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DIFFERENCES BETWEEN

ALCOHOLIC DRUNK DRIVERS

WHO ABSTAIN, CONTROL THEIR DRINKING

OR RELAPSE AFTER TREATMENT

by

Mitchell Solomon
B.A., Wayne State University, 1975
M.A., University of Michigan, 1976

A Dissertation
Submitted to the Faculty of Graduate Studies through the
Department of Psychology in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy at the
University of Windsor

Windsor, Ontario, Canada

1985

ABSTRACT

The present study used univariate and multivariate data

analyses to investigate the combination of variables that could be

used to differentiate between and predict drinking habits of male

alcoholics after treatment. Alcoholic subjects were Abstainers

(N = 60), Controlled drinkers (N = 60) and Relapsed drinkers (N = 60).

Forty variables were assessed including measures of demographics

and social stability, problem drinking, treatment characteristics,

and psychopathology.

The ANOVA revealed that alcoholics who relapse after treatment

had lower incomes, higher alcohol consumption, and higher Michigan

Alcoholism Screening Test and Behavior Impairment Index scores than

the controlled drinkers. Relapsed drinkers had more frequent and

longer previous inpatient treatment and attended more A.A. meetings

than the controlled drinkers. The relapsed drinkers also had less

ongoing treatment and poorer attendance in treatment than the

abstainers. The relapsed drinkers had significantly higher scores

than the abstainers or controlled drinkers on the Frequency (F),

Hypochondriasis (Hs), Depression (D), Psychopathic deviate (Pd),

Paranoia (Pa), Psychasthenia (Pt), Schizophrenia (Sc), Social

Introversion (Si), and Anxiety (A) scales of the MMPI.

A stepwise multiple regression technique that maximized the

multiple correlation coefficient (R^2) produced a 28 variable model

which accounted for 25 percent of the variance in drinking behavior.
Discriminant analysis differentiated between the three groups such
that the relapsed drinkers were very high on psychopathology (Function
1) and near the mid range of problem drinking (Function 2). The
abstainers were low on psychopathology and moderately high on problem
drinking while the controlled drinkers were low on psychopathology
and moderately low on problem drinking. Classification coefficients
were generated for use in predicting or classifying drinking behavior
of new subjects. Unfortunately, the discriminant analysis revealed
that, although better than at a chance level (33 percent), the model
was able to correctly classify only 63 percent of the abstainers,
60 percent of the controlled drinkers, and 65 percent of the relapsed
drinkers.

The implications and problems of the present study are discussed.

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V

TABLE OF CONTENTS

TABLE OF CONTENTS CONTINUED

TABLE OF CONTENTS CONTINUED

LIST OF TABLES

LIST OF FIGURES

x

CHAPTER I

INTRODUCTION

Traditionally, the major goal of alcoholism treatment and most widely used measure of successful outcome has been abstinence (Armor, Polich & Stambul, 1978). This goal reflects the wide acceptance of the concept of alcoholism as an irreversible illness that cannot be cured, only arrested by total abstinence from alcohol. This is based on the traditional "disease" model of alcoholism (Jellinek, 1960) that posits a "loss of control" can occur so that problem drinking and alcoholic behavior is inevitable with the consumption of even one drink. However, the irrevocable disease concept has been challenged recently by advocates of a very controversial alternative--controlled drinking as a goal of treatment. Indeed, recent reports (Pattison, 1976; Sobell & Sobell, 1976) have cited a large number of studies in which the outcome of treatment was a return to apparently normal drinking.

The most commonly used measures of treatment outcome are drinking-related criteria including abstinence, amount of alcohol consumed, and frequency of consumption. Many other non-alcohol related criteria have also been used, including behavioral impairment, employment status, marital status, physical condition, and psychopathology. Most often, treatment has been judged successful or the outcome determined

1

to be positive when one or more of these aforementioned criteria has been found to be significantly improved after treatment as compared to pre- or during treatment levels. .

The issue of outcome criteria aside, the relapse phenomena make evaluation of treatment efficacy difficult. Relapse may be defined thus: to revert back to a former state, or to regress after partial recovery from an illness. Polich et al. (1981) define relapse as a particular kind of change in which "a former patient who has improved at one post-treatment follow-up but who, at a later follow-up shows a regression back to an unfavorable status" (p. 159). This means that only drinking by an alcoholic with a goal of abstinence, or excessive drinking by one with a goal of controlled drinking would be classified as a relapse. Although published reports of success/failure rates for alcoholism treatment vary greatly, both a high rate of remission and a high rate of relapse are reported (NIAAA, 1978, 1981; Armor et al., 1978). The phenomenon of relapse brings forth two major points of view with respect to efficacy of treatment for alcoholism. First, relapse may be nothing more than a failure of treatment. This position is supported most by those who argue, for example, that methodological problems such as inadequate length of follow-up give an erroneous picture of successful treatment (Sobell & Sobell, 1982). Second, as suggested by Hunt, Barnett, and Branch (1971), Hunt and General (1973), and Polich, Armor, and Braiker (1980, 1981), relapsed alcoholics may be a particular subtype of alcoholic potentially differentiated from abstainers or controlled drinkers by personality or other variables.

Although both a high rate of remission and a significant rate of relapse are reported in the literature, a sufficiently large body of data suggests that some alcoholics may return to controlled drinking without relapse. If an alcoholic's potential for successful controlled drinking, abstinence, or relapse can be predicted then treatment may be individualized and applied with greater effectiveness than is currently practiced. The present study is an attempt to discover what combination of variables measured before and during treatment are associated with and can predict abstinence, controlled drinking, or relapse after treatment.

Incidence of Relapse, Abstinence and Controlled Drinking

In an early single group outcome study, Rathod, Gregory, Blows and Thomas (1966) assessed the occurrence of relapse episodes, defined as a failure to maintain total abstinence, in a group of inpatient alcoholics two years after treatment. Therapy was directed toward maintaining permanent sobriety. At two years post-treatment, 50 percent of the alcoholics (N = 42) had relapsed. Four had total abstinence only one year and 38 were abstinent less than one year. Of the 42 alcoholics determined to be in remission, 38 had two years continuous abstinence and four had one short "slip" of three to four days. This study points to a high relapse rate for alcoholics in abstinence-oriented treatment.

In addition to the occurrence of relapse episodes, the relationships between several nonalcohol-related outcome measures and relapse were assessed. Attendance in Alcoholics Anonymous, contact

with treatment staff, number of years addicted to alcohol, and age were found not significantly related to relapse or remission. The only exception was the 20-30 year-old age group which had a significant (88 percent) relapse rate.

Hunt, Barnett, and Branch (1971) made an actuarial analysis of relapse rates over time from 84 studies of heroin, smoking, and alcohol treatment. With the goal of all treatments being total abstinence, these authors looked at percentage of abstainers at completion of treatment and three, six, and 12 months post-treatment. It was found that in treatment of all three drug problems the relapse rates were remarkably similar. The relapse curves conformed to a typical negatively accelerated "extinction" curve marked by a steep decline in the first three months and a subsequent leveling off to an asymptotic level. Hunt et al. (1971) concluded that the 20 percent to 30 percent of treated subjects who never relapse may indicate that either the curves represent the outcome of at least two distinct groups potentially identifiable by some personality and/or physiological characteristics or that two kinds of learning may be involved.

In a subsequent similar analysis Hunt and General (1973) looked at the results of 15 follow-up studies in the alcoholism field alone. They found that 66 percent of subjects had relapsed (failed to abstain) by three months post-treatment. Relapse rates rapidly leveled at three months and 33 percent maintained abstinence for one year. These results were consistent with the earlier findings and were used to further the author's contention that either two types of people or two types of learning processes are involved in substance abuse problems.

In a comprehensive review Emrick (1974) evaluated the 265 English language studies published from 1952 through 1971 that reported on the outcome of some form of psychologically oriented treatment for alcoholism. In the review of this large number of reports, 67 percent of all alcoholics were found to be improved and 33 percent unimproved. Approximately 34 percent of the alcoholics were found to be abstinent at follow-up and approximately six percent were found to be controlling their drinking. Only about six percent were found to become worse following treatment.

In a subsequent report Emrick (1975) updated his review through 1973 and found 13 percent of nontreated and 21 percent of minimally treated alcoholics (less than two weeks inpatient treatment or less than five outpatient sessions) were abstinent. Forty-one percent of nontreated and 43 percent of minimally treated alcoholics were at least somewhat improved. No significant differences were found in abstinence rates betwee treated alcoholics (25 percent) and nontreated or minimally treated alcoholics. However, significant differences were found in overall improvement with 65 percent of treated alcoholics at least somewhat improved while only 42 percent of nontreated or minimally treated alcoholics were improved. Emrick's review suggests that treatment may significantly reduce overall drinking problems and that treatment of any kind generally has beneficial effects for a majority of alcoholics whether or not they maintain abstinence.

Hamburg (1975) in a critical review of behavior therapy approaches to alcoholism treatment concluded that techniques for training new, more adaptive behaviors were effective in minimizing relapse and

improving overall functioning (e.g., marital, interpersonal, vocational) for alcoholics with a treatment goal of either abstinence or controlled drinking. Abstinence was found not to be the only viable treatment goal. Indeed, controlled drinking was found to be a reasonable treatment goal for some alcoholics. Again, strong evidence is presented for the inclusion of a controlled drinking treatment outcome in remission status rather than relapse.

Sobell and Sobell (1973, 1976) in a controlled-group outcome study trained alcoholics to successfully control their drinking. Forty male inpatient chronic alcoholics were randomly assigned to an experimental group (N = 20) in which they received behavioral treatment designed to produce controlled drinking after discharge or a control group (N = 20) in which they received conventional treatment designed to promote complete sobriety after discharge.

The results of the study demonstrate that the controlled drinking subjects had a significantly higher percentage of days functioning well (sum of abstinent and controlled drinking days) than the abstinence subjects at all follow-up points. Furthermore, when looking at individual functioning, the controlled drinkers showed no evidence of relapse during the 2-year follow-up. In contrast, four subjects in the abstinence group showed a definite pattern of relapse with a decrease in the number of days functioning well, over time. Furthermore, one subject in this group could not be located after the first year.

These impressive results were followed-up for an additional third year by Caddy, Addington, and Perkins (1978). This independent follow-up

found the controlled drinking subjects significantly superior to the

abstainers in terms of days, functioning well. Indeed, quite impressively,

half of the controlled drinkers were reported to be "functioning well"

100 percent of the time during the third year (Caddy et al., 1978, p.

352).

These findings of Sobell and Sobell (1973, 1976) and Caddy et al.

(1978) gave a tremendous boost to clinicians and researchers who

attempted to place controlled-drinking in a remission status, rather

than relapse, and to make it a viable treatment goal.

Armor, Polich, and Stambul (1978) in what is known as the

"Rand Report" published an extensive evaluation of data collected

through the Alcoholism Treatment Center (ATC) monitoring system which

was designed to assess the effectiveness of the 44 ATCs funded by

the National Institute on Alcohol Abuse and Alcoholism (NIAAA).

The primary study population was 11,505 male non-DWI (not arrested

for driving while intoxicated) patients admitted to the 44 NIAAA-supported

ATCs throughout the U.S. from October, 1972 to September, 1973. A

6-month follow-up (after intake) was conducted on 2,371 patients. An

18-month follow-up report was based on 600 patients selected from

eight of the 44 ATCs. An impressive rate of improvement was found at

six and 18-months post-intake. At both follow-up points approximately

70 percent improvement was observed in reduced alcohol consumption and

reduced behavioral impairment (e.g., tremors, signs of definite

alcoholism). Unemployment, income, and number of days worked also

showed significant improvement.

A startling finding of this study was that while the improvement

rate was impressive only a relatively small number of patients were long-term abstainers. Indeed, at the 6-month follow-up of the 68 percent considered to be in remission, 18 percent had abstained for one month, and 12 percent were considered to be exhibiting normal drinking. At 18 months, of the 67 percent in remission, 24 percent abstained for six months, 21 percent abstained for one month, and 22 percent were normal drinkers.

In order to investigate the possibility that individuals in remission at one point might be in a nonremission status (relapse) at a later point in time, relapse rates were computed for a subsample (N = 225) of alcoholics who had both six and 18-month follow-ups. Relapse was defined as a change from remission status at one point (six months) to nonremission status at a later (18 months) point. The key finding of the relapse analysis and one that caused a great deal of controversy was that the relapse rates at 18 months were not significantly different for those who were normal drinkers at six months (13 percent) and those who were long term abstainers at six months (17 percent). This finding suggests that for some alcoholics a return to moderate drinking does not necessarily lead to a full relapse (behavioral or social impairment). Furthermore, some alcoholics may return to moderate drinking with the same chance of relapsing as those who abstain. This finding casts serious doubt on the traditional assertion that consumption of any amount of alcohol by the alcoholic will ultimately lead to a full relapse.

Paredes, Gregory, Rundell, and Williams (1979) attempted to replicate some of the findings of Armor et al. (1978) with particular

attention to relapse. A sample of 342 patients from 26 alcoholism

treatment programs in the state of Oklahoma were studied. The

clinical course of these alcoholic patients was investigated at six

and 18-month follow-up points using the diagnostic and classification

criteria in the original Rand Report. Results of the relapse analysis

differed significantly from the data reported by Armor et al. The

overall rate of remission at the 6-month follow-up was considerably

lower in the Paredes et al. study (54 percent) than in the Armor

et al. study. The major finding that is at odds with the Rand Report

is that alcoholics who were abstainers at 6-months were more likely to

be in remission at 18-months than those who were "normal drinkers."

Furthermore, the group of alcoholics who were controlling their

drinking (in remission) at 6-months had higher relapse rates than the

groups of long-term abstainers and short-term abstainers. While this

replication of the Rand Report also found that some alcoholics could

return to "normal drinking" (in remission) at 18-months, the risk of

relapse for this group was substantially higher than that originally

reported by Armor et al.

Characteristics and Prediction of Relapse/Drinking

Since research has shown that significant numbers of alcoholics

will return to controlled drinking or relapse (uncontrolled drinking)

after treatment, regardless of the goal of treatment, it has become

important to differentiate between individuals who will abstain,

control their drinking, or relapse. Identification of factors associated

with post-treatment drinking behavior and prediction of such behavior

is important in order to understand the nature of alcoholism and to
increase treatment efficacy and efficiency.

Hore (1971a, 1971b) attempted to identify factors associated
with relapse in alcoholics seen in outpatient treatment. Twenty-eight
alcoholic subjects kept records of daily subjective ratings of anxiety,
depression, and "craving" for six months. The subjective rating data
were collected during weekly clinical interviews during which each subject
was evaluated for relapse events. Relapse was defined as any "drinking"
for those subjects whose goal was total abstinence and any "increase"
in drinking outside their usual norm for those who were attempting to
maintain social drinking. Information about significant "life events"
was gathered on a monthly basis.

At the end of six months there were approximately three episodes
of relapse per subject. Significant life events involving disturbance
in an important emotional relationship, change or impending change in
work life, health changes requiring hospital attention for subjects
or a member of their household, and change or impending change of
residence were related to relapse episodes in only seven of the
subjects.

In analyzing the events, relapse, and subjective rating data,
Hore (1971b) found no significant intercorrelations between relapse
and any other measure. No significant correlation was found between
number of events and relapse frequency. The results suggest that
relapse occurs suddenly, irrespective of progressive changes in
anxiety, depression, or craving, and if related to life events, occurs
quickly, within a few days.

In a descriptive report Ludwig (1972) attempted to determine the reasons for resumption of drinking or maintenance of sobriety in alcoholics. An interview was conducted and an extensive questionnaire was administered to 176 male alcoholics at follow-up periods of three, six, nine, 12 and 18 months after discharge from a 30-day inpatient hospital treatment program. Reasons for drinking obtained from the 161 (91 percent) patients who resumed drinking at some time during the follow-up period included psychological distress, effect or pleasure, family problems, and no specific reason. Of the 176 patients only 94 (53 percent) were able to maintain at least one sustained 3-month period of abstinence. Their reasons for abstaining included no need or desire, fear of consequences, Alcoholics Anonymous, Disulfiram, and no specific reason.

An extensive interpretation of the findings was not offered by the author but several conclusions were reported. First, it was found that these alcoholics' self-reports of reasons for returning to drink failed to identify "craving" as the primary determinant. Second, no single factor could account for the wide diversity of reasons given for maintaining sobriety or returning to drink. Third, the reasons given for drinking or abstaining had only limited effect in subsequent behavior, since most patients had alternating "dry" and "drunk" periods.

