THE DETECTION OF PROBLEM DRINKERS USING A PERCEPTION OF RISK TEST: A PRELIMINARY STATEMENT

J. Hagart; J. A. Dunbar; A. Ritchie; M. S. Devgun; S. A. Ogston; and B. T. Martin

SYNOPSIS

Drivers considered by the police for prosecution for driving with blood alcohol concentrations in excess of the legal limit are assessed by a battery of psychological and biochemical tests (N = 1,046). These were evaluated against police and medical records, and self reports. A perception-of-risk test devised by the authors prove the most effective means of detecting individuals with drink related problems in a bus-sample (n = 169). The test does not follow conventional lines in requesting information about drinking habits, past or present; it is a test of various "risky" activities, of which only 3 out of 20 relate to drink. The means by which the test is effective, other than that it seems difficult to fake good performance, have yet to be determined but a number of implications seem evident. Most important, the test may have predictive ability and, therefore, preventive and educational potential. Also, it is a generally applicable test, correlating highly with social problems.

INTRODUCTION

The Blennerhassett Committee Report (Department of the Environment, 1977) and a subsequent discussion document (Department of Transport, 1979) are 2 recent British Government publications concerned with problem drinking and driving. Both place considerable emphasis upon issues related to the detection, prosecution and possible rehabilitation of "high risk" offenders: a "high risk" offender being defined as someone who has been successfully prosecuted for 2 drinking and driving offences under the 1967 Road Traffic Act, with blood alcohol levels (BAC's) exceeding 200 mg/100 ml (or equivalent breath alcohol levels) within a period of 10 years (1981 Road Traffic Act). Similar emphasis was placed upon educating young drivers on the risks associated with the potentially lethal combination of alcohol consumption and driving. No distinction was, however, drawn between potential high risk offenders among

*Correspondence regarding this paper should be addressed to J. Hagart, Social Psychology Research Unit, University of Kent at Canterbury, Canterbury, Kent, UNITED KINGDOM.

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younger or older drivers and others with a lesser probability of alcohol-related problems.

As the Blennerhassett Committee pertained to alcohol-related driving offences and road safety, social and medical measures against alcoholism were outside the terms of reference of the committee. It is therefore not clear whether "high-risk" refers simply to the risk of alcohol-related problems, including driving incidents, or to alcoholism or alcohol dependence. The committee considerably modified and elaborated proposals from the British Medical Association and the Medical Council on Accident Prevention, though it acknowledged that the vast majority of those who receive the special disqualification are people with drink problems. As a consequence procedures to aid in the identification of high-risk offenders appear to have been developed on a somewhat ad hoc basis, the discrimination value of the 200 mg% rule being a contentious and imperfect indicator of the alcohol-related problems legislation will undoubtedly uncover in future years (Havard, 1978).

Precise definitions of "caseness," that is, classification as a problem drinker, a person with an alcohol or alcohol-related problem, or a rehabilitated driver (ex-problem drinker), are left to be tackled by the courts when suspended licenses are due to be restored. This novel task is posed in terms of whether "the applicant would present an undue risk to himself and other road users." Even if the administratively convenient figure of 200 mg/100 ml were an accurate and valid cutoff point with regard to the range of alcohol-related problems, the situation regarding potential high-risk offenders remains fraught with problems and has not been adequately tackled--the Blennerhassett Committee simply noted the relevance of a conviction or convictions for drinking and driving offences as an early indicator of possible alcoholism or alcohol dependence. From a psychological perspective, however, other grounds equivalent in status to those employed justify intervention with the 200 mg% rule for considering the further classification of high risk individuals a feasible task. These involve the identification of tests capable of functioning as components in a multivariate screening battery, capable of supplementing other efforts to detect and re-orient possible problem drinkers. In the present paper we examine the validity and rationale underlying a possible contributory test, a perception-of-risk test applied in the Tayside Safe Driving Project.

