Vermont Alcohol Research Center was founded in January 1988 for the purpose of scientific investigation into the interrelations of alcohol, injury risk, and human behavior. Alcohol is the common element in all ongoing and planned research projects; its effects are examined from both public health and public safety perspectives. Each project involves one or more of the following approaches: epidemiologic, phenomenologic, and/or experimental. Accordingly, each project also involves one or more of the following types of study: field, survey, and laboratory research (Figure 1). In addition to activities throughout the state, Vermont Alcohol Research Center currently has out-of-state project sites in Maryland, Ohio, and California in order to avail itself of unique research opportunities in each location.

Vermont Alcohol Research Center is part of the Alcohol Research Institute, a private, non-profit research organization. Since its inception, Vermont Alcohol Research Center has been completely funded by research grant awards from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) of the U.S. Public Health Service. Each of these awards stems from a grant application (or proposal) initiated and prepared by a Principal Investigator, based on his or her research ideas and hypotheses, but often supplemented by those of his or her associates. The proposal is then submitted to the NIAAA for independent peer review by an extramural study section of alcohol research specialists.

1. Conceptual Model

Much of our research to date has focused on selected aspects of drinking and driving. We have recently developed a conceptual model which serves as a guide for designing and conducting our research and for integrating the results (see Perrine, in press). We obtain relevant measures before, during, and after alcohol-involved driving. Data are collected from one or more of these three time periods in each of our ongoing projects (as displayed for each in Figure 1 of Perrine, in press). The unique measurement period is before alcohol-involved driving, since no previous studies are known that have systematically obtained valid observational drinking data for motorists prior to their actual driving. Although this measurement period is the most challenging and difficult for obtaining valid data, it is also the most promising for significant contributions to our understanding the antecedent conditions for the many varieties of alcohol-involved driving and crashing.
2. Research Projects on Alcohol-involved Drivers

Each of the three ongoing projects concerned with alcohol-involved driving is very briefly described in this section. These three projects are highly interrelated, and some or all data in each are obtained after driving. An overview of the interrelated aspects is provided in Perrine (in press, Figure 4), in which the measures (e.g., self-reported alcohol consumption, BAC) are organized according to the type of subject/respondent (e.g., barroom subjects, roadside drivers, general population drivers, and DUI offenders). The special measures common to all research conditions or types of subjects are indicated (e.g., personal HAP interview). Of particular interest and promise, those measures which have a high validity potential are also identified in Perrine (in press, Figure 4).

2.1 Psychobiological Studies of Alcohol-Tolerant Drivers (Principal Investigator: M.W. Perrine; Project Manager: James C. Mundt). This program project is designed to study the characteristics of alcohol tolerance in human subjects from a psychobiological perspective, i.e., both psychosocial and biomedical levels. It focuses on differences in alcohol sensitivity and tolerance, the prevalence of these differences among drinking drivers, and the relevance of these differences for public health and public safety.

In contrast to previous experimental studies of alcohol tolerance in humans, this project will help bridge the gap between epidemiology and experimentation; more specifically, between drinking behavior occurring in the "real" world before driving and the precise measures of alcohol tolerance available in the tightly controlled environment of the laboratory. Drivers drinking in bars are recruited to become subjects in a series of experiments, after extensive screening and interviewing. In addition to the performance-based measures of tolerance collected during controlled experimental procedures, drivers serving as subjects in this study provide a rich database of antecedent drinking practices, family history of alcohol problems, health attitudes, personality measures, and blood samples for analysis of genetic and metabolic covariates of alcohol tolerance.

Groups of subjects displaying different drinking behaviors and degrees of observable impairment are given quantities of alcohol calculated to achieve specifically targeted blood alcohol concentrations (i.e., 0, 50, 100, and 150 mg/dl). Data are collected and analyzed regarding subjective alcohol-related experiences; information processing abilities; voluntary control of speech, postural balance, and coordination; and involuntary aspects of oculomotor and vocal behaviors.