Orford, Oppenheimer, and Edwards (1976) presented two-year follow-up results for a group of 65 married male alcoholics who had participated in an experimental family treatment program. Of the 26 alcoholics with a good outcome, 11 were found to be abstaining and 10

to be controlling their drinking. The results suggest an interaction between degree of dependence, type of treatment and goal of treatment. Indeed, alcoholics with high symptom count (e.g., morning drinking, shakes, secret drinking, hallucinations) were more likely to have been intensively treated and abstaining after two years. In contrast, alcoholics with a low symptom count were more likely to have been briefly counseled, likely not to have had lengthy periods of abstinence, and more likely to be controlling their drinking after two years.

McWilliams and Brown (1977) examined the relationship between treatment termination variables, MMPI scores, and relapse rates in in-patient alcoholics. A total of 111 alcoholics were selected, and based on the nature of treatment termination, were divided into three groups: 1) problem-free termination (N = 45); 2) less than perfect participation due to illicit drug use; refusal of medication, or disciplinary violations (N = 27); and 3) premature termination (less than six weeks in treatment) due to drinking, serious disciplinary violations or elopement (N = 35). Pre- and post-treatment MMPI data were available for groups one and two only.

ANOVA of pre-treatment MMPI scores revealed no statistically significant differences between the three groups on any individual scales. However, all profiles showed evidence of a high level of psychological disturbance at pre-treatment with elevations (T > 70) on the D, Pd and Sc scales. The post-treatment profiles of groups one and two showed highest elevations on the Pd and Sc scales.

Follow-up data on readmission (relapse) for detox or treatment

indicated that 51 percent of the 111 alcoholics had one or more

readmissions within 18 months (Group 1 = 31 percent, Group 2 = 63

percent, Group 3 = 50 percent). At six months post-treatment, Group

3 had the highest relapse rate, Group 2 had the second highest, and

Grpup 1 the lowest rate of readmission. Group 1 had a significantly

lower relapse rate than Group 2 and Group 3 at 12 and 18 months.

Bromet, Moos, Bliss and Wuthmann (1977) attempted to determine

the extent to which the adjustment of alcoholics discharged from one

of five different residential treatment programs could be predicted

from sociodemographic, drinking, occupational, psychological, and

treatment characteristics. The results indicated that differences in

sociodemographic, premorbid functioning, and treatment characteristics

accounted for only a small proportion of the variance in treatment

outcome. Active participation in treatment and use of Antabuse

were associated with a better than expected outcome. Multiple

regression analyses indicated that between 15 percent (for abstinence

outcome) and 33 percent (for social adjustment outcome) of the

variance in treatment outcome was related to pre-treatment socio-

demographic, drinking, occupational, and psychological characteristics.

Only 17 percent of the variance in post-treatment alcohol consumption

was related to sociodemographic and pre-morbid functioning

characteristics.

In an actuarial analysis of admission rates of alcoholic patients

in Canadian inpatient psychiatric facilities, Richman, Ball and Smart

(1978) found that of the 2,473 patients discharged from their first

hospitalization, only 22 percent were readmitted (relapsed) within 21

months. However, of the 933 patients discharged for their second hospitalization, more than 30 percent had relapsed within 21 months. More than 45 percent of the 387 patients hospitalized for a third time relapsed within 21 months. Finally, 55 percent of the 238 patients readmitted for a fourth time relapsed within 21 months of discharge. These data suggest that relapse (future hospital admissions) might be predicted from prior admissions.

In theoretical papers Gorski and Miller (1979) and Gorski (1980) reported on more than 30 symptoms of relapse gleaned from clinical observation of more than 700 alcoholic patients. These symptoms include apprehension about well-being, denial, defensiveness, impulsivity, periods of confusion, depression, feelings of powerlessness and helplessness, loneliness, excessive wishful thinking and fantasy activity, self pity, dissatisfaction with life, and irregular attendance in treatment. What is unique about Gorski's approach is the contention that relapse actually begins long before the first drink is taken or various social, health, family, financial and emotional problems occur. Indeed, it is argued that relapse begins in a "relapse-dynamic", a process which involves subtle and overt cognitive and behavioral changes in the alcoholic that reactivates patterns of denial, isolation, elevated stress, and impaired judgement. The more than 30 identified symptoms represent observable manifestations of this relapse dynamic. The symptoms are presumed to be progressive and ultimately result in a first drink, loss of control of alcohol consumption, and problem drinking.

In response to the controversy and criticism generated by their

earlier study, particularly with respect to the findings on relapse

and controlled drinking remissions, Polich, Armor and Braiker (1980,

1981) conducted a long-term follow-up study of a sample of the

alcoholics evaluated in the original Armor et al. (1978) report. In

this later study, a random sample of 758 of the original alcoholics

studied were evaluated four years after initial treatment. Significant

differences were found between the relapse patterns at four years and

those observed at the 18-month follow-up. The short-term abstainers

(1-5 months) at 18-months had a relapse rate of 29 percent at four

years which was significantly higher than the long-term abstainers

(six months or more) who had a fourth year relapse rate of only 12

percent. The alcoholics who were in remission at 18 months but still

drinking had a higher relapse rate (22 percent) than the long-term

abstainers but lower than the short-term abstainers. Thus, the long-term

abstainers at 18 months appear to have the best prognosis, but short-term

abstainers have the worst prognosis. The alcoholics who had relapsed

at 18 months fared the worst a four-years with 54 percent found to

have a relapse status.

In an attempt to identify the pattern of combined psychosocial

variables that most differentiated the various outcome groups (i.e.,

controlled drinkers, abstainers, and relapsed alcoholics) a

discriminant analysis was performed on 10 variables (e.g., age, mental

health, alcoholic self-concept) measured at the four year follow-up.

The results yielded two discriminant functions that most differentiated

the outcome groups. The first function was found to be essentially a

dimension involving the degree of self-identification as an

alcoholic. The second function was essentially a mental health function.

In an attempt to further explore the patterns of relapse, a multiple regression analysis was conducted on various correlates of relapse (e.g., level of dependence symptoms, marital status, age, etc.). The regression results revealed a complex interaction between several variables. It was found that both long-term and short-term abstention have a significantly better prognosis (lower relapse rate) than nonproblem drinking for alcoholics over age 40, with high dependence symptoms at intake. However, the opposite was found for younger alcoholics. That is, nonproblem drinking had a better prognosis than abstention for alcoholics under age 40 with lower dependence symptoms. In addition, abstention (long-term and short-term) yielded a better prognosis for married alcoholics while nonproblem drinking yielded a better prognosis for unmarried alcoholics.

Relapse data from both the 18 month and four year follow-up analyses fail to confirm the traditional deterministic view of relapse. Indeed, the classic conception that any drinking leads immediately to relapse is simply not upheld. The more recent data, along with a growing body of data demonstrating that some alcoholics may be able to become controlled nonproblem drinkers suggest that the population of alcoholics may be heterogeneous and the risk of relapse from controlled drinking or abstinence treatment goals may vary with the different characteristics of subgroups of alcoholics. The four year follow-up data on differential relapse rates affected by age, dependency symptoms, marital status, etc. supports this theory.

Finney and Moos (1981) attempted to identify characteristics of alcoholic patients that differentiate between those who successfully abstain or become controlled drinkers and those who relapse after treatment. Subjects were 131 alcoholics discharged from residential, abstinence-oriented treatment programs. At a six-month follow-up there were 58 six-month abstainers, 30 one-month abstainers, seven moderate drinkers, and 36 relapsed alcoholics. The moderate drinkers differed significantly from the six-month abstainers on several dimensions. Moderate drinkers had fewer hangovers and physical complaints, had less previous treatment for alcoholism, and a greater sense of psychological well-being prior to treatment. After treatment, the moderate drinkers, as opposed to the abstainers, were more likely to have moderate drinking spouses, recreation-oriented families, and to have work environments characterized more by aversiveness, low peer cohesion, low staff support, low involvement, and high work pressure.

At a two-year follow-up 15 (26 percent) of the 58 abstainers at six-months had relapsed. Only 52 were available for follow-up at two years (five had died). Of the 30 one-month abstainers at six-months post-treatment, 10 (33 percent) had relapsed at two years. One of the two, one-month abstainers, unavilable for follow-up, had died. Six of the seven moderate drinkers (86 percent) had relapsed at two years, with a significantly higher relapse rate than that of the abstainers. Twenty-five of the relapsed drinkers (69 percent) maintained their relapse status at two years while three (eight percent) returned to moderate drinking.

Although the moderate drinkers were more likely to relapse into heavy drinking than were six-month abstainers, there were no differences between the two groups on any of the nondrinking outcome variables at six months or two years. Finney and Moos (1981) argue that controlled drinking is a viable treatment goal for some alcoholics since "even after relapsing into heavy drinking, those persons who initially drank moderately were functioning at least as well as the abstainers with respect to physical complaints, depression, social activities and employment status" (p. 102).

In order to more closely examine the process of recovery from alcoholism, Moos, Finney and Chan (1981) compared 55 recovered alcoholics (41 abstainers, 14 moderate drinkers) and 58 relapsed alcoholics (drinking excessively or rehospitalized) with 113 matched non-alcoholic controls, two years after treatment. The results of this study revealed that, two years after treatment, significantly fewer recovered alcoholics (24 percent) than the controls (84 percent) or the relapsed alcoholics (76 percent) were drinking. The relapsed alcoholics drank significantly more beer, wine, distilled spirits and total ethanol than the other two groups. The results showed that the recovered alcoholics appear to function as well as the non-alcoholic controls. Indeed, there were no significant differences between these groups on most dimensions (e.g., mood and health, social functioning, occupational functioning) evaluated in this study. The relapsed alcoholics were functioning considerably worse on all dimensions than either the controls or recovered alcoholics. This study points to the viability of controlled drinking as a treatment goal.

Freedberg and Johnston (1981) looked at differences in psycho-social characteristics and work performance between successfully treated alcoholics and relapsed alcoholics. Subjects were 151 abstinent alcoholics and 109 heavily drinking alcoholics assessed one year after completing a three week inpatient treatment program. These groups were matched on education, employment history, marital status, and social adjustment. All subjects had essentially identical pre-treatment scores on the four parts of the Supervisor's Rating Form (S.R.F.) (productivity, drinking, absenteeism, lateness) which measures work performance. Identical pre-treatment scores were also found on the 13 scales of the Ontario Problem Assessment Inventory, which measures interpersonal functioning, self-control, assertion, communication, relaxation, sexuality, and martial relations. However, one year after treatment, the relapsed alcoholics (heavy drinking) had significantly poorer scores on all scales than did the successfully treated alcoholics (abstainers). The abstainers also demonstrated significant improvements on all scales over their pre-treatment scores.

Ogborne and Bornet (1982) reanalyzed some of the original Rand report data, looked at data from a follow-up study of halfway house treatment for alcoholism, and found that exposure to Alcoholics Anonymous (A.A.) may increase both the chances of sobriety and the chances of serious relapse. They found that when subject characteristics such as age, severity of symptoms and length of abstinence are controlled, those alcoholics who attend A.A. regularly and also drink, report more physical and other negative consequences than drinkers who attend A.A. less often. The authors argue that the philosophy and

teaching of A.A. particularly with respect to the inevitability of serious relapse if sobriety is not maintained, may constitute a self-fulfilling prophecy. More serious relapse symptoms among regular affiliates of A.A. who "slip" may result because these alcoholics are more strongly committed to the A.A. philosophy.

An alternative explanation of these findings is that those problem drinkers most attracted to A.A. are those whose symptoms are most consistent with the disease model of alcoholism upon which A.A. is based. Therefore, those drinkers who have a chronic inability to control their drinking may be more prone to affiliate strongly with A.A.

Gottheil, Thornton, Skolida, and Alterman (1982) compared the relapse patterns of alcoholic patients who participated in treatment programs studied by the Rand Corporation, State of Oklahoma, and Veteran's Administration (VA). In spite of apparent vast differences in these studies with respect to patient sampling, admission criteria, treatment techniques, treatment goals, follow-up intervals, and follow-up criteria, similarities in relapse patterns far outweighed the differences in findings. One major exception was that for both shorter (six months) and longer (12, 18 and 24 months) follow-up periods, the rate of relapse was significantly lower in the Rand study (43 percent) than in the Oklahoma (59 percent) and V.A. (73 percent) studies.

There was little evidence to suggest that formerly abstinent alcoholics who began drinking moderately inevitably progressed to

heavy or uncontrolled drinking. Only about 10 percent of the patients in these studies were persistently abstinent at all follow-up points. The percentage of patients drinking moderately varied from 33 percent to 59 percent and did not decrease over time. The percentage of patients in remission varied from 53 percent to 67 percent with the V.A. study reporting a constant 55 percent remission rate across all follow-up points.

Generally, abstainers had a lower relapse rate than did moderate drinkers. However, both abstainers and moderate drinkers, in remission at an early follow-up, had significantly lower relapse rates later than did those in nonremission at an earlier point. Drinking in excess of three ounces of absolute ethanol daily, drinking more than five ounces on any particular occasion, drinking on more than 15 out of 30 days, and drinking to the point of intoxication were found to be signs of a poor prognosis (relapse).

Gottheil et al. concluded that abstinence is the most desirable treatment outcome. However, their analysis supports the inclusion of moderate drinking in the definition of remission, rather than relapse, and challenges the fatalistic hypothesis that alcoholism is invariably a chronic and progressively deteriorating disease.

This review of the alcoholism treatment relapse literature indicates that in spite of the evidence that many types of alcoholism treatment do work (Emrick, 1975; Polich et al., 1980, 1981) there is also overwhelming and widely acknowledged evidence that relapse (however defined) occurs with significant frequency (Hunt et al., 1971; Armor et al., 1978; Richman et al., 1978; Paredes et al., 1979; Gottheil et al.,

1982). At the same time there is a sufficiently large body of data to suggest that some alcoholics may return to controlled drinking for extended periods of time (Pattison, 1976; Polich et al., 1980, 1981) without relapse.

Alcoholics who successfully control their drinking contradict the doctrines of A.A. and the widely accepted principle that the only viable treatment goal is total abstinence. As a consequence, controlled drinking has broad ramifications for etiological theories, prevention, and treatment of alcoholism. Indeed, if an alcoholic's potential for successful controlled drinking can be predicted, or if as Polich et al. (1980, 1981) suggest, controlled drinkers and abstainers are two distinct groups of alcoholics and their different characteristics can be determined, then differential treatment may be applied with greater efficacy than is currently practiced.

Attempts to identify the array of variables that might differentiate between those alcoholics who successfully control their drinking, successfully abstain, and relapse have focused primarily on measurement of these variables after group membership has already been determined. Thus it is not known whether these variables determine treatment outcome status (group membership) or vice versa. The exceptions are studies by Orford et al. (1976), Bromet et al. (1977), McWilliams and Brown (1977), Armor et al. (1978), Polich et al. (1980, 1981), and Finney and Moos (1981) which assessed some pre-treatment variables in an attempt to predict drinking or treatment outcome status. However, whether or not pre-treatment or post-treatment measures are taken, most studies have used univariate statistical

procedures to analyze the data. Although the multidimensional nature of alcohol problems and precipitating factors are recognized (Sobell & Sobell, 1982) multivariate statistical procedures capable of elucidating complex relationships among a multitude of variables have not been applied. An exception is the Polich et al. (1980, 1981) study. Unfortunately, even in this case the variables were not measured prior to group membership.

A significant omission in the literature is the use of DWI (driving while impaired or drunk driving) as a pre- or post-treatment variable. Indeed, most studies do not even use DWI as an indicator of relapse. Furthermore, Armor et al. (1978) and Polich et al. (1980, 1981) eliminated DWI offenders as subjects due to reported small numbers (less than 15 percent) and reported lower alcohol consumption levels. This is in spite of the fact that up to 56 percent of alcoholics in the U.S. are reported to have at least one DWI conviction on their driving records and that up to 48 percent of Americans arrested for DWI could be identified as alcoholic (NIAAA, 1978, p. 240). Furthermore, an earlier report (NIAAA, 1974, p. 101) indicated that a vast majority of DWI offenders have blood alcohol levels in the extremely high range (above 0.15 percent) and that repeat DWI offenders have even higher levels (above 0.22 percent). Therefore, based on the sheer quantity of alcohol consumed, many DWI offenders could appropriately be labeled "alcoholic".

The controversy over abstinence vs. controlled drinking as far as remission from alcoholism is concerned is of particular relevance to DWI offenders. Indeed, an individual who demonstrates controlled

drinking maintains some risk of incurring another DWI offense while a
relapsed drinker maintains an even higher risk. For purposes of
treatment or adjudication of DWI offenders it would indeed be helpful
to identify what types of individuals will succeed as abstainers
or controlled drinkers, and what types will fail and relapse.