The Tayside Safe Driving Project

The Tayside Safe Driving Project (TSDP) was initiated by Dr. James Dunbar as a multi-disciplinary project
incorporating medical, biochemical, and psychological perspectives (Dunbar et al., 1983). The principal goal of the project was to be identification of high risk offenders/problem drivers among driving offenders at the earliest possible opportunity, using readily available screening instruments. Additional information regarding the TSDP is presented elsewhere in these proceedings (see papers by Dunbar et al. and Devgun et al.).

Problem drinkers and high-risk offenders are viewed as over-lapping subsets among a larger group of alcohol consumers. This appears to be a less rigorous definition than that provided in recent legislation. It is, however, clearly representative of the range of drinkers recognized by the Blennerhassett Committee and dealt with by alcohol therapy, rehabilitation, and counselling agencies. Clients of these agencies possess varying degrees of psychological and physiological susceptibility to alcohol-related problems. Other undesirable consequences associated with excessive alcohol consumption, such as accidents and driving under the influence of alcohol, are also distributed through these groups with varying degrees of severity and prevalence.

As a broad operational definition of high-risk cases/problem drinkers was adopted, the TSDP team had to face the problem of specifying adequate criterion measures. The preceding comments the range of problems indicates that no single, readily available measure or marker of alcoholism or alcohol-related problems exists, only a range of indicators with varying degrees of validity and reliability. Recent authors have attempted to improve the precision of judgements regarding caseness as an alcoholic, an alcohol dependent person, or simply as a problem drinker by combining information from a number of the best existing measures (Baxter et al., 1983; Plant et al., 1983; Skinner, 1982). In accord with these multi-variate approaches, the TSDP opted to work with a set of objective and subjective measures (police and general practitioner records, biochemical and psychometric indicators of problem drinking) and establish their validity in the population to be examined. This procedure, often referred to in the psychological literature as the production of convergent validity when directed towards the clarification of concepts, reduces the need to specify any particular criteria as ideal.

Biochemical indicators used in the study were selected from standard liver function tests and initially included assays of aspartate aminotransferase (AST) and gammaglutamyltransferase (GGTP). Psychometric indicators included the Eysenck Personality Inventory (Eysenck & Eysenck, 1964), the
Severity of Alcohol Dependence Questionnaire (Stockwell et al., 1979), and other alcohol screening tests, such as the M.A.S.T. (Zung, 1979), the C.A.G.E. (Ewing & Rouse, 1970), and the Hilton Questionnaire (Hilton & Lokare, 1978). A test of drinking and driving knowledge test, standardized for the population from which the majority of the TSDP population was drawn, was also included (Hagart & Fillington, 1981; Hagart et al., 1981), as was the pilot version of a new psychometric instrument, a perception-of-risk questionnaire (PRQ).

The PRQ was initially devised and included in the TSDP for a number of reasons. First, many of the current crop of alcohol screening questionnaires (Saunders & Kershaw, 1980) have encountered difficulties in general population studies. Those tests undoubtedly have face validity and, in institutional or clinical settings, criterion validity when assessed against clinical judgements. They are also capable of discriminating at statistically significant levels between clinical and normal populations. However, if classification of individuals who have not been through the standard United Kingdom medical referral procedures are intended or suspected by respondents, or some other undesirable outcome seems likely, such as suspension of a driving license, the interpretation of this type of material is influenced by many factors such as social desirability sets and defensiveness. Subsequent conclusions are subject to many reservations. When subjects recognize they have a problem and could answer positively, they may be unwilling to declare it. Because of the nature of the questionnaires -- self reports of alcohol consumption, drinking habits, and the like -- they have little difficulty in disguising their handicap or degree of alcohol consumption. An adequately constructed perception-of-risk test (or other indirect measure) ought to be capable of circumventing most of these problems and offer equivalent or complementary identification rates.

