121 items were rearranged into groups, with the intent of associating those items which were most highly correlated. A visual inspection seemed to indicate six groups. Subsequently, an item was eliminated according to the number of its significant intra-group and extra-group correlations.

6. An item was eliminated if it failed to correlate significantly with at least 20 percent of its intra-group items (14 items eliminated), or if it correlated significantly with more than 20 percent of its extra-group items (6 items eliminated). As before, items were eliminated in order, beginning with that item which failed by the widest margin to meet either criteria. This procedure reduced one of the groups to three items, items which met the two criteria for inclusion in other groups. These three items were therefore transferred to these other groups, thereby eliminating the sixth group.

7. The correlations among the remaining 101 items in five groups were subjected to more stringent criteria than in the sixth step, but with the same intent: to develop item groupings such that (a) items within a group would be relatively homogeneous, and (b) the groups would be relatively independent. The two criteria in this step involved the elimination of an item if it failed to correlate significantly with at least 25 percent of its intra-group items (10 items eliminated), or if it correlated significantly with more than 15 percent of its extra-group items (8 items eliminated).

The remaining 83 items constituted the five scales which represented the five response dimensions to the driving questionnaire. A student's responses to the items within a scale formed the basis for the determination of a dimension score. The interpretation given these dimensions is discussed subsequently,

and for the present they will be referred to simply as D1 (with 31 items), D2 (18 items), D3 (11 items), D4 (16 items), and D5 (7 items).

The means and standard deviations of the five questionnaire dimensions are given in Table 1 for the various subgroups, and the size of each subgroup is also listed. Means and standard deviations are not given for the non-violators of the six vehicle code and four penal code categories, because the size of each of these subgroups, and hence each mean and standard deviation, closely approximates the values given for the entire sample. Table 1 also gives the critical ratios for the differences between means of the five questionnaire dimensions for the various subgroups. These critical ratios represent differences in questionnaire responses between female and male, pre-driver and driver, lower social area and higher social area, and violator and non-violator for the six vehicle code and four penal code categories.

The product-moment correlations between the five questionnaire dimensions are given in Table 2. The phi correlations between the dichotomized variables are shown in Table 3, with the positive direction indicated at the bottom of the table.

Table 4 gives the distribution of violations according to sex, driving experience, and social area. No distinction is made between students with one and more than one violations in a given category, and relatively few students had more than one violation in a given category. The N_c column gives the number of students in each category who had at least one other violation in another category (vehicle or penal).

DISCUSSION

Before discussing the results presented in the tables, the questionnaire response dimensions will be inter-

TABLE 1
MEANS, STANDARD DEVIATIONS, AND CRITICAL RATIOS FOR THE FIVE QUESTIONNAIRE DIMENSIONS

Subgroup	N	D1 Determination			D2 Cautiousness			D3 Expediency			D4 Defensiveness			D5 Ambivalence			
		M	SD	CR	M	SD	CR	M	SD	CR	M	SD	CR	M	SD	CR	
		Entire Sample	1080	13.86	4.72		10.24	3.01		2.42	1.55		1.28	1.32		0.924	0.957
Sex:																	
Female	512	13.42	4.77	2.90*	10.05	2.97	2.01	2.21	1.42	4.23*	1.18	1.19	2.86*	0.804	0.891	3.84*	
Male	568	14.25	4.62		10.42	3.03		2.61	1.63		1.37	1.42		1.028	0.997		
Driving experience:																	
Pre-driver	412	13.52	4.80		10.05	3.02	2.68*	2.17	1.52	4.39*	1.22	1.18	0.69	0.818	0.874	2.49	
Driver	430	14.09	4.77		10.61	3.02		2.63	1.52		1.28	1.35		0.977	0.980		
Social area:																	
Lower	538	13.59	4.62	1.88	9.74	3.06	5.46*	2.55	1.50	2.65*	1.45	1.47	3.99*	1.000	0.999	2.54	
Higher	542	14.13	4.86		10.74	2.85		2.30	1.57		1.13	1.16		0.854	0.909		
Vehicle code violation:																	
Category 1	14	13.86	4.69	0.00	11.43	2.47	1.79	3.64	1.50	3.01*	1.64	1.44	0.93	0.857	0.834	0.30	
2	7	12.13	6.40	0.72	11.59	1.50	2.35	1.72	1.03	1.78	1.00	1.31	0.56	0.858	0.857	0.20	
3	22	13.64	3.97	0.26	10.45	2.66	0.37	2.86	1.42	1.43	1.77	1.35	1.69	1.046	0.878	0.65	
4	14	14.07	4.20	0.19	10.14	2.77	0.13	3.36	1.39	2.51	1.57	1.40	0.77	0.929	0.703	0.01	
5	23	14.75	3.73	1.14	10.83	2.29	1.21	3.21	1.67	2.25	1.58	1.38	1.03	0.750	0.674	1.21	
6	13	12.50	3.05	1.59	9.64	1.93	1.10	2.86	1.35	1.18	2.00	1.41	1.84	1.286	1.066	1.22	
Penal code violation:																	
Category 1	74	13.58	4.56	0.51	10.08	3.05	0.33	2.42	1.43	0.00	1.77	1.44	2.85*	1.068	0.935	1.23	
2	10	12.30	4.98	0.99	9.40	1.50	1.73	2.10	1.22	0.83	2.50	1.43	2.69*	1.000	0.775	0.31	
3	44	13.16	4.64	0.98	9.61	2.83	1.45	2.77	1.54	1.47	2.11	1.58	3.42*	1.000	0.853	0.57	
4	8	15.00	4.19	0.76	10.63	3.67	0.30	2.75	1.30	0.71	2.25	1.39	1.97	1.125	0.600	0.94	