The purpose of the present study is to identify characteristics
of alcoholic DWI offenders that will differentiate between those who
will abstain, control their drinking, or relapse after treatment.
Variables which may help to distinguish between these groups include
demographic characteristics, measures of problem drinking,
psychopathology, and treatment characteristics. These variables have
all been identified with membership in one or more of the previously
mentioned alcoholism treatment outcome groups.

Relevant Variables

Demographic and Social Stability Variables. Cahalan (1970)
demonstrated that drinking patterns in the U.S. may vary as a function
of religion, sex, age, race, and ethnic background. Cahalan and Room
(1974) found that problem drinking in males can be predicted very
well by using only traditional demographic variables of age, income,
education, religion, and ethnic origin. It has been well documented
that population characteristics may influence, but not solely
determine patterns of alcohol use and misuse. Characteristics known
to influence alcohol consumption include sex, age, education, ethnic
origin and religious affiliation (NIAAA, 1978).

Since sociocultural factors can influence drinking patterns in

the general population, an influence upon the drinking habits of alcoholics in treatment might also be expected. Indeed, Armor et al. (1978) found that education, income, age, and race were related to remission rates. Furthermore, Polich et al. (1981) found that age, martial status, and other variables interacted to influence post-treatment drinking patterns and relapse rates.

The literature indicates that alcoholics suffer social disabilities in addition to alcohol impairment, particularly problems that result from marital and job instability. Social adjustment or stability in the form of steady employment and stable familial relationships has been consistently reported as a positive prognostic factor in alcoholism treatment (Rosenblatt, et al., 1971, Baekland et al., 1973; Armor et al., 1978). Polich et al (1980, 1981) found an interaction between marital status and post-treatment drinking status with respect to remission. That is, married alcoholics fared better when abstaining while unmarried alcoholics fared better with controlled drinking.

Measures of Problem Drinking

Alcohol consumption. The measurement of alcohol consumption is essential for any assessment of alcoholic remission or relapse. Most definitions of alcoholism or problem drinking include large quantities of or greater than average consumption of alcohol over an extended period of time. The popular assumption that any drinking by an alcoholic is a poor prognostic sign and ultimately leads to excessive and problematic drinking (relapse) has been refuted by empirical findings. Indeed,

there are numerous studies that report finding some alcoholics capable of maintaining their remission status while demonstrating controlled non-problematic drinking (Emrick, 1974, 1975; Hamburg, 1975; Sobell & Sobell, 1973, 1976; Caddy et al., 1978; Armor et al., 1978; Orford et al., 1976, Polich et al., 1980; and Finney & Moos, 1981). Emrick (1974) found a positive relationship between drinking outcome and several other dimensions (e.g., physical condition, legal problems). Thus, alcohol consumption was judged to be an essential factor but not the sole factor in determining remission/relapse status of alcoholics.

Physical/clinical symptoms. Alcoholism is rarely defined by consumption alone. Indeed, most definitions of alcoholism include symptoms of adverse health consequences or complications as a result of excessive alcohol consumption. The World Health Organization (1952) and Jellinek (1960) definitions include physical damage or health complications as a consequence of drinking. The National Council on Alcoholism (1972) established strict guidelines for diagnosis of alcoholism. These guidelines include symptoms of major alcohol-related illnesses such as alcoholic hepatitis, Wernicke-Korsakoff Syndrome, and chronic gastritis. Polich et al. (1981) found that health problems (clinical symptoms) were significantly related to relapse after treatment. That is, the presence of any symptoms prior to treatment significantly increased the risk of problem drinking after treatment, while the absence of physical symptoms reduced the risk of relapse.
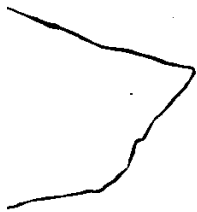
Behavioral impairment. In addition to the clinical symptoms, the National Council on Alcoholism (1972) specified symptoms of behavioral impairment including job loss, legal problems and marital disruption. Other commonly used measures of behavioral impairment include blackouts (loss of memory), missing meals when drinking, aggressive behavior when drinking, drinking alone, and drinking upon awakening. A number of studies have used measures of behavioral impairment not only in diagnosis of drinking problems but in evaluation of remission or relapse after treatment (Sobell & Sobell, 1973, 1982; Emrick, 1974, 1975; Hamburg, 1975; Pattison, 1976; Armor et al., 1978; Orford et al., 1976; Finney & Moos, 1981; and Gottheil et al., 1982). However, very few studies (Armor et al., 1978; Polich et al., 1980, 1981; and Finney & Moos, 1981) measured these variables prior to treatment in an attempt to predict post-treatment remission or relapse.

In addition to the diagnostic criteria of the National Council on Alcoholism (1972) and the American Psychiatric Association (1980), a number of diagnostic and assessment techniques that are specific for alcoholism are available (Jacobson, 1976). Probably the most commonly used techniques are the MacAndrew Alcoholism Scale (MacAndrew, 1965) and the Michigan Alcoholism Screening Test (Selzer, 1971). These techniques have been used essentially for screening and diagnostic purposes rather than prediction of post-treatment drinking behavior, remission, or relapse.

Treatment Characteristics

Treatment setting. Systematic comparisons of treatment settings (i.e., inpatient, outpatient) are rare in the literature (Armor et al., 1978). Emrick (1975) in his extensive review of relative efficacy of alcoholism treatments determined that any kind of treatment generally has positive effects on patient functioning. Superiority of one form of treatment over another was not demonstrated. Baekland et al. (1975) in a review of inpatient and outpatient treatment outcomes failed to find strong evidence for the superiority of one treatment over the other. Armor et al. (1978) found an interaction between treatment setting, amount of treatment and remission rates. That is, alcoholics in outpatient treatment and in combined inpatient/outpatient treatment had better remission rates with higher amounts of treatment than those who received less treatment. Richman et al. (1978) found that relapse might be predicted from prior hospital admissions.

Amount and duration of treatment. In general, length of treatment has been found to be positively related to remission rates in outpatient treatment (Armor et al., 1978). Baekland et al. (1975) concluded that length of treatment is more strongly related to abstinence than to other measures of remission. Orford et al. (1976) found an interaction between symptomatology, length of treatment and remission. That is, brief treatment produced the best remission rates (abstinence) with low symptom problem drinkers while longer treatment provided better results with high symptom problem drinkers. Armor et al. (1978) concluded that total number

of treatment sessions, rather than duration (length of time during
which treatment occurred) was positively related to remission
status. McWilliams and Brown (1977) found that completion of a
treatment program was positively related to remission at six, 12, and
18 months post-treatment while premature termination was related
to increased risk of relapse. Gorski and Miller (1979) and Gorski
(1980) have argued that irregular attendance in and premature
termination of treatment are predictive of relapse.

Type of therapy. Although numerous forms of therapy such
as family, recreational, Gestalt, Psychoanalytic, and Transactional
Analysis have been used in treatment of alcoholism, most can be
classified roughly as "individual therapy" or "group therapy".
This distinction is made with the recognition that neither individual
nor group therapy is a unitary approach, but rather a collection of
varied techniques. This gross distinction is useful because the
differences between the two groups are much greater than the differences
in techniques within each type (Solomon, 1981). Furthermore,
many professionals in the treatment field deem that the
distinction between individual and group therapy has prognostic
value for the outcome of alcoholism therapy.

In his review of psychologically oriented treatment, Emrick
(1975) found some evidence for the efficacy of treatment in general
for reducing overall drinking related problems whether or not the
alcoholic maintained abstinence. He found little support for the
superiority of one form of treatment over another. Armor et al.
(1978) found that both individual and group therapy were associated
with significant improvement in patient functioning (remission) at

the six month and 18 month follow-up points. Smart (1978) in a large scale study of alcoholics in a variety of treatment facilities found some evidence for the superiority of group therapy over individual therapy in producing higher remission rates.

The oldest and most well known treatment for alcoholism is Alcoholics Anonymous (A.A.). In effect, A.A. is a non-denominational, spiritually-based, international self-help organization of alcoholics in various states of problem drinking or remission. This organization contends that alcoholism is a disease that cannot be cured, only arrested. As a consequence, treatment is aimed at lifetime abstinence. Although A.A. exists and operates, for the most part, independently of any formal treatment system, most inpatient and outpatient treatment programs maintain compulsory or voluntary participation in A.A. groups as an integral part of therapy. Rathod et al., (1966) found that attendance in A.A. was not related to remission (abstinence) or relapse (any drinking). Ludwig (1972) found that A.A. attendance had very little influence on remission (abstinence). Armor et al. (1978) found that the amount of formal treatment and attendance in A.A. interacted to affect remission rates. When there was little or no formal treatment for alcoholism, regular attendance in A.A. meetings significantly increased remission (abstention) rates. With high levels of formal treatment attendance in A.A. had little additional effect. Armor et al. (1978) concluded that, "the main impact of A.A. is not to increase remission rates, but rather to shift the pattern of remission in the direction of abstention" (p. 121). Ogborne and Bornet (1982)

found that A.A. attendance increased both the chances of sobriety
and the chances of serious relapse.

In addition to psychological treatment of alcoholism, drug
therapy is frequently used in outpatient treatment settings. The
drug Disulfiram, or Antabuse, is one of the most widely used of all
drugs in the treatment of alcoholism in the United States. When
Disulfiram is ingested followed by consumption of even small amounts
of alcohol the affected person will experience extreme discomfort
characterized by headache, rise in blood pressure, flushing of the
head and neck, fainting and nausea. Disulfiram is generally used
in outpatient treatment in order to insure that a patient will
remain abstinent. Ludwig (1972) found that taking Disulfiram had
very little influence on remission (abstinence). Armor et al.
(1978) found that Antabuse significantly improved remission rates
at the six-month follow-up. However, at the 18-month follow-up,
the effect of the drug had disappeared.

Psychopathology

Traditionally, alcoholism has been viewed as a complex of
personality traits, psychiatric impairment, and behavioral problems
that are symptomatic of some underlying pathological process. That
is, most pathological characteristics associated with alcoholism
including depressive, neurotic-depressive, sociopathic, and anxiety
features (Hoffman, 1976) result from intrapsychic conflicts or some
pre-existing biochemical dysfunction. Indeed, because of its
sedative effects, ethyl alcohol may be used as a form of self-medication

for some anxious alcoholics. At the same time, prolonged alcohol consumption itself can produce feelings of anxiety and depression (Davis, 1971) which, in turn, may precipitate continued drinking. Vaillant (1983) has argued that, based on longitudinal research, years of alcoholic drinking precipitate various forms of psychopathology which in turn precipitate continued problem drinking.

Since alcohol consumption is known to both precipitate and alleviate psychiatric symptoms, a mutual cause and effect relationship probably exists between drinking and psychopathology (Polich et al., 1981). Nevertheless, a number of studies have measured and reported the presence of some form of psychopathology in a majority of alcoholics prior to treatment (McWilliams & Brown, 1977; Cadoret, 1981; Costello, 1981; Polich et al., 1981). Most studies have been concerned primarily with assessing the degree or type of psychological pathology associated with alcoholism. Less often, studies have assessed improvement in psychological functioning associated with treatment or evaluated continued deficits associated with relapse (Baekland et al., 1975; Emrick, 1975; Hoffman, 1976; Polich et al., 1981). There are no published reports of any attempts to discover whether or not pre-treatment psychological pathology is associated with a particular remission, relapse, or drinking pattern in alcoholics after treatment. However, psychiatric symptoms such as anxiety, depression, impulsivity, sociopathy, and cognitive impairment (thought disorder) may be associated with particular patterns of remission or relapse (Polich et al., 1980, 1981).

Hypotheses

1. Demographic variables (age, education, income, religion, marital status, occupation, employment) will differ significantly between the groups of abstainers, controlled drinkers, and relapsed drinkers. In particular, greater age, education, and income will characterize abstainers and/or controlled drinkers. Lesser age, education and income will characterize relapsed drinkers.

2. Higher alcohol consumption levels, greater adverse health consequences and behavioral impairment, and more previous treatment will characterize abstainers and/or relapsed drinkers. Lower alcohol consumption levels, less adverse health consequences and behavioral impairment, and less previous treatment will characterize controlled drinkers.

3. Greater psychopathology (MMPI Scale elevations) will characterize abstainers and/or relapsed drinkers. Lesser psychopathology will characterize controlled drinkers.

CHAPTER II

METHOD

Subjects

The present study employs three groups of alcoholic subjects
with histories of arrests for DWI (driving while impaired or drunk
driving). The three groups, abstainers, controlled drinkers, and
relapsed alcoholics were determined by drinking status measured 18
months after first admission to outpatient alcoholism treatment.
Subjects were selected from DWI alcoholics admitted to Results, Inc.,
a suburban Detroit outpatient psychiatric and alcoholism treatment
clinical from January 3, 1983 through June 30, 1983. The subjects
were referred for alcoholism treatment by attorneys, judges, or
probation officers involved in adjudication of their drunk driving
offenses in the district courts of Wayne, Oakland, and Macomb
Counties. All subjects had a significant (five or greater) score
on the Michigan Alcoholism Screening Test at the time of admission.
Only white male subjects were employed in order to avoid the
confounding effects of sex differences and because of the extremely
small numbers of female and non-white alcoholics available for
study.

Following the recommendation of Sobell and Sobell (1982), an

18-month follow-up. interval was selected based on the observation
that 12 to 18 months is an adequate time interval over which relevant
data (e.g., drinking pattern, drinking-related problems) will reflect
stable functioning. Subjects were contacted 18 months from initial
enrollment in treatment (from July 2, 1984 through December 31,
1984) and asked to participate in a study of "drinking problems".
They were asked to take part in a 15 minute interview for questioning
about their past or present drinking habits and asked to sign a
release of information (see Appendix A) to allow use of the interview
information and treatment program records for research purposes.
Confidentiality was guaranteed and subjects were informed that the
information about them would be reported only as group data.
Furthermore, all subjects were assured that their participation or
nonparticipation and information gathered would not affect their
legal status with respect to their referral source. Those subjects
who agreed to participate were given a debriefing sheet explaining
the purpose of the study (see Appendix B).

Procedure

Each subject's drinking behavior and a few select problem
behaviors were assessed through the follow-up questionnaire
(see Appendix C) administered during a face-to-face interview of
approximately 15 minutes. The questionnaire was completed by an
experienced interviewer who read the questions to the subject. From
this questionnaire, length of abstinence, the Quantity-Frequency Index
of Average Daily Consumption, and the Index of Typical Quantity (see

Appendix E) were compute . Based on these measures, and several

problem behaviors, subjects were classified into one of the three

outcome status groups commonly reported in the alcoholism treatment

literature. For the present study, operational definitions of the

three groups, based on definitions of Armor et al. (1978, pp. 98-99)

are:

1. Abstained: Subjects in this group report six months or more
· of total abstinence.

2. Controlled Drinking: Subjects in this group report some

drinking during the past six months and meet all of the following

criteria during the 30 days prior to their last drink:

a. Average daily consumption of less than three ounces of

ethanol (Index of Average Daily Consumption).

b. Less than five ounces typical quantity on any drinking

days (Index of Typical Quantity).

c. No tremors reported.

d. Less than three episodes of blackouts, missing

work, morning drinking, missing meals, and being drunk.

3. Relapsed: Subjects are classified as relapsed if they

fail to meet the criteria for abstained or controlled drinking

status.

Eighteen months prior to the follow-up interview, subjects

were admitted for outpatient treatment subsequent to a week-long

intake evaluation procedure. During the initial intake interview

demographic, social stability, alcohol consumption, previous

alcoholism treatment history, and behavioral impairment information

was gathered through data collection instruments modeled after the

NIAAA "Initial Contact Form" (Armor et al., 1978). Following the

initial interview, the Michigan Alcoholism Screening Test (MAST) and

the Minnesota Multiphasic Personality Inventory (MMPI) were

administered. At some time during this first week all subjects were

seen by a physician for a physical examination and medical history.

At this time information about physical/clinical symptoms was

gathered. Once treatment was begun, records of type of treatment

(individual therapy, group therapy, AA., Antabuse) and frequency of

attendance were documented. Thus, all of this information was

available for the present study as archival data. These data were

recorded on the Treatment Data Form (see Appendix D) after subjects

completed the follow-up interview and signed the release of

information.

Demographic and Social Stability Information

Information concerning age, marital status, religious

affiliation, education, employment status, occupation, and income

were taken from records of each subject's initial intake interview

(see Appendix D).