Second, with the exception of large-scale educational programs, preventive approaches in the field of alcohol-related problems have been relatively few in number. The lack of readily identifiable target populations limits these approaches to heterogenous groups such as young males, young drivers, and motorcyclists. Another factor is the general lack of awareness of complementary theoretical models. The health education model dominates the field whereas others, such as personality and sociological models, have been "tested and found lacking" in explanatory power. Most of the preventive work in the alcohol field is, therefore, targeted "blind." The dominance of the health
education model is, however, contended to have arisen from overgeneralization of the necessarily qualified conclusions arising from research studies and to be the reflection of changing emphasis within the alcohol field, rather than the replacement of poor models with superior models. Some form of synthesis of the different approaches is required.

Third, existing test materials also do not fulfill all the requirements of tests aiming to detect problem drinkers at the earliest possible opportunity. Those requirements are that tests should not only be valid and reliable, they should also be acceptable to the population concerned and not be readily susceptible to defensive manipulation, distortion, face-saving, or socially conformist type responses. Nor should they arouse defensive or obstructive feelings in respondents or, possibly, use such responses "against" them. Within the alcohol field these requirements indicate a need for some form of indirect test material capable of tapping important causal and/or modifying alcohol-related variables (e.g. personality characteristics, experience, and attitudes) while conforming to ethical standards.

The above requirements present something of a dilemma. The relevant tests ought to correlate significantly with alcohol-related problems and yet not be transparent in intent. Perceptions-of-risk seem to be one set of theoretical constructs likely to elicit a range of relevant responses from subjects and meet the test requirements set out above. Excessive alcohol consumption and associated driving behavior are clearly risk-taking behaviors. Theoretical reasons as to why perceptions of risk are conceived to be an apt vehicle for tapping alcohol-related problems are discussed elsewhere (Hagart et al., in press). For the present, we may note that the domains of personality, attitudes, and experience, upon which a perception or risk test draws for its validity, have been investigated by many researchers. The relevance of different facets of these domains to alcohol consumption and alcohol-related behaviors has been clearly demonstrated in a number of clinical and lay domains (Brown & Copeman, 1975; Donovan, et al., 1983; Mostyn & Sheppard, 1980). A related concept, the subjective-perception-of-detection (S.P.O.D.), is a widely used concept in the traffic safety field (Ross, 1973, 1974). (Questionnaire materials putting different dimensions of perceptions of risk in operational terms are illustrated in Table 1. These terms are to some extent culturally dependent, of course.)
Two versions of the perception-of-risk questionnaire (PRQ) were constructed*. One uses a 7-point Likert type scoring procedure; the other, identical in format with the exception of one question, uses a linear analogue scale with fixed endpoints. The potentials of the 2 versions were initially investigated in a study concerning the induction of GGTP under the influence of heavy drinking bouts (Dunbar et al., 1982). Within this test population (n = 54) statistically significant correlations existed between PRQ scores, drinking and driving knowledge, alcohol-related non-motorizing offences, self-reported serious accidents and minor injuries, GGTP, and age (see Table 2). The majority of the correlations persisted at significant or high levels when age was controlled for. The correlation between the 2 versions of the PRQ, completed no less than 1 hour apart, was moderate: 0.62. Doubling the test length or improving the internal validity of a shorter test (providing greater homogeneity of questions) increased reliability figures to 0.77, indicating that such a test reliably measures the concept it is intended to.

The significant correlations with knowledge (a strong correlate of experience) and the high correlation with extraversion (one of the dominant personality factors indicative of heavy alcohol consumption) indicate that, as postulated, personality and experiential factors are tapped by perceptions-of-risk measures. A similar conclusion regarding attitudes can be inferred from the nature of the test format and the contents of some of the questions: value judgements and beliefs are contributory factors.