* Significant at 0.01 level, two-tail. (A CR of 2.58 is significant at the 0.01 level, while a CR of 1.96 is significant at the 0.05 level.)

TABLE 2

PRODUCT-MOMENT CORRELATIONS BETWEEN THE FIVE QUESTIONNAIRE DIMENSIONS

	D1	D2	D3	D4	D5
D1 Determination		0.083*			
D2 Cautiousness			0.328*	0.200*	0.104*
D3 Expediency				-0.331*	-0.210*
D4 Defensiveness					0.159*
D5 Ambivalence					

* Significant at 0.01 level, two-tail.

TABLE 3

PHI CORRELATIONS BETWEEN SEX, DRIVING EXPERIENCE, AND SOCIAL AREA¹

	1	2	3
1 Sex			
2 Driving exp.			0.284*
3 Social area			

¹ Male, driver, and higher are considered "positive."

* Significant at 0.01 level, two-tail.

TABLE 4
DISTRIBUTION OF VIOLATIONS BY SEX, DRIVING EXPERIENCE, AND SOCIAL AREA

Violation	N_c^1	N_o^2	Sex		Driving Experience			Social Area	
			512 Females	568 Males	412 Pre-drivers	238 Unknowns	430 Drivers	538 Lower	542 Higher
Vehicle code:									
Category									
1: pedestrian	14	6	0	14	4	2	8	4	10
2: mechanical	7	6	0	7	0	0	7	2	5
3: legal	22	19	2	20	1	4	17	14	8
4: speeding	14	12	2	12	0	2	12	4	10
5: moving (non-speeding)	23	16	2	21	3	5	15	9	14
6: auto theft	13	10	2	11	0	1	12	10	3
Penal code:									
Category									
1: minor miscellaneous	74	43	15	59	17	10	47	52	22
2: major miscellaneous	10	8	3	7	3	1	6	7	3
3: theft	44	30	5	39	9	7	28	30	14
4: violence	8	6	0	8	1	2	5	6	2

¹ Number of students in each violation category.

² Number of students in each violation category with another violation in one of the other nine categories.

preted. However, since the interpretation of verbal responses is necessarily subjective, the reader's review of the following interpretations should be tempered by the fact that other investigators might suggest alternative interpretations.

Interpretation of the Response Dimensions

The first questionnaire dimension, D1, seems to reflect determination. For instance, a student with a high score on D1 is more likely to state that he would take actions which allow him to proceed ahead of an oncoming driver who is attempting to make a left turn, go around a line of cars rather than wait for the line to proceed, drive faster than the posted speed limit, explain to an officer writing a citation that he (the student) did the only thing possible under the circumstances, tell the officer that he was simply moving with the traffic, force his way into an adjacent heavy-traffic lane rather than be delayed, try to modify his speed so as to make better over-all time through a series of signals, make a

U-turn rather than take the time to go around the block, use the curb lane if there is no other way of passing a slow car, change lanes rather than be held up, and frequently make rolling stops at stop signs.