Measures of Problem Drinking

Alcohol consumption. Although it is generally assumed that

alcoholics under-report their level of alcohol consumption and

problem behavior, therefore making self-report data invalid, this

has been found not to be necessarily true. Polich et al. (1981) in a

validity study of their subjects' self-reported behavior conservatively
estimated that 23 percent underestimated their alcohol consumption
and symptom levels. The highest rate of underreporting was found
among those who report the lowest typical consumption of ethanol per
day (2 oz. or less) while the lowest underreporting was found among
those who reported highest typical daily consumption levels (over
4 oz. ethanol). In attempting to adjust their data to reflect the
impact of underreporting, outcome status was affected by only a small
degree. Indeed, adjustment for alcohol consumption changed the
observed outcome of 18 percent non-problem drinkers to 14 percent
(Polich et al., 1981, p. 252). Sobell and Sobell (1982) reported
that alcoholics do not necessarily underreport their alcohol
consumption or symptom levels. Furthermore, by conducting face-to-
face interviews in a clinical setting and by insuring that
confidentiality of reported information will be maintained, the
reliability and validity of self-report information can be
maximized.

Two measures of alcohol consumption are used in this study.
The first is the NIAAA (QF) Quantity-Frequency Index of Average
Daily Consumption (Armor et al., 1981, p. 273). This index is an
estimate of the total daily volume of alcohol consumed during a 30
day period (see Appendix E). QF is an accurate measure of daily
alcohol consumption unless the individual drinks on an irregular
basis or consumes irregular amounts of alcohol. Under these
circumstances another measure of alcohol consumption is more accurate.

This second measure of alcohol consumption is the Index of Typical Quantity (Q) consumed on a drinking day (Armor et al., 1981, p. 269). Q is computed from the amount of alcohol consumed only on drinking days (see Appendix E).

Both indexes are computed from subject records of alcohol consumption compiled at the time of initial intake. In addition, both indexes are computed from drinking information gather at the 18-month follow-up and used to determine membership in the abstained, controlled drinking or relapsed group.

Physical/clinical symptoms. Information about each client's history of diagnosis and treatment for alcohol-associated illnesses was gathered from the self-reported medical history taken at the time of initial intake and from a physical examination by the clinic staff physician during the week of initial intake. The physician confirmed the medical history report and documented any additional health problems based on the physical exam, standard laboratory tests, and any additional diagnostic tests warranted.

For this study the Index of Adverse Health Consequences (AHC) was constructed as a measure of the physical symptoms of excessive alcohol consumption. The AHC is measured by scoring the occurrence of any of 30 alcohol-related health problems based on the National Council on Alcoholism (1972) criteria (see Appendix F).

Behavioral impairment. Three measures of behavioral impairment are used in this study: (a) NIAAA Behavioral Impairment Index (BII), (b) MacAndrew Alcoholism Scale (MAC), and (c) Michigan Alcoholism Screening Test (MAST).

The NIAAA Behavioral Impairment Index (Armor et al., 1978) is based on several of the National Council on Alcoholism criteria (see Appendix G). The index is derived from the frequency of occurrence of 12 symptoms of behavioral impairment or alcohol dependence including tremors, blackouts, missing meals due to drinking, and continuous drinking. Polich et al. (1980, 1981) found an interaction between the Behavioral Impairment Index, age, and drinking pattern of alcoholics who were in remission. That is, alcoholics over age 40 with a high impairment index had lower relapse rates if abstaining while alcoholics under age 40 with low Behavioral Impairment Index scores had lower relapse rates with controlled drinking.

The MacAndrew Alcoholism Scale (MacAndrew, 1965) is comprised of 49 True-False items of the Minnesota Multiphasic Personality Inventory. It was originally constructed to differentiate male alcoholics from nonalcoholic psychiatric patients and is intended for use strictly as a detection technqiue. Most of the scale items contain no reference to consumption of alcohol. As a consequence, the MAC may be most useful as a tool in identification of alcoholics among those who conceal or deny their symptoms.

Jacobson (1976) reported that the MAC is solidly established with published reports indicating from 73.5 percent to 90.6 percent correct classification of alcoholics with a cutting score of 23. The MAC appears to measure a general trait associated with a history of current substance abuse, not simply alcoholism, which is unrelated to the disruptive effects of drinking. Furthermore,

there is evidence that higher scorers on the MAC who have no overt symptoms of alcoholism or substance abuse (false positives) are addiction prone and have a propensity to develop alcohol or substance abuse problems not yet manifest in overt behavior.

The Michigan Alcoholism Screening Test (Selzer, 1971) is a 25 item (yes-no answer) questionnaire (see Appendix H). The face valid items pertain to drinking behaviors and their consequences, and self-evaluation and prior involvement with helpers for drinking problems. Item responses in the keyed direction are differentially weighted (0-5) and the scores summed to produce a single MAST score. A score of five or more places the subject in the "alcoholic" category. Scores less than five are not diagnostic of alcoholism. In addition to detecting alcoholism, the MAST appears to assess the degree of self-identification as an alcoholic.

In a test of concurrent validity, (Moore, 1972) administered the MAST to female and male psychiatric patients. The overall correlation between MAST scores of five or greater and psychiatrists' diagnosis of alcoholism was found to be .78. Selzer et al. (1975) assessed MAST reliability and computed a coefficient alpha of .83 for a group of non-alcoholic drivers (including drunk drivers), .87 for alcoholics (inpatient and outpatient), and .95 for the entire sample. Regarding validity, the MAST score correlated at .90 with membership in the group of non-alcoholic drivers and with the group of inpatient alcoholics. Jacobson (1976) concluded that the MAST is a reasonably valid and reliable screening device with 80-90 percent of alcoholics correctly identified with a cutting score of 5.

Treatment Characteristics

Previous treatment setting. Information about participation in treatment prior to the program involved in the present study is gathered in the treatment data form (Appendix D). The following measures of prior treatment are used in the present study:

1. IHF (Inpatient or Hospital Treatment Frequency). This is the number of times the subject was admitted to a hospital or inpatient alcoholism treatment program.

2. IHL (Inpatient or Hospital Treatment Length). This is the total number of days the subject was in previous inpatient or hospital treatment.

3. OF (Outpatient Frequency). The number of times the subject was enrolled in outpatient alcoholism treatment.

4. OL (Outpatient Length). The total number of weeks of previous outpatient treatment.

Amount and duration of treatment. Information about each subject's participation in the treatment program is contained in clinic records and recorded on the treatment data form (Appendix D). the following three measures of treatment amount and duration are used:

1. DT (Duration of Treatment). The total number of weeks from the week of initial intake to the last week of attendance.

2. AT (Amount of Treatment). The total number of weeks during which any treatment sessions were attended.

3. PAT (Percent Attendance in Treatment). This is a measure of the subject's regularity of attendance. The PAT score is computed by dividing the AT score by the DT score:

$$PAT = \frac{AT}{DT} \times 100$$

Type of therapy. Four measures of type of therapy are used in the present study:

1. ITS (Individual Therapy Sessions). The total number of individual therapy sessions from the week of intake to the last week of attendance in treatment.

2. GTS (Group Therapy Sessions). The total number of group therapy sessions attended.

3. AA (Alcoholics Anonymous Attendance). The total number of AA meetings attended while in treatment at the clinic.

4. DA (Days Antabuse Taken). The total number of days Antabuse (Disulfiram) was taken while in treatment.

This information is documented in the Treatment Data Form (Appendix D) as taken from subject treatment records.

Psychopathology

The three validity scales (L,F,K) and ten clinical scales (Hs/Hypochondriasis, D/Depression, Hy/Hysteria, Pd/Psychopathic Deviate, Mf/Masculinity-Femininity, Pa/Paranoia, Pt/Psychasthenia, Sc/Schizophrenia, Ma/Mypopania, Si/Social Introversion) of the Minnesota Multiphasic Personality Inventory (MMPI) are used as measures of psychopathology. In addition, three research scales

(A/Anxiety, R/Repression, Es/Ego Strength) are used. The MMPI was
administered and scored at the time of the subject's initial intake.
The scores are recorded in the Treatment Data Form (Appendix D).

Butcher and Tellegan (1978) have suggested that K's validity
as a "suppressor" not be assumed and that more meaningful results
will be achieved if the K correction is not used. In addition,
since the use of T scores is not specifically indicated, more
meaningful results will be achieved if raw scores are used in
research computations. Therefore, only the non-K-corrected MMPI
raw scores are used in the statistical computations for this
study.

Method of Analysis

The virtual absence of multivariate statistical procedures
in the treatment relapse literature is a major problem
identified by Sobell and Sobell (1982). Indeed, in spite of the
recognized multidimensional nature of alcohol problems and
complex interaction of variables influencing drinking behavior,
most studies have used univariate statistical procedures to
analyze data. Multivariate procedures are ideally suited for
elucidating complex relationships among a multitude of variables
and are therefore used in the present study.

In the present study chi-square analyses (SAS, 1982) are
used to test the significance of group differences on the
discrete demographic variables (religion, marital status,
employment, occupation). Multivariate Analysis of Variance (SAS,

1982) is used to test the hypothesis that abstainers, controlled

drinkers, and relapsed drinkers are distinct groups of alcoholics and

differ on one or more of the demographic, problem drinking,

psychopathology, and treatment variables. The univariate F's are

evaluated to determine which group means differ significantly on the

variables. A stepwise multiple regression (SAS, 1982) is used to

eliminate unnecessary variables and to find the most heuristic model

for predicting group membership. The resulting model is then subjected

to a discriminant analysis (SAS, 1982) to determine how well the

variables classify subjects into each group. Discriminant analysis

(SPSS, 1983) is also used to study the nature of differences

between the groups and to determine which variables are the best

discriminators.

Another aim of the present study is to predict post-treatment

drinking behavior (abstaining, controlled drinking, relapsed drinking)

of DWI alcoholics from one or more of the demographic, problem

drinking, psychopathology, and treatment variables. Discriminant

analysis is ideally suited for this purpose, particularly since the

variables in this study are measured prior to group membership.

Classification function coefficients are derived from the analysis

so that other subject samples may be classified according to group

membership (post-treatment drinking).

CHAPTER III

RESULTS

Relevant data were gathered from 180 subjects or 78.26% of the 230 adults admitted for treatment from January 3, 1983 through June 30, 1983. The three groups (Abstainers, Controlled Drinkers, Relapsed) each contained 60 subjects. The group means for all 36 continuous variables are given in Table 1. Frequency data for the four discrete demographic variables are given in Table 2 (Marital Status), Table 3 (Occupation), Table 4 (Religion) and Table 5 (Employment). Chi-square analysis of the variables revealed no significant group differences on any measure. Indeed, 26% of the entire sample were never married, 49% married, and 25% were divorced. With respect to occupation, 8% of the sample were in professional or managerial occupations, 22% were in skilled crafts or technical work, 27% in semi-skilled occupations, and 43% were unskilled laborers. With respect to religious affiliation, 48% of the entire sample were Protestant and 52% were Catholic. All subjects were employed with 98% of the entire sample employed full-time while only 2% were employed part-time.

A multivariate analysis of variance was conducted using the 36 continuous variables as dependent measures and group membership as the independent variable. The Hotelling-Lawley Trace was used to get an F approximation to test whether the three groups of subjects

Table 1

Continuous Variable Means for Abstainers, Controlled Drinkers, and

Relapsed Drinkers

Variable	Abstainers	Controlled Drinkers	Relapsed Drinkers	All Alcoholics
Age	39.38	36.08	34.63	36.70
Education	12.47	12.18	12.03	12.23
Income[a]	27.09	24.68	22.84	24.87
Quantity-Frequency Index[b]	5.62	4.41	5.89	5.31
Index of Typical Quantity[b]	7.01	6.47	7.30	6.92
Behavior Impairment Index	12.12	9.15	12.91	11.39
MacAndrew Alcoholism Scale	26.53	26.47	26.97	26.66
Adverse Health Consequences	0.77	1.00	1.10	0.96
Michigan Alcoholism Screening Test	23.98	18.15	26.22	22.78
Inpatient Hospital Frequency	0.33	0.18	0.60	0.37
Inpatient Hospital Length[c]	9.25	4.40	16.32	9.99
Outpatient Frequency	0.50	0.52	0.65	0.56
Outpatient Length[d]	12.47	10.90	13.35	12.24
Duration of Treatment[d]	39.23	38.80	35.98	38.01
Amount of Treatment[d]	32.27	29.62	26.27	29.38
Percent Attendance	81.01	77.92	73.74	77.56
Individual Therapy Sessions	22.33	18.60	18.75	19.89
Group Therapy Sessions	13.22	13.92	10.28	12.47
AA Attendance	8.38	3.70	10.07	7.38
Days Antabuse Taken	33.23	9.68	34.28	25.73
MMPI Scales:				
Lie (L)	4.17	4.33	3.97	4.16
Frequency (F)	6.85	5.68	9.93	7.49
Correction (K)	14.75	15.38	13.17	14.43
Hypochondriasis (Hs)	4.95	6.05	7.93	6.31
Depression (D)	20.65	20.53	24.20	21.79
Hysteria (Hy)	21.02	21.52	22.25	21.59
Psychopathic Deviancy (Pd)	19.32	19.10	22.13	20.18
Masculinity/Femininity (Mf)	23.95	23.62	25.10	24.22
Paranoia (Pa)	10.73	10.67	12.80	11.40

Table 1 Continued

Variable	Abstainers	Controlled Drinkers	Relapsed Drinkers	All Alcoholics
Psychesthenia (Pt)	11.80	11.37	17.37	13.51
Schizophrenia (Sc)	11.93	11.60	18.38	13.97
Hypomania (Ma)	17.47	18.52	20.15	18.71
Social Introversion (Si)	25.22	24.40	29.42	26.34
Anxiety (A)	10.78	10.42	16.28	12.49
Repression (R)	4.83	5.20	5.06	5.01
Ego Strength (Es)	46.28	45.72	43.78	45.26

[a]Income in thousands of dollars

[b]Ounces of alcohol

[c]Number of days

[d]Number of weeks

Table 2

Frequency Data for Marital Status of Three Groups

| Group | Marital Status | | | |
	Never Married	Married	Divorced	Total
Abstainers	15	30	15	60
Controlled Drinkers	15	30	15	60
Relapsed	17	28	15	60
Total	47 (26.11%)	88 (48.89%)	45 (25.00%)	180

Note. χ^2 = 0.261

df = 4

Not significant

Table 3

Frequency Data for Occupation of Three Groups

Group	Occupation				
	Professional/ Manager	Skilled/ Technical	Semi- Skilled	Unskilled Laborer	Total
Abstainers	5	11	17	27	60
Controlled Drinkers	5	15	17	23	60
Relapsed	5	13	15	27	60
Total	15 (8.33%)	39 (21.67%)	49 (27.22%)	77 (42.78%)	180

Note. χ^2 = 1.194

df = 6

Not significant

Table 4

Frequency Data for Religion of Three Groups

	Religion		
Group	Protestant	Catholic	Total
Abstainers	26	34	60
Controlled Drinkers	27	33	60
Relapsed	33	27	60
Total	86 (47.78%)	94 (52.22%)	180

Note. χ^2 = 1.915

df = 2

Not significant

Table 5

Frequency Data for Employment of Three Groups

Group	Employment Full-Time	Part-time	Total
Abstainers	59	1	60
Controlled Drinkers	58	2	60
Relapsed	59	1	60
Total	176 (97.78%)	4 (2.22%)	180

Note. χ^2 = 0.512

df = 2

Not significant

differ significantly on the composite dependent measure (36 variables). The test of significance (Hotelling-Lawley Trace = 0.74, F = 1.45, $p < .05$) revealed significant group differences on the composite dependent measure.