From these data, we plan to determine: (1) how tolerant these drivers actually are to the effects of alcohol, (2) the degree to which tolerance is found across all the behavioral parameters measured, and (3) whether tolerance is specific to just one or two measures. We also plan to assess the degree to which tolerance is characterized by short-term recovery from the impairing effects of alcohol within a single testing session or is stable across individuals over the several weeks that the subjects participate in the study. With the extensive historical and personality data provided by the subjects and the genetic analysis of their DNA, we will be able to analyze both environmental and genetic contributions to the development of alcohol tolerance. Thus, the data may indicate those psychological, biological, and environmental factors that are most valid for predicting high
tolerance to the effects of alcohol. In terms of such predictability, the results of the present project should provide a basis for (1) guiding public health and public safety policy, and (2) developing more effective prevention strategies for identifying and counseling high-tolerant drinkers in the general population.

Further information regarding this project is presented in several papers appearing elsewhere in these Proceedings: Mundt, Kelleher, and Perrine (in press); Mundt and Perrine (in press); Perrine and Mundt (in press); and Perrine (in press).

2.2 Alcohol Tolerance and Adaptation Among Drinking Drivers (Principal Investigator: M.W. Perrine; Project Manager: Allan R. Meyers). This project is designed to determine: (1) whether there is a significant proportion of drinking drivers who do not manifest typical signs of intoxication, even at blood alcohol concentrations (BAC) well above the legal limit; insofar as there are such drivers, (2) how many there are, and (3) how their demographic, social, and psychological profiles differ from those of the driving population at large. Related researched questions include: (1) the difference between drivers with high BACs arrested for driving under the influence of alcohol (DUI) and those with correspondingly high BACs who are not arrested, and (2) the relative effectiveness of different deterrents for drunken driving.

To these ends, we have collected data from approximately 25,000 drivers contacted at roadside on weekend evenings (between 10:00 p.m. and 4:00 a.m.) in the Akron-Canton, Ohio region. There have been two seasons of data collection (May-October in 1990 and 1991, and 1992).

Data from consenting drivers (about 96% of those contacted) include responses to a short questionnaire; BAC measures derived from passive alcohol sensors (all drivers) and from Alco-Sensors (all alcohol-positive drivers and a randomly selected sample of alcohol-negatives); and performance on three of the most widely-used field sobriety tests (walk-and-turn, one-leg stand, and horizontal gaze nystagmus) by all alcohol-positive drivers and a random sample of alcohol-negatives. All alcohol positive drivers and a random sample of all other drivers are invited to complete extensive interviews on their health attitudes and practices, with particular reference to driving and alcohol use. There are also reviews of drivers’ Division of Motor Vehicles records and, where relevant, police and court records.

When completed, this project will provide the largest and most comprehensive contemporary data base on alcohol and driving, as measured in the field. It should elucidate one of the most obscure and troubling problems in public health and public safety: the alcohol-tolerant drinking driver. It should also provide an unprecedented opportunity to address a number of other themes in public health, mental health, public safety, and criminal justice research.

Further information regarding this project is presented in several papers appearing elsewhere in these Proceedings: Foss and Perrine (in press); Meyers, Perrine, and Foss (in press); Perrine (in press); Perrine, Foss, Meyers, Voas, and Vélez (in press).
2.3 Probabilities of Drunken Driving Among DUIs and Public (Principal Investigator: M.W. Bud Perrine; Project Manager: Bradley J. Anderson). The overarching objective of this project is to investigate the likelihood of alcohol-impaired driving among distinct segments of the U.S. driving population. During the initial phase of this study, extensive interview data were collected from approximately 4,000 respondents in four different states (California, Maryland, Vermont, and Virginia). In addition to the general driving population, respondents were selected from a variety of programs for convicted first and multiple DUI offenders. The present project represents a continuation and extension of earlier work.

An important component of current efforts involved the refinement and development of measurement instruments and statistical models for predicting subsequent involvement in alcohol-related traffic crashes and DUI. To accomplish this objective, multivariate analyses of previously collected interview data were used to select questionnaire items that best discriminated between members of the general driving population, first-time DUI offenders, and multiple DUI offenders. To determine which driver characteristics best predict future alcohol-related driving events, driver records from all interviewed respondents are intermittently retrieved from state motor vehicle departments. The long-term nature of this study allows for extended tracking periods. Depending on their dates of entry into the study, subjects’ driving records will be tracked for periods of 4 to 10 years.