D2 appears to measure cautiousness. A student with a high score on this questionnaire dimension is more likely to state that he would use his horn to notify other drivers of his actions, slow down whenever he's unsure of the intent of other drivers, wait for a break in traffic before attempting to drive across an intersection, remain in his lane behind a line of cars rather than take a chance in passing, stop completely at a stop sign before making a right turn, proceed with an action in heavy traffic only if he is sure the action is legal, and wait for oncoming traffic to end before making a left turn.

The third questionnaire dimension is measured by items which appear to reflect expediency. A student with a high score on D3 is more likely to state that he would speed up so that he could pass through an intersection ahead of an oncoming driver who is attempting to make a left turn, leave his high beam lights on until the on-

coming driver lowers his, dart across an intersection when traffic hesitates, force his way into a line of cars in an adjacent lane, close the gap ahead of him in order to prevent a passing driver from filling the gap, and speed up to test the determination of another driver in being the first to reach an intersection.

D4 appears to measure defensiveness. A student with a high score on this dimension is more likely to state that he would sit in his car and plan on keeping quiet after a police officer had pulled him to the curb, drive much faster than the posted limits, follow closely behind a car which had cut in ahead, not stop at an intersection even though other cars are stopping, feel that he is receiving a citation because the officer has not been issuing enough citations, cut closely in front of another driver who made passing difficult, and close the gap ahead to prevent its use by a driver who passed dangerously close.

The last questionnaire dimension, D5, would seem to measure ambivalence. A student with a high score on D5 would be more apt to state that he would change to another lane rather than compete for a position in his lane, maintain his low speed in turning right rather than stop completely at a stop sign, honk for the driver of an unattended car rather than drive around the obstruction or wait patiently, begin to move slowly into a busy highway rather than wait for a break in traffic, move slightly into the next lane to go around a stopped car rather than stop or change lanes completely, and maintain his speed rather than speed up or slow down to counteract an inconsiderate driver.

Having presented the basis for labeling the dimensions, the labels themselves—determination, cautiousness, expediency, defensiveness, and ambivalence—will be used hereafter rather than D1, D2, D3, D4, and D5. Table 2 shows that the intent of deter-

mining relatively uncorrelated questionnaire response dimensions was fairly well achieved. The average size of the inter-dimension correlations compares favorably with those found in personality tests in common use (2, 5). Each dimension is conceived of as a continuum, not a dichotomy, and each student has each of the five characteristics to some extent. Furthermore, there is no assumption that the questionnaire responses reflect actual driving behavior simply because the items pertain to driving situations.

Unfortunately the questionnaire responses alone do not indicate an appropriate conceptualization of these characteristics. Do they represent driving behavior or personality? Do each of the five characteristics fall within a single conceptual area? One way to seek answers to these questions is to attempt to find relations between the response dimensions and measures of behavior.

Behavioral Correlates of the Response Dimensions

The primary interest in this study involves the behavioral correlates of responses to the questionnaire. These behavioral correlates are driving behavior (as measured by vehicle code violations) and delinquent behavior (as measured by penal code violations).

The relationships between behavior and the response dimensions are given in Table 1: (a) students with some types of vehicle code violations scored significantly higher on expediency, and (b) students with penal code violations scored significantly higher on defensiveness. It should be mentioned that some results significant at the 0.05 level have been admitted to the discussion, despite the fact that only results at the 0.01 level have been marked as significant in the tables.

Six categories of vehicle code vio-

lations were used in this study. Three of these—pedestrian, speeding, and moving—are significantly related to expediency, but to none of the other questionnaire dimensions. These three categories pertain to violations involving body or car movement, while the remaining three categories tend not to. Since most of the items in the questionnaire involve car movement, it is not surprising to find that non-verbal measures of movement (pedestrian, speeding, moving violations) are related to questionnaire responses. But why should vehicle code violations be related to only one response dimension? The results of this study do not yield a clear answer to this question, but it may be that many of the questionnaire responses are inadequate indexes of actual driving behavior.

Each of the four penal code categories employed in this study are significantly related to defensiveness, but to none of the other questionnaire dimensions.

In summary, then, of the behavioral correlates of responses to the driving questionnaire: driving behavior is related to expediency, with violators more expedient, while delinquent behavior is related to defensiveness, with delinquents more defensive. Although both conclusions might be expected from rational considerations, it is comforting to have them confirmed by statistical analyses.