Table 6 shows the MANOVA Summary and univariate F-tests for the significant variables only. The matrices which are the multivariate analog of sums of squares in univariate ANOVA are not reported here because they would be unwieldy. Significant group differences were found on 20 of the 36 variables: Income, Quantity-frequency Index (QF), Behavior Impairment Index (BII), Michigan Alcoholism Screening Test (MAST), In-patient Hospital Frequency (IHF), In-patient Hospital Length (IHL), Amount of Treatment (AT), Percent Attendance (PAT), Alcoholics Anonymous attendance (AA), Frequency (F), Correction (K), Hypochondriasis (Hs), Depression (D), Psychopathic deviate (Pd), Paranoia (Pa), Psychasthenia (Pt), Schizophrenia (Sc), Hypomania (Ma), Social introversion (Si), and Anxiety (A). Least significant difference (LSD) tests were conducted to determine which of the group means for the 20 variables were significantly different (see Table 7). The abstainers had a significantly higher income ($27,092) than the relapsed alcoholics ($22,840). With respect to alcohol consumption (Quantity-Frequency Index - QF), the relapsed alcoholics (QF = 5.89) did not differ significantly from the abstainers (QF = 5.62). However, both groups drank significantly more alcohol prior to treatment than the controlled drinkers (QF = 4.41). The relapsed alcoholics and abstainers did not differ with respect to the pretreatment Behavior Impairment Index but both were significantly

Table 6

Analysis of Variance and MANOVA Summary for Abstainers, Controlled
Drinkers, and Relapsed Drinkers on the Continuous Variables

Variable	SS	df	F
Income	545530111.11	2	3.27*
Error	14744899666.67	177	
Quantity-Frequency			
Index (QF)	75.27	2	6.69**
Error	995.09	177	
Behavior Impairment			
Index (BII)	472.84	2	17.61****
Error	2373.99	177	
Michigan Alcoholism			
Screening Test (MAST)	2081.73	2	7.16***
Error	25722.82	177	
Inpatient Hospital			
Frequency (IHF)	5.34	2	4.43**
Error	106.72	177	
Inpatient Hospital Length			
(IHL)	4309.34	2	4.55**
Error	83880.63	177	
Amount of Treatment (AT)	1084.90	2	3.41*
Error	28171.65	177	
Percent Attendance (PAT)	1597.54	2	3.92*
Error	36086.25	177	
AA Attendance (AA)	1306.03	2	3.99*
Error	28934.52	177	
Frequency (F)	578.61	2	10.65****
Error	4806.37	177	
Correction (K)	156.43	2	3.42*
Error	4053.77	177	

Table 6 Continued

Variable	ss	df	F
Hypochondriasis (Hs)	273.14	2	5.01**
Error	4825.43	177	
Depression (D)	521.21	2	7.40***
Error	6234.18	177	
Psychopathic Deviant (Pd)	343.63	2	6.76**
Error	4497.32	177	
Paranoia (Pa)	176.53	2	5.98**
Error	2610.67	177	
Psychasthenia (Pt)	1343.51	2	8.63***
Error	13773.47	177	
Schizophrenia (Sc)	1754.54	2	7.42***
Error	20926.32	177	
Hypomania (Ma)	219.41	2	3.76*
Error	5157.57	177	
Social Introversion (Si)	869.48	2	5.31**
Error	14501.17	177	
Anxiety (A)	1296.04	2	8.28***
Error	13856.95	177	
MANOVA[a]		72	1.45*
Error		282	

Note. Only variables with significant F ratios are displayed. The

Table 6 Continued

F ratios for Age, Education, Typical Quantity (Q), MacAndrew Alcoholism
Scale (MAC), Adverse Health Consequences (AHC), Out-patient Frequency
(OF), Out-patient Length (OL), Duration of Treatment (DT), Individual
Therapy Sessions (ITS), Group Therapy Sessions (GTS), Days Antabuse
Taken (DA), L, Hy, Mf, R, and Es were not significant.

[a]F approximation based on the Hotelling-Lawley Trace (0.74)

    * $\underline{p} < .05$

   ** $\underline{p} < .01$

  *** $\underline{p} < .001$

 **** $\underline{p} < .0001$

Table 7

T Tests: Least Significant Difference (LSD) Between Group Means for
20 Variables

Variable	LSD	Group	Mean	Grouping[a]	
Income[b]	3288.53	Abstainers	27.09	A	
		Controlled Drinkers	24.67	A	B
		Relapsed Drinkers	22.84		B
Quantity-Frequency Index (QF)[c]	0.85	Relapsed Drinkers	5.89	A	
		Abstainers	5.62	A	
		Controlled Drinkers	4.41		B
Behavior Impairment Index (BII)	1.32	Relapsed Drinkers	12.91	A	
		Abstainers	12.12	A	
		Controlled Drinkers	9.15		B
Michigan Alcoholism Screening Test (MAST).	4.34	Relapsed Drinkers	26.22	A	
		Abstainers	23.98	A	
		Controlled Drinkers	18.15		B
Inpatient Hospital Frequency (IHF)	0.28	Relapsed Drinkers	0.60	A	
		Abstainers	0.33	A	B
		Controlled Drinkers	0.18		B
Inpatient Hospital Length (IHL)[d]	7.84	Relapsed Drinkers	16.32	A	
		Abstainers	9.25	A	B
		Controlled Drinkers	4.40		B

Continued ...

Table 7 Continued

Variable	LSD	Group	Mean	Grouping[a]	
Amount of Treatment (AT)[e]	4.55	Abstainers	32.27	A	
		Controlled Drinkers	29.62	A	B
		Relapsed Drinkers	26.27		B
Percent Attendance (PAT)	5.15	Abstainers	81.01	A	
		Controlled Drinkers	77.92	A	B
		Relapsed Drinkers	73.74		B
AA Attendance (AA)	4.61	Relapsed Drinkers	10.07	A	
		Abstainers	8.38	A	
		Controlled Drinkers	3.70		B
Frequency (F)	1.88	Relapsed Drinkers	9.93	A	
		Abstainers	6.85		B
		Controlled Drinkers	5.68		B
Correction (K)	1.72	Controlled Drinkers	15.38	A	
		Abstainers	14.75	A	B
		Relapsed Drinkers	13.17		B
Hypochondriasis (Hs)	1.88	Relapsed Drinkers	7.93	A	
		Controlled Drinkers	6.05		B
		Abstainers	4.95		B
Depression (D)	2.14	Relapsed Drinkers	24.20	A	
		Abstainers	20.65		B
		Controlled Drinkers	20.53		B

Table 7 Continued

Variable	LSD	Group	Mean	Grouping[a]	
Psychopathic Deviant (Pd)	1.82	Relapsed Drinkers	22.13	A	
		Abstainers	18.32		B
		Controlled Drinkers	19.10		B
Paranoia (Pa)	1.38	Relapsed Drinkers	12.80	A	
		Abstainers	10.73		B
		Controlled Drinkers	10.67		B
Psychasthenia (Pt)	3.18	Relapsed Drinkers	17.37	A	
		Abstainers	11.80		B
		Controlled Drinkers	11.37		B
Schizophrenia (Sc)	3.92	Relapsed Drinkers	18.38	A	
		Abstainers	11.93		B
		Controlled Drinkers	11.60		B
Hypomania (Ma)	1.95	Relapsed Drinkers	20.15	A	
		Controlled Drinkers	18.52	A	B
		Abstainers	17.47		B
Social Introversion (Si)	3.26	Relapsed Drinkers	29.42	A	
		Abstainers	25.22		B
		Controlled Drinkers	24.40		B
Anxiety (A)	3.19	Relapsed Drinkers	16.28	A	
		Abstainers	10.78		B
		Controlled Drinkers	10.42		B

Table 7 Continued

Note. Critical value of T = 1.97, df = 177, $p < .05$.

[a]Significant differences between means occur where letters between pairs of means are different.

[b]Income in thousands of dollars

[c]Ounces of Alcohol

[d]Number of days

[e]Number of weeks

greater than that of the controlled drinkers. The mean Michigan

Alcoholism Screening Test score of the relapsed alcoholics (MAST = 26.22)

was not significantly different from that of the abstainers' (MAST = 23.98).

However, both were significantly higher than that for the alcoholics

who controlled their drinking (MAST = 18.15). For Inpatient Hospital

Frequency and Inpatient Hospital Length, a similar pattern of group

differences was observed. The only significant differences in group

means were found between the relapsed alcoholics and controlled drinkers

with the former having a greater frequency and length of inpatient

treatment than the latter. The mean Amount of Treatment and

Percentage Attendance in Treatment were significantly greater for the

abstainers than for the relapsed alcoholics. The controlled drinkers

had a significantly lower mean AA attendance than either the relapsed

alcoholics or abstainers.

A similar pattern of group differences was observed for a majority

of the MMPI Scales (Frequency, Hypochondriasis, Depression,

Psychopathic Deviancy, Paranoia, Psychasthenia, Schizophrenia, Social

Introversion, Anxiety) with the relapsed alcoholics having significantly

higher mean scores than either the abstainers or controlled drinkers.

The abstainers and controlled drinkers did not differ significantly

on these MMPI Scales. However, for Scale K the controlled drinkers

had a significantly higher mean score than the relapsed alcoholics.

For the Hypomania Scale (Ma) the relapsed alcoholics had a higher

mean score than the abstainers.

A Stepwise Multiple Regression was conducted for the three groups

using group membership as the dependent variable and the 36 continuous

Variables as predictors. The MAXR method (SAS, 1982) was used to find the most heuristic model containing the combination of variables which maximizes the sequential increases in the squared multiple correlation coefficient (R^2). Variables were selected sequentially such that the best one variable model, two variable model, three variable model, etc. was achieved. At each step the next variable that increased predictive power (R^2) independent of those already selected was added to the model. At each step, variables already in the model that no longer maximized the predictive power were dropped from the model. A 28 variable model was retained with the maximum variance accounted for ($R^2 = .25$) with an F value significant at the .01 level (Table 8). Thus, eight variables were eliminated; the Index of Typical Quantity (Q), the Behavior Impairment Index (BII), the MacAndrew Alcoholism Scale (MAC), Days Antabuse was Taken (DA), Psychopathic Deviate (Pd), Masculinity-Feminity (Mf), Psychasthenia (Pt), and Repression (R). The 28 variables that maximized the multiple correlation are given in Table 8.

The Discriminant Analysis summary is given in Table 9. Because there are three groups, only two discriminant functions are required to describe the data. The first function contains 57.01 percent of the total discriminating power of the two functions. The second function contains 42.99 percent of the discriminating power. Wilkes' Lambda is a multivariate measure of group differences over the discriminating variables. This statistic measures residual discrimination or the ability of the variables to discriminate between groups beyond the discriminating power of the previously extracted discriminant functions. It is an inverse measure, such that as the value of Lambda

Table 8

Maximum R^2 Improvement for Dependent Variable Group: Stepwise

Multiple Regression

Source	df	SS	F	R^2
Regression	28	29.90	1.79**	.25
Error	151	90.10		
Total	179	120.00		
Age	1	0.93	1.56	
Education	1	0.50	0.84	
Income	1	0.39	0.66	
Quantity-Frequency Index	1	0.19	0.32	
Adverse Health Consequences	1	0.25	0.41	
Michigan Alcoholism Screening Test	1	1.09	1.83	
Inpatient Hospital Frequency	1	0.33	0.55	
Inpatient Hospital Length	1	0.04	0.06	
Outpatient Frequency	1	1.12	1.87	
Outpatient Length	1	0.06	0.10	
Duration of Treatment	1	0.34	0.56	
Amount of Treatment	1	0.12	0.20	
Percent Attendance	1	0.03	0.05	
Individual Therapy Sessions	1	1.56	2.61*	
Group Therapy Sessions	1	1.50	2.51	
Attendance	1	0.04	0.06	
Lie (L)	1	0.40	0.67	
Frequency (F)	1	0.39	0.65	
Correction (K)	1	0.18	0.30	
Hypochondriasis (Hs)	1	1.08	1.81	
Depression (D)	1	0.49	0.82	
Hysteria (Hy)	1	0.43	0.73	
Paranoia (Pa)	1	0.84	1.41	
Schizophrenia (Sc)	1	1.65	2.77*	
Mania (Ma)	1	1.04	1.74	
Social Introversion (Si)	1	1.09	1.82	
Anxiety (A)	1	0.61	1.02	
Egostrength (Es)	1	0.85	1.42	

*$p < .10$
**$p < .01$

Table 9

Discriminant Analysis Summary for Three Groups

	Discriminant Functions			
Function	Percent of Variance	Wilkes' LAMBDA	Chi-Square	df
1	57.01	0.59	85.72	56*
2	42.99	0.79	37.57	27

	Group Centroids	
Group	Function 1	Function 2
Abstainers	-0.53	0.55
Controlled Drinkers	-0.28	-0.67
Relapsed Drinkers	0.81	0.12

*$p < .01$

approaches zero there is greater discrimination and the groups are greatly separated relative to the amount of variance within the groups. As Lambda approaches 1.0, there is progressively less discrimination between groups. The values of Wilkes' Lambda for the two discriminant functions (Table 9) are moderately low for the first function but moderately high for the second function. Therefore, the first function is likely to have good discriminating power while the second function is not.

Wilkes' Lambda is converted to a chi-square to test the significance of the discriminating power of the discriminant function. The chi-square (85.72) for function 1 is significant ($p < .01$) while chi-square for function 2 (37.57) is not significant. Thus, the ability of only the first function to discriminate between groups (drinking behavior) is not due to chance.

The Group Centroids (see Table 9) are the means on all the functions for each group. The centroids represent the most typical location of cases from each group in the discriminant function space. Figure 1 presents the plot of the group centroids so that the ability of the two discriminant functions to discriminate between the three groups can be seen spatially. It can be seen that the relapsed alcoholics are significantly higher on the first function than the controlled drinkers and abstainers. The controlled drinkers are only slightly higher on this function than the abstainers. On the second function, the relapsed alcoholics fall between the abstainers and controlled drinkers.

In order to interpret the discriminant functions, the structure
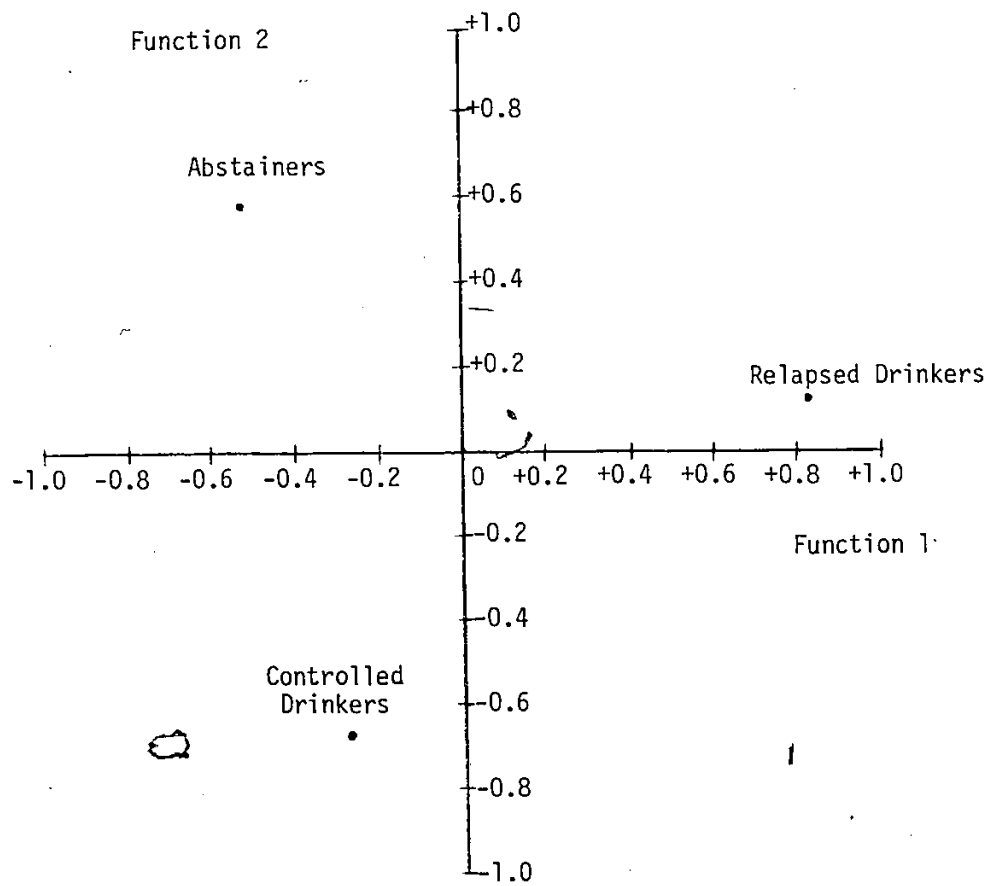
Figure 1. Plot of Group Centroids for Abstainers, Controlled Drinkers, and Relapsed Drinkers on Two Discriminant Functions.

coefficients need to be evaluated. Structure coefficients (Table 10) are product-moment correlations between a single variable and a discriminant function. The structure coefficient tells how closely a variable and a function are related, such that when the absolute magnitude of the coefficient approaches ± 1.0 the function is carrying almost the same information as the variable. When the coefficient is near zero the function carries virtually none of the information represented by the variable. The variables with the highest structure coefficients can be used to name or interpret the discriminant function.