Application in the Tayside Safe Driving Project

The Likert version of the PRQ, together with some supplementary material, has since been completed by 165 drivers suspected of driving with blood alcohol concentrations in excess of the United Kingdom legal limit of 80 mg%. We found no statistically significant differences between the 165 subjects and the complete TSDP population (N = 1,045), with the exception of AST. Aspartate aminotransferase is, however, deemed to be affected by operational conditions to such an extent that it cannot be considered a useful indicator of alcohol-related problems in this type of population (Devgun et al. this volume).

* Copies of the complete scoring format for the PRQ test material are available upon request from the first author (J. H.).
Table 1

Illustrative Items on the Perception-of-Risk Questionnaire (PRQ)

1. What is the highest speed you would feel safe at if you were driving a powerful sports car on a clear stretch of dual carriageway? (Do not take official speed limits into account if you would feel safe traveling at speeds above those limits.)

2. How much of a distance does the average pedestrian require between cars traveling at 30 mph before he or she could cross the road safely?

3. How safe would you say it was to step on to a pedestrian crossing if a double-deck bus was approaching it at 30 mph and was 40 ft from the crossing?

4. How risky do you think it would be to drive in a stock car race without wearing a seat belt?

5. When traveling around a bend at 40 mph at what angle do you think the average motorcyclist would lose control of his machine? (This question has a series of illustrations accompanying it.)

6. When a car driver smokes how much of a distraction is smoking likely to be his or her driving?

7. How safe would it be for the average drinking driver to drive after drinking 2 pints of strong lager?

8. How safe a driver do you think you would be after drinking 6 pints of strong beer (or 12 shorts) over 3-hours drinking?

9. If the brakes on your car were slightly faulty how much of a hazard would you say this was?

10. Drivers sometimes find it difficult to judge their speed properly after leaving motorways. How much of a danger is this likely to be to other road users?

11. How safe would you feel on your first attempt if you took up a sport like hang-gliding or parachute jumping?

12. If traffic lights change suddenly when you are close to them, how safe is it in general to cross the junction?

13. How much more hazardous is it to drive in thick fog than on a clear day?

14. How much of a risk would a person be justified in taking if the only way he or she could get home after a party was to drive after drinking quite heavily?

15. Bumper to bumper traffic is quite common nowadays, especially at holidays. How close together can drivers travel at 40 mph in safety?

16. The last time you were involved in a skid, how anxious did you feel immediately afterwards?

17. How useful do you think "cat's eyes" are to drivers traveling at night?

18. If you compare driving quite fast on an icy road with driving on the same road when it was clear, how much more dangerous is the icy road likely to be?

19. How startled would you feel if one of the rear tires of your car burst when you were traveling on a busy dual carriageway at 45 mph?

20. Most drivers tend to get annoyed if they are in a hurry and they get held up by road works. How different from normal would you say your driving was when you drive after getting annoyed?

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Table 2  
Correlates of Perception of Risk Scores in the Experimental Study (Versions A & B)

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**All self reported incidents were for the year preceding the study except for the total number of previous accidents. The tests were scored positively, the higher the score the "safer" the individual.  
*P less than .05  **P less than .01

SPEARMAN CORRELATIONS: 2-tailed tests. n = 54
When comparing PRQ scores against Alcohol Problem Ratings reported previously we computed a Chi-squared value of 5.63 (df = 1, n = 108). This is statistically significant (p less than .025). Compared against GGTP (n = 144) we found Pearson's Chi-squared was 5.79 (p less than .02, df = 1). In view of the embryonic nature of the test material these results are encouraging. With larger sample sizes, we plotted least square regression lines indicative of the relationships between PRQ scores and previous criminal offences, accidents, and alcohol consumption equivalent to the best of those produced by standardized tests (e.g., the EPI., S.A.D.Q., and C.A.G.E.) but more consistent across problem areas, indicative of a trait associated with a range of alcohol-related problems. This confirms a previous report (Hagart et al., 1982) that the test (the PRQ) probably identifies different populations of drinking/drivers and problem drinkers from those identified by other, more specific, theoretically-oriented tests. More detailed information regarding PRQ scores, age groups, psychiatric status, and alcohol consumption is presented elsewhere (Hagart et al., in press). With development and establishment of an appropriate cutoff point (or points, dependent upon the population studied) PRQ scores could be highly discriminating in non-institutional or non-agency populations. Inclusion of supplementary material (Table 3), conforming to some extent to the items in many alcohol questionnaires, reduced the effectiveness of the test material in detecting cases, correlations with GGTP, General Practitioner information, and so on.