Inasmuch as only about one-half the sample reported any driving experience, and since practically all the driving violations were obtained by this portion of the sample, the possibility exists that the higher expediency of the violators actually represents a higher expediency of drivers in general.

Sex, Driving Experience, and Social Area

In addition to the two major behavioral attributes, three supple-

mentary attributes—sex, driving experience, and social area—were also included in the study.

With respect to sex, it is not particularly surprising to find that males scored higher on determination, expediency, and defensiveness, though male predominance in ambivalence might not have been anticipated. This last finding may illustrate nothing more than has already been pointed out: response dimensions are difficult to interpret and label. Males and females are represented about equally in the sample, and about equally from lower and higher social areas, but more of the drivers were males. Yet this last fact does not begin to account for the finding that practically all the vehicle code violators were males. A previous study by Comrey (1) revealed a similar finding, but in addition indicated that male predominance with respect to accidents is much less pronounced. As would be expected, the majority of penal code violators were males. Males are associated with vehicle code violations and higher expediency scores, and males are also associated with penal code violations and higher defensiveness scores; both associations are in line with the major findings previously discussed.

With respect to driving experience, the higher expediency scores of drivers is in line with previous conclusions. If the higher cautiousness scores of drivers seems surprising, it should be recalled that what has been referred to as cautiousness does not seem to be related to driving behavior (as measured by vehicle code violations). It is not clear what is being measured by D2. As might be expected, drivers tend to come from lower social areas. Students who reported some driving experience have, of course, most of the driving violations, but they also have about three times as many penal violations as pre-drivers. On the basis of their violations, students whose driving ex-

perience is unknown seem to be proportionately divided between drivers and pre-drivers, justifying the random division of this group in the computation of the correlations of Table 3. It is not known how many of the drivers had licenses, but most of them were 15 years old, whereas 16 is the minimum age at which licenses are usually issued in California.

Finally, with respect to social area: Students from higher social areas scored significantly higher on cautiousness, and significantly lower on expediency and defensiveness. None of these findings is particularly surprising. With respect to vehicle code violations, students from higher social areas, as compared with lower, have about the same number of violations, but these seem to be concentrated in the three moving categories. With respect to penal code violations, students from higher social areas, as compared with lower, have about one-third as many violations for each category. Finally, most students with any violation at all are likely to have more than one.

SUMMARY AND CONCLUSIONS

A driving questionnaire was administered to 1,080 students (almost all 15 years old) enrolled in driver education classes, one class from each of the 40 regular high schools in Los Angeles. The questionnaire consisted of 220 items, and 83 of these items were selected and grouped into five response categories by a method which involved the analysis of the correlations between items. Inferences made from the content of the items within each category suggested that the five scales were measuring determination, cautiousness, expediency, defensiveness, and ambivalence, though not necessarily with respect to driving. Five scores were computed for each student based

upon his responses to the items within each scale.

The results reveal that (a) males scored significantly higher on determination, expediency, defensiveness, and ambivalence, (b) students with driving experience scored significantly higher on cautiousness and expediency, (c) students from higher social areas scored significantly higher on cautiousness, and significantly lower on expediency and defensiveness, (d) students with some types of vehicle code violations (moving only) scored significantly higher on expediency, and (e) students with penal code violations scored significantly higher on defensiveness.

If vehicle and penal code violations are considered as measures of driving and delinquent behavior, then the last two results indicate that driving and delinquent behavior are correlates of responses to the driving questionnaire.

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REFERENCES

1. COMREY, ANDREW L., "A Factor Analysis of Variables Related to Driver Training." *Jour. of Applied Psych.*, 42:218-221 (1958).
2. EDWARDS, ALLEN L., "Edwards Personal Preference Schedule Manual." Psychological Corp., New York (1954).
3. Laboratory in Urban Culture, "Los Angeles Census Tract 1950." Occidental College, Los Angeles (May 1954).
4. SHEVKY, ESHREF, and WILLIAMS, MARILYN, "The Social Areas of Los Angeles: Analysis and Typology." Univ. of Calif. Press, Berkeley (1949).
5. "Sixteen Personality Factor Questionnaire Handbook." Institute for Personality and Ability Testing, Champaign, Ill. (1957).