In looking at the structure coefficients (Table 10) it becomes more understandable that only the first discriminant function was found to be significant. Indeed, 23 of the variables have structure coefficients that contribute primarily to the first function. Only five variables contribute to the second function. All the MMPI variables contribute to the first function. In fact, the seven variables with the highest structure coefficients are MMPI scales (Frequency, Anxiety, Depression, Schizophrenia, Paranoia, Hypochondriasis, Social Introversion). Thus, the first function is best interpreted as a psychopathology dimension with higher discriminant function scores representing greater pathology and lower scores representing less pathology. The first function discriminates between the relapsed alcoholics and abstainers and controlled drinkers by degree of psychopathology. Therefore, the 28-variable model is able to discriminate the relapsed alcoholics from the abstainers and controlled drinkers primarily due to the discriminating power of the psychopathology

Table 10

Structure Coefficients for 28 Variables and Two Discriminant Functions

Variable	Function 1	Function 2
Frequency (F)	.54	
Anxiety (A)	.51	
Depression (D)	.48	
Schizophrenia (Sc)	.48	
Paranoia (Pa)	.44	
Hypochondriasis (Hs)	.40	
Social Introversion (Si)	.40	
Percent Attendance (PAT)	-.35	
Hypomania (Ma)	.34	
Inpatient Hospital Frequency (IHF)	.33	
Inpatient Hospital Length (IHL)	.32	
Amount of Treatment (AT)	-.32	
Correction (K)	-.30	
Income	-.30	
Ego Strength (Es)	-.26	
Age	-.26	
Outpatient Frequency (OF)	.18	
Duration of Treatment (DT)	-.17	
Group Therapy Sessions (GTS)	-.17	
Hysteria (Hy)	.17	
Education (Ed)	-.16	
Adverse Health Consequences (AHC)	.11	
Lie (L)	-.09	
Quantity-Frequency Index (QF)		.47
Michigan Alcoholism Screening Test (MAST)		.45
AA Attendance (AA)		.34
Individual Therapy Sessions (ITS)		.19
Outpatient Length (OL)		.08

(MMPI) variables. Of course the other variables (e.g., Percent
Attendance, Inpatient Hospital Frequency) are involved, but their weak
contribution to function 1 suggests that their discriminating power
in the 28-variable model is very weak.

The second discriminant function is essentially an alcohol
problem dimension based on the highest structure coefficients of
Quantity-Frequency Index (QF), Michigan Alcoholism Screening Test
(MAST), and AA Attendance (AA). In looking at Figure 1 it appears
that the 28-variable model differentiates the three groups on the
alcohol problem dimension with the abstainers having the most alcohol
problems, the controlled drinkers having the least, and the relapsed
drinkers between the two. However, due to the fact that function 2
is not statistically significant it does not reliably discriminate
between the groups. Therefore, the alcohol problem dimension does
not add any significant discriminating power to the 28-variable model.

Table 11 gives the classification function coefficients (Fisher's
Linear Discriminant Functions). These coefficients may be used to
classify new cases according to drinking behavior. In order to do this,
three linear combinations (classification scores) are computed for
each case. For each new subject, the variable scores are multiplied
by the corresponding classification function coefficients and summed
along with the constant. A subject is classified into the group that
produces the highest classification score.

The Discriminant Analysis Classification Summary (Table 12)
indicates that the 28-variable model was able to correctly classify
subjects according to drinking behavior at well above a chance level.

Table 11

Classification Function Coefficients (Fisher's Linear Discriminant

Functions) for Abstainers, Controlled Drinkers, and Relapsed Drinkers

and 28 Variables

Variable	Abstainers	Controlled Drinkers	Relapsed Drinkers
Age (ED)	0.80	0.77	0.77
Education	6.32	6.09	6.17
Income	-0.00	-0.01	-0.01
Quantity-Frequency Index (QF)	1.70	1.48	1.64
Adverse Health Consequences (AHC)	-2.94	-2.87	-2.84
Michigan Alcoholism Screening Test (MAST)	0.73	0.67	0.69
Inpatient Hospital Frequency (IHF)	-4.33	-3.74	-3.75
Inpatient Hospital Length (IHL)	0.01	0.01	0.02
Outpatient Frequency (OF)	-7.20	-6.75	-6.32
Outpatient Length (OL)	0.14	0.13	0.13
Duration of Treatment (DT)	6.42	6.57	6.49
Amount of Treatment (AT)	-8.07	-8.21	-8.12
Percent Attendance (PAT)	3.31	3.37	3.32
Individual Therapy Sessions (ITS)	0.15	0.10	0.06
Group Therapy Sessions (GTS)	0.09	0.06	0.02
AA attendance (AA)	-0.10	-0.10	-0.09
Lie (L)	3.32	3.29	3.42
Frequency (F)	1.68	1.53	1.76
Correction (K)	1.59	1.65	1.64
Hypochondriasis (Hs)	0.75	0.88	0.87
Depression (D)	-0.04	0.01	0.03
Hysteria (Hy)	0.23	0.17	0.16
Paranoia (Pa)	0.53	0.60	0.64
Schizophrenia (Sc)	-1.81	-1.83	-1.93
Hypomania (Ma)	2.64	2.71	2.74
Social Introversion (Si)	1.88	1.88	1.94
Anxiety (A)	0.96	0.96	1.03
Ego Strength (Eg)	2.20	2.18	2.27
(Constant)	-321.79	-320.47	-326.41

Table 12

Discriminant Analysis Classification Summary for Three Groups

From Group:	Abstainers	Controlled Drinkers	Relapsed Drinkers	Total
Abstainers	38 (63.33%)	14 (23.33%)	8 (13.33%)	60
Controlled Drinkers	19 (31.67%)	36 (60.00%)	5 (8.33%)	60
Relapsed Drinkers	11 (18.33%)	10 (16.67%)	39 (65.00%)	60
Priors	.33	.33	.33	

Note. Numbers represent the number and percent of correctly classified subjects from each group. Priors = probability of random (chance) assignment to group.

Sixty-five percent of the relapsed alcoholics, 63.33 percent of the abstainers, and 60.00 percent of the controlled drinkers were correctly classified. Therefore, the classification function coefficients (Fisher's linear discriminant functions) are likely to classify new subjects with a better than chance probability.

Significant correlations between the 36 continuous variables are listed in Table 13 in Appendix I. Correlations which are of particular interest will be examined in the Discussion section.

CHAPTER IV

DISCUSSION

The aims of this study, to identify characteristics of alcoholic DWI offenders that differentiate between those who become abstainers, controlled drinkers, or relapsed drinkers, and to predict outcome group membership, were achieved. The three hypotheses investigated were that: 1) greater age education and income will characterize alcoholics who become abstainers and/or controlled drinkers after treatment while lesser age, education, and income will characterize relapsed drinkers; 2) greater alcohol consumption, adverse health consequences, behavioral impairment, and previous treatment will characterize alcoholics who become abstainers and/or relapsed drinkers after treatment while lesser alcohol consumption, health consequences, behavioral impairment, and treatment will characterize controlled drinkers; 3) greater psychopathology will characterize abstainers, and/or relapsed drinkers while less psychopathology will characterize controlled drinkers.

Univariate Analysis

In spite of literature that demonstrates how drinking patterns may vary according to demographic variables (Cahalan, 1970; NIAAA, 1978) and how the drinking habits of alcoholics may be influenced by

73

demographic variables (Rosenblatt, et a., 1971; Baekland et al., 1973; Armor et al., 1978; Polich et al., 1980) this study found only one demographic variable (Income) to be significantly related to drinking pattern after treatment. The first hypothesis was, for the most part, rejected. However, the abstainers had a significantly higher income than the relapsed drinkers, prior to treatment. The income of the controlled drinkers did not differ significantly from either the abstainers or relapsed drinkers. The differences between the present study and earlier reports, with respect to demographic variables, is most likely due to differences in the population samples studied. Indeed, the sample in the present study tended to be of a lower age and more socioeconomically stable with a higher percentage married and employed, and of a higher income than other studies (i.e., Armor et al., 1978; Polich et al., 1980).

Some of the measures of alcohol consumption and of problem drinking were found to be significantly related to drinking behavior after treatment as predicted in Hypothesis Two. Higher alcohol consumption, as measured by the Quantity-Frequency Index of Average Daily Consumption (QF), was significantly related to relapsed drinking and abstaining, while lower alcohol consumption was related to controlled drinking. This is consistent with earlier reports (Bromet al., 1977; Armor et al., 1978; Polich et al., 1980) that controlled drinkers are likely to have had lower levels of alcohol consumption prior to treatment. Inasmuch as the Index of Typical Quantity of alcohol consumed (Q) did not differ significantly

between the groups the significant factor contributing to group differences in alcohol consumption appears to be how often alcohol is consumed excessively (during a 30-day period) and not the amount of alcohol consumed per drinking occasion. It appears that alcoholics with the lowest pre-treatment alcohol consumption levels are more able to successfully control their drinking after treatment. Alcoholics with the highest pre-treatment alcohol consumption levels appear unable to control their drinking after treatment and either abstain completely or return to excessive alcohol consumption.

For the most part, the measures of behavioral impairment were found to be significantly related to drinking patterns after treatment, as predicted in Hypothesis Two. Indeed, both the Michigan Alcoholism Screening Test (MAST) scores and Behavior Impairment Index (BII) scores were found to have the same pattern of association with drinking outcome. That is, higher MAST and BII scores were associated with abstinence and relapsed drinking while lower scores were associated with controlled drinking after treatment.

These findings are consistent with earlier reports (Bromet et al., 1977; Armor et al., 1978; Polich et al., 1980) that alcoholics who demonstrate controlled drinking after treatment are more likely to have been less impaired physically, economically, socially, etc., by their drinking than those alcoholics who relapse. The pattern here is similar to that observed with respect to alcohol consumption. That is, alcoholics with the highest levels of pre-treatment

behavioral impairment as measured by the MAST and BII appear unable
to control their drinking and either abstain completely or relapse
and return to excessive alcohol consumption.

The MacAndrew Alcoholism Scale (MAC) and the Index of Adverse
Health Consequences (AHC) failed to confirm Hypothesis Two. Indeed,
neither measure showed significant group differences and appear
not to be good predictors of drinking behavior after treatment.
However, the mean MAC scores for all three groups (see Table 1) are
above the cutting score of 23 and would be diagnostic of alcholism.
The failure of the MAC to differentiate between the groups makes
sense in light of the fact that most of the scale items do not
refer directly to alcohol consumption or symptoms of alcoholism and
therefore scale elevations do not necessarily reflect the degree of
impairment from alcoholism represented by elevations on the MAST
or BII.

Hypothesis Two was for the most part, not confirmed with respect
to most of the treatment variables. Only the relapsed drinkers
were found to have a greater frequency of previous inpatient treatment
(IHF) and longer inpatient treatment (IHL) while the controlled
drinkers had less frequent and shorter previous inpatient treatment,
as predicted. This finding appears to be consistent with the report
of Richman et al (1978) that relapse may be predicted from prior
hospital admissions. However, the abstainers had more ongoing
treatment (AT.) and a higher percentage of attendance (PAT) than the
relapsed drinkers. Both the relapsed drinkers and the abstainers

had significantly more AA attendance than the controlled drinkers. This finding is consistent with the report of Ogborne and Bornet (1982) that Alcoholics Anonymous participation increases the chances of sobriety and relapse.

The findings that IHF and IHL were associated with relapsed drinking while previous outpatient treatment frequency (OF) and length (OL) did not predict drinking behavior suggest that more impaired alcoholics are likely to have had inpatient treatment, with an increased risk of relapse, while less imapaired alcoholics are likely to have had outpatient treatment or no treatment at all with less risk. The correlations in Table 13 (Appendix I) support this as IHF and IHL both have significant correlations with four measures of impairment from alcohol (BII, MAC, AHC, MAST) while OF and OL are significantly correlated only with the MAST.

The findings that Duration of Treatment (DT), number of Individual Therapy Sessions (ITS), and number of Group Therapy Sessions (GTS) failed to predict drinking outcome while AT and PAT do differentiate between outcome groups are consistent with previous reports (Armor et al., 1978; Baekland et al., 1975; Emrick, 1975) that superiority of one form of treatment versus another has not been demonstrated but that more treatment may have a positive effect on drinking outcome. The finding that the number of days Antabuse was taken (DA) failed to predict drinking outcome is consistent with previous reports (Armor et al., 1978, Ludwig, 1972) that Antabuse had little influence on abstinence.

Although 11 of the 16 MMPI variables were found to predict drinking habits after treatment, Hypotheses Three was not entirely supported. Indeed, the relapsed drinkers had significantly higher scores on nine scales [Frequency (F), Hypochondriasis (Hs), Depression (D), Psychopathic deviate (Pd), Paranoia (Pa), Psychasthenia (Pt), Schizophrenia (Sc), Social introversion (Si), Anxiety (A)] than either the abstainers of controlled drinkers. The controlled drinkers had significantly higher scores on the K scale than the relapsed drinkers. The relapsed drinkers had significantly higher scores on the Hypomania (Ma) scale than the abstainers. The abstainers and controlled drinkers did not differ significantly on these scales. That is, while it was predicted that the abstainers and relapsed drinkers would have higher scores than the controlled drinkers, the relapsed drinkers had higher scores than the abstainers and controlled drinkers. Thus, greater psychopathology is associated only with relapsed drinking.

It seems plausible that the alcoholics who become relapsed drinkers may be using alcohol as a form of self-medication for anxiety, depression, etc. This supports the argument of Vaillant (1983) that problem drinking causes psychopathology which then leads to more problem drinking. However, these results cannot identify whether psychopathology actually preceeds problem drinking or is involved in a mutual cause and effect relationship with problem drinking (Polich et al., 1981). In fact, the Quantity-Frequency Index (QF) of alcohol consumption correlates significantly with

nine of the MMPI variables and the Index of Typical Quantity (Q) with
eight of the variables (see Table 13). In addition, QF and many of
the MMPI variables are significant predictors of drinking outcome. Thus,
some of the alcoholics who relapse may drink excessively in an effort
to medicate themselves while others may begin as controlled
drinkers whose drinking may precipitate psychopathology followed
by excessive drinking.

It appears that a majority of the variables evaluated in this
study do predict drinking behavior of the alcoholics evaluated,
after treatment. A definite pattern emerges such that the alcoholics
who are relapsed drinkers after treatment are likely to have lower
incomes, higher alcohol consumption levels, higher MAST and BII
scores, and more frequent and longer previous inpatient treatment
than the controlled drinkers. The relapsed drinkers also attended
AA meetings more frequently than the controlled drinkers and had
less current treatment and a lower attendance percentage than the
abstainers. The relapsed drinkers also have significantly higher
levels of pre-treatment psychopathology than either the abstainers or
controlled drinkers. Alcoholics most likely to relapse are those
exhibiting one or more of the following pathological characteristics
associated with MMPI Scale elevations: 1) greater preoccupation
with health and somatic complaints (Hs); 2) mild depression (D); 3)
greater antisocial behavior, authority conflict, and less conformity
(Pd); 4) greater sensitivity, distrust, and suspiciousness (Pa);
5) greater worry, anxiety, and self criticism (Pt); 6) greater
feelings of loneliness, alienation, and isolation, and idiosyncratic

thinking (Sc); 7) greater restlessness and distractability, and mild hyperactivity (Ma). The alcoholics most likely to relapse are also slightly less gregarious and outgoing (Si) and experience greater situational anxiety (A) than the abstainers and controlled drinkers. The relapsed drinkers are also significantly less defensive (K) than the controlled drinkers.

It is important to note that these aforementioned results are based on analyses of non-K-corrected MMPI raw scores. When K was used as an individual predictor it significantly differentiated the controlled drinkers from the relapsed drinkers. If the K correction had been used for scales Hs, Pd, Pt, Sc, and Ma there would have not been any significant change in the results except for magnification of the observed differences between groups. No change would be expected for these scales due to the fact that all five have the same relative pattern of association with drinking outcome. On four of the scales, the relapsed drinkers had significantly higher scores than either the abstainers or controlled drinkers, while the latter two groups did not differ significantly.

Multivariate Analysis

The findings thus far discussed are based solely on univariate statistics. Although the group differences on each individual variable that reach statistical significance may allow prediction of drinking behavior, results such as those previously discussed have been criticized (Sobell & Sobell, 1982) for their limited usefulness in predicting individual behavior and for failing to

account for multiple influences upon drinking behavior and alcoholism.
In addition, the variables in this study that were found to be
significantly related to drinking behavior, were related in different
ways, some predicting one pattern of drinking, while others predict
a different pattern. Furthermore, many of the variables share
a considerable amount of variance as evidenced by the large number
of significant intercorrelations in Table 13. The use of multivariate
statistical procedures in an effort to minimize these problems, to
maximize accurate prediction and to attempt to explain the
multidimensional influences on drinking behavior of alcoholics is
rare in the alcoholism literature.