To determine the underlying item structure of the initial 20-item PRQ, we completed appropriate factor analyses. With a subject-to-variable ratio of 8:1 the analyses produced relatively clear results across a number of different SPSS (Nie et al., 1975) and BMD (Dixon et al., 1981) factoring procedures at different stages of the project. Each produced similar factor structures, that is, hypothetical sources of questionnaire responses. Using Rao's canonical factoring procedure (n = 129) with oblique rotation to simple structure (delta = 0), we identified 7 factors when one accepted the Kaiser-Guttman eigenvalue rule as a reasonable cutoff point (Table 4). The major factors were independent of each other conceptually 5 could be labelled as follows: Distance Judgments; Emotional Responses to Driving Incidents; Driving Condition; Judgments; Judgments Concerning Peripheral Factors Likely to Influence Driving Behavior; and Drinking and Driving Judgments. In a later analysis (n = 165) using the BMD maximum likelihood program we also produced a 7-factor solution with the first 4 factors agreeing with those from the earlier analysis. The loadings on the first unrotated
Table 3

Illustrative Items on Supplementary Questionnaire

1. How good a driver do you think you are?
2. How much of an extra risk do you feel you are taking if you drink before driving?
3. How much of a risk to you health would you say your present drinking habits are?
4. How much do you like driving at high speeds?
5. If you wanted to cut down your present drinking habits would you find it easy to do?
6. How do you feel when you are a passenger in a car driving at very high speeds?
7. How capable do you think you would be at reacting to an emergency if you had been drinking for about an hour?
8. How would you feel about driving if you were never allowed to overtake?
9. Do you think alcohol affects you more than the average person of your sex and age?
10. How competent a driver are you?
11. All of us tend to make mistakes at times. How much more likely are you to make mistakes if you had been drinking for an hour?
12. How much do you think the average male could drink regularly without damage to their health?
13. If you generally drank twice as much as you do now how do you think this would affect the way you have in general?
14. How much of a thrill do you get out of overtaking slow drivers while traveling at quite a high speed?
15. If you had to get somewhere in a hurry, how willing do you think you would be to break minor traffic regulations, for example in a no-parking zone, drive down a "bus only" lane, and so on?
16. Do you feel you enjoy life more when you are driving?
17. How well do you think you would survive a crash at 60 mph?
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*G = General Factor (first unrotated factor)

**H* = Estimated Communality

+Correlation coefficient .30 are omitted to facilitate interpretation of the factor structures.

++Factor 1 Gap Acceptance
Factor 2 Emotional Responses
Factor 3 Driving Conditions
Factor 4 Distractions
Factor 5 Drinking and Driving
Factor 6 ?
Factor 7 ?
factor (see Table 2) clearly indicate that drinking and driving questions, although still significantly associated with major sources of perceptions of risk responses, contribute relatively little to the overall test scores. Factors analyses of the extended set of items (including those from Table 3) again indicate the relative unimportance of alcohol-related questions. Their absence did not impair the validity of PRQ type test material. The validity of the measures was further indicated when drivers who acknowledged receiving psychiatric treatment or counseling or were reported by their general practitioner as having recently been receiving treatment or counseling were excluded from the TSDP analyses. The factor structures were not noticeably different, indicating that the relevant determining factors existed throughout the population of drinking drivers.