Comparatively little research attention has been given to female or elderly drinking drivers because young males are disproportionately represented in the population of convicted and crash-involved drinking drivers. A major thrust of our current research is to focus much-needed attention on these two insufficiently studied groups. To meet this objective, we are recruiting and interview female and elderly drivers from four different sources: (1) the general driving population, (2) the nocturnal driving population, (3) convicted DUI offenders in treatment programs, and (4) bar patrons. The effect of a DUI offender’s gender and/or age upon police discretion in alcohol traffic enforcement is being investigated by means of a telephone survey of a random sample of police officers in the three areas in which the main studies are being conducted (California, Ohio, and Vermont).

Data collected for this project will be augmented by information obtained in our closely-related projects. The results should enhance our understanding of factors that predict future involvement in DUI and alcohol-involved traffic crashes. The data collected in this study should enable the development of statistical profiles for female drinking drivers and older drinking drivers, as well as contribute to our understanding of potentially important gender and age differences in drinking-driving behaviors. Our ultimate goal is to obtain information that will contribute to more effective prevention and treatment programs.

Further information regarding this project is presented in several papers appearing elsewhere in these Proceedings: Anderson, Perrine, Meyers, and Fortini (in press); Fortini and Perrine (in press); Perrine (in press); Voas, Tippetts, and Perrine (in press).
2.4 Future Research Projects. Pilot work has been completed for several future projects and is in progress for others. For example, our interests in studying alcohol effects on human performance in real-world situations has led to a preliminary study of alcohol effects on shallow-water diving, using above- and below-water videotaping, 13 subjects, and 5 levels of BAC per subject (0.00% to 0.12%). In a related area, pilot work currently in progress will address the prevalence of alcohol use among downhill skiers, and possibly measure the effects of alcohol on skiing performance, under extremely well-controlled experimental conditions. In an unrelated area, a pilot study of police attitudes and practices regarding DUI suspects and arrests is currently in progress; the survey instrument is designed and will be fielded soon.

Two program project grant applications are currently under review, entitled: (1) "Psychobiological Studies of Alcohol Tolerance in Females," and (2) "Self-Reported Drinking: Longitudinal Study and Validity." One grant application is in preparation, concerning: "DUI Prevention Through Modification of Police Behavior," and one is under consideration for preparation within the next 12 months: "Alcohol Tolerance, Stress, and Blood Pressure." Longer range projects would study alcohol effects on driving performance using a simulator and/or instrumented car with high alcohol-tolerant motorists.

3. Current Staffing

Full-time employees of Vermont Alcohol Research Center currently include: 4 research scientists, 1 statistician, 1 statistical analyst, 1 data manager, 15 research assistants, and 5 administrative support staff. The part-time employees currently include: 10 lab assistants, 15 interviewers, 5 field assistants, and 1 resource assistant. Additional, ad hoc expertise is provided by 21 consultants, plus the 7 members of our 2 Scientific Advisory Committees.

4. Facilities

Since its inception in January 1988, Vermont Alcohol Research Center has grown from a local staff of 5 and from 2,000 square feet of offices to 16,000 square feet of labs, offices, conference rooms, library, workshop, individual interview rooms, and 6-position telephone interview room (for computer-assisted telephone interviews). Four studio offices are equipped with beds to enable drinking subjects to sleep overnight under observation, thereby enabling measurement of sleep variables as well as alcohol hangover effects. These facilities occupy the third floor of a new building, located on a hill in Colchester, Vermont (just north of Burlington) with a panoramic view of Lake Champlain and the Adirondack Mountains. In addition to research activities in Vermont, active project sites are located in Ohio (primarily Stark County and Summit County), Maryland (Prince George's County), and California (Alameda, San Mateo, and San Diego counties); a former project site was located in Charlottesville, Virginia.

5. Awards and Affiliations

The Awards Committee of the International Council on Alcohol, Drugs and Traffic Safety
has elected the Vermont Alcohol Research Center to receive the prestigious Widmark Award of Merit (Institutional). It was conferred "In Recognition of Numerous Meritorious Contributions to the Advancement of the Cause of Alcohol, Drugs and Traffic Safety; and in Recognition of Sustained Support of Activities in this Field."

Vermont Alcohol Research Center and its Director are affiliate members of the Interdisciplinary Center for Traffic Sciences at the Würzburg University. Collaborative laboratory and field research activities are both in progress and under development with German colleagues at the Würzburg University. Several scientists of Vermont Alcohol Research Center have faculty appointments at the University of Vermont.

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6. References


Vermont Alcohol Research Center

Figure 1. Ongoing and planned research projects of the Vermont Alcohol Research Center.