    The selection of a large (28 variable) model in order to better
understand the differences in drinking patterns of alcoholics is
an effort to encompass multiple influences on alcoholism (e.g.,
demographic variables, alcohol consumption levels, physical and
behavioral impairment from drinking) simultaneously. The model
encompasses influences on problem drinking and alcoholism reported in
the literature including demographic characteristics (e.g., age,
income), measures of problem drinking (e.g., alcohol consumption,
adverse health consequences), treatment characteristics (e.g.,
length of previous inpatient treatment, amount of ongoing treatment)
and psychopathology (e.g., MMPI Scales D, Sc, and Ma). The
elimination of the Index of Typical Quantity (Q), MacAndrew
Alcoholism Scale (MAC), Days Antabuse was taken (DA), Masculinity-
Femininity (Mf) and Repression (R), Impairment Index (BII),

Psychopathic deviate (Pd), and Psychasthenia scales (Pt) is due to
the fact that they share an excessive amount of variance with other
variables (see Table 13). Indeed, BII has significant intercorrelations
with 21 other variables, Pd with 19 variables, and Pt with 17
variables. Thus, they were not retained in the model because they
did not account for enough unique variance and did not significantly
increase R^2. Some variables (e.g., adverse health consequences,
duration of treatment) with non-significant univariate F ratios were
retained in the model because they maximized the R^2 for the model.

Due to the fact that all variables in this study were measured
prior to the establishment of group membership (drinking behavior)
the results of the discriminant analysis can be used to classify or
predict drinking behavior of new subjects. Although two functions
were produced by the discriminant analysis, only the first
(psychopathology) significantly differentiated between the three
groups of alcoholics. In fact, psychopathology as measured by the
MMPI scales best differentiated the group of relapsed drinkers from
the abstainers and controlled drinkers. The psychopathology dimension
did not differentiate very well between the abstainers and controlled
drinkers. The second discriminant function (problem drinking) did
not significantly differentiate between the three groups. However,
the three groups were reasonably well differentiated in the
discriminant space such that the relapsed drinkers were very high
on psychopathology (Function 1) and near the mid range of problem
drinking (Function 2). The abstainers were low on psychopathology

and moderately high on problem drinking, while the controlled drinkers were low on psychopathology and moderately low on problem drinking.

Implications and Problems

The results of this study have significant implications for treatment of alcoholism particularly due to the fact that high rates of controlled drinking and relapse among alcoholics after treatment are reported in the literature (Gottheil et al., 1982; Polich et al., 1980). Although abstinence may be the most desirable treatment outcome for most alcoholics (Gottheil et al., 1982) since the 28 variable model may identify those alcoholics who are most likely to control their drinking or relapse after the treatment then appropriate prevention or treatment may be applied. That is, treatment directed toward increasing the ability of alcoholics to moderate their drinking might be applied to those most likely to exhibit controlled drinking, thereby decreasing the probability or severity of later relapse. Directing the treatment to improving attendance or focusing directly on whatever psychopathology is present are options for dealing with those alcoholics identified as potential relapsed drinkers.

The alcoholic subjects in this study had histories of drunk driving (DWI) arrests. It would be quite useful to be able to accurately predict whether alcoholic drunk drivers will abstain, control their drinking, or relapse after treatment because, of course, whether or not the individual drinks again has implications for the probability of incurring another drunk driving arrest. Based

on the probability of drinking outcome, more efficacious
recommendations for treatment or punishment might be made.
Unfortunately, the 28 variable model correctly classified only 60-65
percent of the alcoholic drunk drivers in the sample. This makes the
model of questionable utility in a judicial setting. Thus, one of
the weaknesses of this study is the lack of sufficiently high
correct classification of subjects. In other words, this model
has statistical significance but is somewhat lacking in substantive
significance. This weakness is most likely due to the fact that the
variables measured account for an insufficient amount of variance in
drinking behavior. Future research might improve classification
by including post-treatment variables such as family relations
and work environment (Finney & Moos, 1981) and life stress (Ludwig,
1972) found to influence drinking patterns after treatment.

Another weakness is the use of archival data, which did not
allow inclusion of additional variables that might improve
classification. Although the variables evaluated in this study are
those most commonly assessed by alcohol treatment programs, other
measures such as different alcohol screening tests or standardized
tests of psychopathology, or tests of normal personality
characteristics might improve classification.

Still another weakness of this study lies with the nature of
the psychopathology variables (MMPI). The fact that many of the
MMPI scales share common items makes correlations between them
difficult to interpret. Indeed, the extent to which the significant
intercorrelations are due to the shared items or to true correlations

between the psychopathology being measured cannot be determined in this study. This is mostly a problem for interpretation of the results and has not been addressed in the literature. However, there is a precedent for use ofthe MMPI and multivariate statistical procedures including discriminant analysis (O'Leary, Rohsenow, & Chaney, 1979; O'Leary, Calsyn, Chaney, & Freeman, 1977).

Summary and Conclusions

To summarize, the present study made use of rarely applied multivariate statistical procedures (discriminant analysis) and identified a 28-variable model that best discriminated alcoholics who relapse from those who abstain or control their drinking after treatment. The abstainers and controlled drinkers were not as well discriminated. Psychopathology measures (MMPI variables) accounted for most of the discriminating power of the model. Because the variables were measured prior to group membership, computed discriminant scores can be used to classify new subjects according to drinking behavior. The model correctly classified 60 - 65 percent of the alcoholic drunk drivers according to drinking behavior after treatment which is better than a chance probability of 33 percent.

Alcoholic drunk drivers who relapse after treatment are likely to exhibit greater somatic concerns (Hypochondriasis), greater Depression (D), more antisocial behavior (Psychopathic deviate), greater sensitivity (Parnoia), greater anxiety (Psychasthenia), greater feelings of alienation (Schizophrenia), and greater restlessness

(Hypomania) than those who abstain or control their drinking.. Relapsed drinkers are likely to evidence less gregariousness (Social introversion) and greater situational Anxiety (A) than the abstainers and controlled drinkers. Relapsed drinkers are also significantly less defensive (K) than the controlled drinkers.

Alcoholics who relapse after treatment are likely to have had lower incomes, higher alcohol consumption levels, higher MAST and BII scores, i.e., greater impairment from drinking, than the controlled drinkers. They have more frequent and longer previous inpatient treatment and attend AA meetings more frequently than those who control their drinking. The relapsed drinkers also had less current treatment and poorer attendance in treatment than the abstainers.

The results of this study add nothing to settle the controversy between proponents of controlled drinking (Sobell & Sobell, 1973, 1976) as a treatment goal for alcoholics and those who adhere to the traditional AA philosophy that any drinking by an alcoholic constitutes a relapse. This study also adds nothing to settle the controversy between the view that psychopathology causes excessive drinking and alcoholism (Hoffman, 1976) and the view that excessive drinking causes psychopathology (Vaillant, 1983). Instead, this study offers a statistical model based on 28 variables that can be used to predict drinking behavior in alcoholics after treatment. This model was developed on a sample of alcoholics with histories of drunk driving arrests and of higher social stability than those reported

in other studies. Therefore, some of the variables in the model may be inappropriate for other populations.

The fact that the model developed in this study has only a 60 - 65 percent correct classification rate suggests that there are some powerful unknown factors influencing alcoholism. In spite of the myriad of studies that report on various causes of alcoholism or on the factors influencing drinking habits of alcoholics, a parsimonious and heuristic model that encompasses the multidimensional influences on alcoholism is still elusive.

APPENDIX A

RELEASE OF INFORMATION

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

Office of Substance Abuse Services

Client Information Release Authorization

I, _____, hereby authorize _____Results, Inc._____
    (client's name)   (program name)

its director or designee, ____Mitchell Solomon____, to release information contained in my
                          (program director or designee)

client records to the individuals or organizations and only under the conditions listed below:

1. Name of person(s) or organization(s) to whom disclosure is to be made:_____

       Mitchell Solomon/University of Windsor

2. Specific type of information to be disclosed: Demographic, problem drinking, treatment attendance, psychopathology measures (treatment data form), and follow-up questionnaire

3. The purpose and need for such disclosure: Research

4. This consent is subject to revocation at anytime except in those circumstances in which the program has taken certain actions on the understanding that the consent will continue unrevoked until the purpose for which the consent was given shall have been accomplished. However, any consent given under Subpart C, Federal Register, volume 40-number 127, July 1, 1975, shall have a duration no longer than that reasonably necessary to effectuate the purpose for which it is given.

5. Without expressed revocation this consent expires (Date) _____

6. Information will be reported only as group data. Data collection forms will be destroyed upon completion of the research project.

<table>
<tr><td>Witnessed By</td><td>Client's Signature</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Date Witnessed</td><td>Date Signed</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td>Signature of Parent or Guardian (if client is a minor)</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td>Date Signed</td></tr>
</table>

This client information release authorization form is prepared by the Office of Substance Abuse Services in accordance with the authority specified in Public Act 56 of 1973. This form is in compliance with Title 42 the Code of Federal Regulations, Part II.

MDPH:OSAS:Licensing
7/75

APPENDIX B

DEBRIEFING SHEET

THE STUDY

Research has shown that in spite of the evidence that many types of alcoholism treatment do work there is also overwhelming and widely acknowledged evidence that relapse occurs with significant frequency. At the same time, there is a sufficiently large body of data to suggest that some alcoholics may return to controlled drinking for extended periods of time without relapse. If an alcoholic's potential for successful controlled drinking, abstinence, or relapse can be predicted then treatment may be individualized and applied with greater efficiency and effectiveness than is currently practiced.

The present study is an attempt to discover what combination of variables measured before and during treatment are associated with abstinence, controlled drinking, or relapse after treatment. During your follow-up interview current alcohol consumption and associated problems were measured so that the following drinking patterns could be determined:

1. Abstained: Six months or more of total abstinence.

2. Controlled drinking: Some drinking during the past six months and meet all of the following criteria during the 30 days prior to the last drinking:

   a) Less than 3 ounces average daily alcohol consumption.
   b) Typical quantity on any drinking day less than 5 ounces.
   c) No tremors.
   d) Less than 3 episodes of blackouts, missing work, morning drinking, missing meals, and being drunk.

3. Relapsed: Failure to meet criteria for abstained or controlled drinking.

   The variables taken from your clinic records include the following:

1) Demographic and social stability: Age, race, marital status, religion, education, employment status, occupation, and income.

2) Alcohol consumption.

3) Physical/clinical symptoms (e.g., cirrhosis, pancreatitis, hypoglycemia, etc.).

4) Behavioral Impairment Index: A measure of severity of impairment resulting from alcoholism (e.g., number of days "drunk", had blackouts, or had tremors). -

5) MacAndrew Alcoholism Scale: A scale of the Minnesota Multiphasic Personality Inventory (MMPI) which measures a general trait associated with a history of or current substance abuse.

6) Michigan Alcoholism Screening Test: A screeening test which measures the presence or absence of significant symptoms of alcoholism.

7) Previous treatment: Number of times admitted to previous inpatient and outpatient treatment, number of days in previous inpatient treatment, and number of weeks in previous outpatient treatment.

8) Amount and duration of treatment: Number of weeks enrolled at Results, Inc., number of weeks during which any treatment sessions were attended, percentage of attendance (ratio of weeks of attendance over weeks enrolled x 100), number of individual and group therapy sessions, number of AA meetings attended, number of days antabuse was taken.

9) Psychopathology: Your scores on the Minnesota Multiphasic Personality Inventory (MMPI) are used as measures of psychological adjustment problems (e.g., depression, anxiety, defensiveness, psychosis).

Thank you again for volunteering your time to participate in this study. When the research is completed the results will be forwarded to you.

APPENDIX C

FOLLOW-UP QUESTIONNAIRE

FOLLOW-UP QUESTIONNAIRE

Client No.:
Date:

1. How long has it been since you
   last had an alcoholic drink?

1-6 Days	. . . . .	1
7-29 Days	. . . . .	2
1-5 Months	. . . . .	3
6-11 Months	. . . . .	4
1-2 Years	. . . . .	5
Over 2 Years	. . . . .	6

2. During the 30 days prior to your
   last drink, on how many days did
   you drink any alcoholic beverages?   No. of Days _____

3. During these 30 days, on how many
   days did you drink beer, ale, or
   any other malt beverage?   No. of Days _____

4. On a typical day when you drank
   beer, ale, or any other malt
   beverage how much did you drink?

_____ Cans	x 12	oz. per can
_____ Bottles	x ___	oz. per bottle
_____ Six packs	x 12	oz. per can
_____ Glasses	x ___	oz. per glass
_____ Quarts	x 32	oz. per quart
_____ (other)____	x ___	oz. per unit

5. During those 30 days, on how
   many days did you drink any wine?   No. of Days _____

6. On a typical day when you drank
   wine, how much did you drink?

_____ Quarts	x 32	oz. per quart
_____ Fifths	x 26	oz. per fifth
_____ Glasses	x ___	oz. per glass
_____ (other)____	x ___	oz. per unit

7. During those 30 days how many
   days did you drink whiskey, vodka
   gin, or other distilled liquor?   No. of Days _____

8. On a typical day when you drank
   distilled liquor, how much did
   you drink?

_____ Quarts	x 32	oz. per quart
_____ Fifths	x 26	oz. per fifth
_____ Pints	x 16	oz. per pint
_____ Drinks	x ___	oz. per drink
_____ Shots	x ___	oz. per shot

The next few questions have to do with things that you may have experienced
during the 30 day period prior to your last drink:

9. During those 30 days, how many   No. of Days - _____
   did you have blackouts?

FOLLOW-UP QUESTIONAIRE

10.   During those 30 days, how many   No. of Days _____
      days did you miss a meal
      because of drinking?

11.   During that period, how many   No. of Days _____
      days did you miss work due
      to drinking?

12.   During that period, how many days   No. of Days _____
      did you have tremors or the
      "shakes"?

13.   During that period, how many days   No. of Days _____
      did you drink as soon as you
      awoke   in the morning?

14.   During that period, how many days   No. of Days _____
      did you get drunk?

APPENDIX D

TREATMENT DATA FORM

TREATMENT DATA FORM

I.D. No:

I. DEMONGRAPHIC AND SOCIAL STABILITY

1. Age (in years) _____

2. Ethnicity or Race:

   1=White   3=Hispanic   5=American Indian
   2=Black   4=Oriental   6=Other

3. Religion:

   1=Protestant   4=None.
   2=Catholic   5=Other
   3=Jewish

4. Marital Status:

   1=Never Married   4=Divorced
   2=Married/Cohabitating   5=Separated
   3=Widowed

5. Education (Highest Grade Completed in School) _____

6. Employment Status:

   1=Employed full-time
   2=Employed part-time
   3=Unemployed
   4=Retired/Disabled

7. Occupation:

   1=Professional/Mgr.   4=Skilled Crafts/Technical Worker
   2=Proprietor   5=Semi-skilled Worker
   3=Sales/Clerical   6=Unskilled/Laborer

8. Income last year:

   1=Less than $ 5,000   6=$20,000 - $24,999
   2=$ 5,000 - $ 8,999   7=$25,000 - $29,999
   3=$ 9,000 - $11,999   8=$30,000 - $39,999
   4=$12,000 - $14,999   9=$40,000 - $50,000
   5=$15,000 - $19,999   10=Over $50,000

II. MEASURES OF PROBLEM DRINKING

1. How long has it been since you last had an alcoholic drink?

1-6 Days	. . . . .	1
7-29 Days	. . . . .	2
1-5 Months	. . . . .	3
6-11 Months	. . . . .	4
1-2 Years	. . . . .	5
Over 2 Years	. . . . .	6

2. During the 30 days prior to your last drink, on how many days did you drink any alcoholic beverages?

   No. of Days _____

3. During these 30 days, on how many days did you drink beer, ale, or any other malt beverage?

   No. of Days _____

4. On a typical day when you drank beer, ale, or any other malt beverage how much did you drink?

_____ Cans	x 12	oz. per can
_____ Bottles	x ___	oz. per bottle
_____ Six packs	x 12	oz. per can
_____ Glasses	x ___	oz. per glass
_____ Quarts	x 32	oz. per quart
_____ (other) ___	x ___	oz. per unit

5. During those 30 days, on how many days did you drink any wine?

   No. of Days _____

6. On a typical day when you drank wine, how much did you drink?

_____ Quarts	x 32	oz. per quart
_____ Fifths	x 26	oz. per fifth
_____ Glasses	x ___	oz. per glass
_____ (other) ___	x ___	oz. per unit

7. During those 30 days how many days did you drink whiskey, vodka gin, or other distilled liquor?

   No. of Days _____

8. On a typical day when you drank distilled liquor, how much did you drink?

_____ Quarts	x 32	oz. per quart
_____ Fifths	x 26	oz. per fifth
_____ Pints	x 16	oz. per pint
_____ Drinks	x ___	oz. per drink
_____ Shots	x ___	oz. per shot

9. Quantity-Frequency index of average daily consumption of alcohol (QF) =

   _____

10. Index of typical Quantity of alcohol consumed per drinking day (Q) =

    _____

BEHAVIORAL IMPAIRMENT INDEX

On how many days out of the past 30 did these occur?