DISCUSSION

Our results are in concordance with the views expressed earlier on paper-and-pencil tests as indicators of alcohol-related problems and the possibility of PRQ scores being effective discriminating variables. The relatively poor, and sometimes negative, contribution to test scores by alcohol-related supplementary material (e.g. Table 3) was somewhat unexpected in view of the question wording, the differences being simply the type of judgment requested. These were probabilistic and value-oriented, as opposed to simply factual. If one extrapolates from these results to relatively transparent questionnaires, such as the S.A.D.Q. and the M.A.S.T., one must pose the question: "What exactly are the latter tests measuring when completed in research investigations using non-clinical or non-institutional populations?" Many researchers already note the type of difficulties inherent in self-reports (Heather & Robertson, 1981; Miller et al., 1977; Pernanen, 1974). Accepting that transparent instruments discriminate between alcohol-problem populations and the normal population, we may postulate that despite extensive efforts at standization and refinement, in non-agency populations they identify the "tip of the alcohol-problem iceberg" and may miss a high proportion of non-self identifiers, providing false prevalence statistics and misleading researchers. More opaque, or indirect, test materials such as the PRQ, produce interesting interactions with transparent tests within the population studied.

The effectiveness of the PRQ, despite its current lack of refinement, may have been due to a number of factors associated with questionnaire completion. These include: the seeming irrelevance of the majority of the questions to alcohol-related matters; the lack of knowledge within
subjects as to what would constitute a normal or socially accept able form of response; confidence in apprehensive drinkers if they felt they had successfully avoided incriminating themselves on the few alcohol-related questions; and, possibly, cognitive impairment in heavy drinkers or cognitive deficiencies generally. Other pertinent factors may have been the context in which the tests were carried out or the non-compulsory nature of the project. Drivers did suspect the motives of the research team. In general, they did not see themselves as possessing alcohol-related problems. The drivers also knew the researchers would have access to general practitioner and police records once they had given permission. Thus, the drivers could have engineered their responses, bringing the questionnaire responses into line with known records. The same could not be said so easily regarding quantities unknown to most, if not all, subjects (e.g. GGT enzyme levels). Even this would not be impossible, however. For example, despite the long lag time before excessive induction levels are reached, GGT is primarily a covariate of obvious drinking habits. These are readily accessible to introspective or perceptive individuals. Nevertheless, whatever the origins, the consistency of the results across 2 populations indicates the generality of PRQ measures.

The principal function of psychologically-oriented tests such as the PRQ is to identify high-risk or problem-drinking individuals at the earliest possible opportunity. One would, however, expect differences between younger and older drivers, and between experienced and inexperienced populations. For example, it would be an empirical impossibility and a logical fallacy to expect the experiential factors measured by the test items to be markedly evident in young drivers, though the lack of experience may be equally relevant. The relevant importance accorded the different elements within the PRQ, therefore, needs to vary within different populations. Some of these age-related results are discussed more extensively elsewhere, as are theoretical considerations related to these findings (Hagart et al., in press).

CONCLUSION

We hypothesized that the perception of risks is likely to reflect personality, attitude, and experiential factors. That this was so was demonstrated in the initial pilot study by the TSDP. Overall, the results are also in conformity with those evident in the research literature where perception-of-risk tests provide useful indicators of undesirable outcomes (Dunn, 1972; Hagart, 1983; Solidy, 1975). If an adequate synthesis of different professional
approaches can be achieved and predictive validity demonstrated, the current PRQ test material, or variations thereon, may find a viable niche in the alcohol field. In view of the tentative nature of the constructs and the lack of knowledge of the various determinants (Hagart, in press), additional research and development is recommended with different populations. Supplementary analyses and reports, including multivariate analyses, will examine fully the relationships between perceptions or risks and other variables in the TSDP.

REFERENCES


Hagart, J., Dunbar, J. A. et al. (Submitted for publication). Perceptions of risk and alcohol consumption.