1. Being drunk

None	=	0
1-4 Days	=	1
5-10 Days	=	2
11 or more	=	3

2. Alcoholic "blackouts"

None	=	0
1-2 Days	=	1
3-5 Days	=	2
6 or more	=	3

3. Had tremors or "shakes"

None	=	0
1-2	=	1
3-5	=	2
6 or more	=	3

4. Drinking on awakening or morning drinking

None	=	0
1-4	=	1
5-10	=	2
11 or more	=	3

5. Missed work or other activities due to drinking

None	=	0
1-2	=	1
3-5	=	2
6 or more	=	3

6. Missed a meal due to drinking

None	=	0
1-4	=	1
5-10	=	2
11 or more	=	3

7. Arguments or fights with others while drinking

None	=	0
1-2	=	1
3-5	=	2
6 or more	=	3

8. Difficulty sleeping

None	=	0
1-2	=	1
3-5	=	2
6 or more	=	3

9. Longest period of continuous drinking

Less than 6 hours	=	0
6-12 hours	=	2
more than 12 hours	=	3

10. Drank alone or with others

Always with others = 0
Usually with others = 1
Usually alone = 2
Always alone = 3

11. Longest period without drinking

12 hours or more = 0
Less than 12 hours = 2

12. Drank while on the job

Never = 0
1 day or more = 2

RAW SCORE _____

$$BII = \frac{RAW\ SCORE}{12} \times 10 = \underline{\hspace{2cm}}$$

MacAndrew Alcoholism Scale (MAC):

RAW SCORE = _____
T SCORE = _____

Index of Adverse Health Consequences (AHC):

___ Cirrhosis of the Liver
___ Alcoholic Hepatitis
___ Enlarged Liver
___ Fatty Liver
___ Pancreatitis
___ Chronic Gastritis
___ Hematological Disorders
(Anemia or Clotting Disorder)
___ Peripheral Neuropathy
___ Beriberi
___ Pellagra
___ Toxic Amblyopia
___ Wernicke-Korsakoff Syndrome
___ Alcohol Myopathy
___ Alcoholic Cardiomyopathy
___ Alcoholic Cerebellar degeneration
___ Nocternal Diaphoresis

___ Increased incidence of
infections
___ Hypoglycemia
___ Ulcers
___ Hypertension
___ High Blood Cholesterol
or Lipid Content
___ Diabetes
___ Repeated fractures or
broken bones.
___ Gout
___ Tachy Cardia
___ Cardiac Arrhythmias
___ Bruising easily
___ Hyperreflexia
___ Hyporeflexia
___ Medically advised to quit
drinking due to a physical
problem (not alcoholism)

AHC TOTAL _____

III. TREATMENT CHARACTERISTICS

IHF: Frequency of previous Inpatient/Hospital Treatment
IHL: Previous Inpatient/Hospital Treatment length (Days)
 OF: Previous Outpatient Treatment frequency
 OL: Previous Outpatient Treatment length (Weeks)

 DT: Duration of last Outpatient Treatment (Weeks)
 AT: Amount of last Outpatient Treatment (Weeks)
PAT: Percentage Attendance in Treatment
$$\frac{AT}{DT} \cdot x\ 100 =$$

ITS: No. of Individual Therapy sessions
GTS: No. of Group Therapy sessions
 AA: No. of AA meetings attended
 DA: No. of Days Antabuse was taken

IV. PSYCHOPATHOLOGY (MMPI)

SCALE	RAW SCORE	K	T-SCORE
L			
F			
K			
1			
2			
3			
4			
5			
6			
7			
8			
9			
0			
A			
R			
ES			

APPENDIX E

ALCOHOL CONSUMPTION:

QF AND Q

Alcohol Consumption

Two meaures of alcohol consumption are used in this study. The first is the NIAAA Quantity-Frequency Index of Average Daily Consumption (QF). This index is an estimate of the total volume of ethyl alcohol consumed per day by an individual during a specified period (30 days). Armor et al. (1981) compute the QF index by the following formula:

$$QF = \sum_{i=1}^{3} F_i Q_i C_i$$

· Where F = The fraction of days in the period when beverage i [beer, wine, liquor] was consumed,

Q = The quantity of beverage i consumed (in ounces) on a typical day when the subject drank beverage i,

C = The estimated proportion of ethanol content (by volume) in beverage i. (p. 273)

The second measure of alcohol consumption used in this study is an index of Typical Quantity (Q) consumed on a drinking day. Q is computed by the following formula (Armor et al., 1981, p. 269):

Q (typical quantity) = (QB·DB+QW·DW+QL·DL)/D

QB, QW, and QL are the typical quantities of beer, wine, and liquor consumed per day multiplied by the percentage of ethyl alcohol in each (.04 for beer, .12 for wine, .43 for distilled liquor). DB, DW, and DL are the number of days when beer, wine, or liquor was consumed. D is the total number of days when alcohol was consumed.

APPENDIX F

INDEX OF ADVERSE

HEALTH CONSEQUENCES

Index of Adverse Health Consequences

Information about each client's medical history (diagnosis and treatment of alcohol-associated illnesses) was gathered from self-reported medical histories taken at the time of initial intake and from a physical examination by the clinic staff physician during the week of initial intake. An Index of Adverse Health Consequences of Drinking (AHC) was constructed by scoring the presence of any instance of the following alcohol-related health problems based on the National Council on Alcoholism (1972) criteria:

1. Cirrhosis of the Liver
2. Alcoholic Hepatitis
3. Enlarged Liver
4. Fatty Liver
5. Pancreatitis
6. Chronic Gastritis
7. Hematological Disorders (Anemia or Clotting Disorder)
8. Peripheral Neuropathy
9. Beriberi
10. Pellagra
11. Toxic Amblyopia
12. Wernicke-Korsakoff Syndrome

13. Alcohol Myopathy
14. Alcoholic Cardiomyopathy
15. Alcoholic Cerebellar Degeneration
16. Nocturnal Diaphoresis
17. Increased incidence of infections
18. Hypoglycemia
19. Ulcers
20. Hypertension
21. High Blood Cholesterol or Lipid Content
22. Diabetes
23. Repeated fractures or broken bones

24. Gout

25. Tachycardia

26. Cardiac Arrhythmias

27. Bruising easily

28. Hyperreflexia

29. Hyporeflexia

30. Medically advised to quit
    drinking due to a physical
    problem (not alcoholism)

Scores on the AHC Index may vary from 0 to 30.

APPENDIX G

BEHAVIOR IMPAIRMENT INDEX

NIAAA Behavioral Impairment Index (BII)

The BII (Armor et al., 1978, p. 273) is composed of the following 12 items representing symptoms and functional impairment arising from alcoholism:

1. Number of days "drunk".
2. Number of days drunk in the morning or upon awakening.
3. Number of days meals were missed due to drinking.
4. Number of days had alcoholic blackouts.
5. Number of days had tremors or "shakes".
6. Number of days missed work or other activities due to drinking.
7. Number of days had arguments or fights with others while drinking.
8. Number of days had difficulty sleeping.
9. Longest period of continuous drinking (hours).
10. Pattern of drinking alone or with others.
11. Longest period without drinking (hours).
12. Number of days drinking on the job.

Items 1, 2, 3 are scored thus: no days = 0; 1-4 days = 1; 5-10 days = 2; 11 or more days = 3.

Items 4, 5, 6, 7, 8 are scored: no days = 0; 1-2 days = 1; 3-5 days = 2; 6 or more days = 3.

Item 9 is scored: less than 6 hours = 0; 6-12 hours = 2; more than 12 hours = 3.

Item 10 is scored: always drink with others = 0; usually drink with others = 1; usually alone = 2; always alone = 3.

Item 11 is scored: 12 or more hours = 0; less than 12 hours = 2.

Item 12 is scored: no days = 0; 1 or more days = 2.

The BII score is computed by taking the mean of the 12 item scores and multiplying by 10. The resulting score ranges from 0 to 29. An index score of 6 or higher is considered to reflect a substantial level of impairment (Armor et al., 1978, p. 90).

APPENDIX H

MICHIGAN ALCOHOLISM

SCREENING TEST (MAST)

MICHIGAN ALCOHOLISM SCREENING TEST (MAST) (Revised 11/14/77)
Melvin L. Selzer, M.D., Professor of Psychiatry
University of Michigan

Points   YES   NO

     0. Do you enjoy a drink now and then?   ____ ____

(2) *1. Do you feel you are a normal drinker? (By normal we mean
       you drink less than or as much as most other people). ____ ____

(2) 2. Have you ever awakened the morning after some drinking
      the night before and found that you could not remember
      a part of the evening? ____ ____

(1) 3. Does your wife, husband, a parent, or other near relative
      ever worry or complain about your drinking? ____ ____

(2) *4. Can you stop drinking without a struggle after one or two
      drinks? ____ ____

(1) 5. Do you ever feel guilty about your drinking? ____ ____

(2) *6. Do friends or relatives think you are a normal drinker? ____ ____

(2) *7. Are you able to stop drinking when you want to? ____ ____

(5) 8. Have you ever attended a meeting of Alcoholics Anonymous (AA)? ____ ____

(1) 9. Have you gotten into physical fights when drinking? ____ ____

(2) 10. Has your drinking ever created problems between you and
      your wife, husband, a parent, or other near relative? ____ ____

(2) 11. Has your wife, husband (or other family members) ever
      gone to anyone for help about your drinking? ____ ____

(2) 12. Have you ever lost friends because of your drinking? ____ ____

(2) 13. Have you ever gotten into trouble at work because of drinking? ____ ____

(2) 14. Have you ever lost a job because of drinking? ____ ____

(2) 15. Have you ever neglected your obligations, your family, or
      your work for two or more days in a row because you were
      drinking? ____ ____

(1) 16. Do you drink before noon fairly often? ____ ____

(2) 17. Have you ever been told you have liver trouble? Cirrhosis? ____ ____

*Alcoholic response is negative.

YES   NO

(2) 18. After heavy drinking have you ever had delirium tremens (D.T.s)
or severe-shaking, or heard voices or seen things that really
weren't there?   ____ ____

(5) 19. Have you ever gone to anyone for help about your drinking?   ____ ____

(5) 20. Have you ever been in a hospital because of drinking?   ____ ____

(2) 21. Have you ever been a patient in a psychiatric hospital or on
a psychiatric ward of a general hospital where drinking was
part of the problem that resulted in hospitalization?   ____ ____

(2) 22. Have you ever been seen at a psychiatric or mental health
clinic or gone to any doctor, social worker, or clergyman
for help with any emotional problem, where drinking was part
of the problem?   ____ ____

(2) **23. Have you ever been arrested for drunk driving, driving while
intoxicated, or driving under the influence of alcoholic
beverages?   ____ ____

               (If YES, how many times? ____)

(2) **24. Have you ever been arrested, or taken into custody, even for
a few hours, because of other drunk behavior?   ____ ____

               (If, YES, how many times? ____)

     **   2 points for each arrest

                                  TOTAL SCORE =   _____

APPENDIX I

ADDITIONAL TABLES

Table 13

Variable Intercorrelations

	ED	INCOME	QF	Q	BII	MAC	AHC	MAST	IHF
AGE	-.15*	.38**	.08	.07	.08	.08	.35**	.11	.66**
ED		.30**	-.25**	-.12	-.19**	-.17*	-.18*	-.26**	-.18*
INCOME			-.10	-.13	-.07	-.03	-.02	-.03	.02
QF				.62**	.65**	.28**	.11	.45**	.39**
Q					.44**	.18*	.06	.29**	.24**
BII						.17*	.11	.49**	.36**
MAC							.09	.26**	.28**
AHC								.18*	.15*
MAST									.66**

Continued .....

Table 13 Continued

	IHL	OF	OL	DT	AT	PAT	ITS	GTS	AA
AGE	.05	-.01	.10	.06	.08	.04	.01	.07	.06
ED	-.13	-.06	-.06	-.15*	-.10	.09	-.06	-.07	-.15*
INCOME	-.05	.08	.09	.06	.09	.07	-.05	.08	.01
QF	.36**	-.01	-.04	.02	-.01	-.11	.07	-.08	.31**
Q	.25**	-.05	-.06	-.01	-.04	-.10	-.07	.04	.19*
BII	.34**	.04	.01	.03	-.04	-.19**	-.03	-.02	.20**
MAC	.29**	.08	.13	-.07	-.10	-.10	-.10	.02	.20**
AHC	.15*	.06	.10	-.03	-.02	.05	.03	-.03	.11
MAST	.65**	.37**	.33**	.18*	.09	-.16	.12	.02	.51**

Table 13 Continued

	DA	L	F	K	Hs	D	Hy	Pd	MF
AGE	.02	-.10	-.09	.01	.15*	.07	.12	-.09	-.02
ED	-.19*	-.08	-.10	.14	-.20**	-.16*	-.03	-.14	.19**
INCOME	-.10	-.13	-.25**	.05	-.08	-.08	.04	-.15*	.05
QF	.23**	-.09	.20**	-.16*	.21**	.20**	.11	.28**	.08
Q	.08	-.07	.17*	-.14	.10	.17*	.07	.26**	.03
BII	.22**	-.15*	.30**	-.26**	.27**	.28**	.10	.31**	.16*
MAC	.09	-.23**	.15*	-.17*	.14	-.12	-.03	.20**	.01
AHC	.01	.05	.03	-.03	.31**	.13	.15*	.02	.02
MAST	.33**	-.25**	.36**	-.34**	.29**	.33**	.08	.41**	.12

	Pa	Pt	Sc	Ma	Si	A	R	Es
AGE	-.12	-.58	-.06	-.19**	.01	-.05	.11	-.04
ED	.07	-.12	-.11	.01	-.23**	-.11	-.03	.18*
INCOME	-.15*	-.14	-.20**	-.13	-.16*	-.12	-.02	.12

Continued ....

115

Table 13 Continued

	Pa	Pt	Sc	Ma	Si	A	R	Es
QF	.12	.22**	.19**	.18*	.10	.19**	-.02	-.14
Q	.15*	.20**	.18*	.18*	.11	.18*	-.09	-.05
BII	.22**	.35**	.30**	.16*	.19**	.30**	-.01	-.28**
MAC	.02	.11	.13	.45**	-.25**	.14	-.41**	-.17*
AHC	-.01	.08	.08	.05	.14	.06	.09	-.21**
MAST	.18*	.40**	.39**	.21**	.25**	.41**	-.04	-.30**

	IHL	OF	OL	DT	AT	PAT	ITS	GTS	AA
IHF	.92**	.16*	.10	.16*	.08	-.11	.08	.05	.47**
IHL		.16*	.10	.15*	.10	-.08	.07	.09	.44**
OF			.78**	.17*	.11	-.05	.13	.03	.18*
OL				.11	.10	.01	.07	.05	.18*
DT					.89**	-.04	.46**	.34**	.10
AT						.39**	.55*	.33**	.12
PAT							.24**	.06	.03

Continued ......

116

Table 13 Continued

	IHL	OF	OL	DT	AT	PAT	ITS	GTS	AA
ITS								-.54**	.14
GTS									-.03

	DA	L	F	K	Hs	D	Hy	Pd	MF
IHF	.33**	-.13	.31	-.29**	.25**	.25**	.02	.27**	.08
IHL	.36**	-.12	.32**	-.27**	.23**	.22**	.01	.24**	.08
OF	.16*	-.13	.73**	-.14	.04	.01	-.05	.04	.07
OL	.12	-.13	.04	-.09	-.01	.01	-.04	.067	.03
DT	.17*	.09	.01	-.02	.01	.04	-.02	-.01	-.03
AT	.23**	.15*	-.04	.01	-.08	-.03	-.09	-.11	-.04
PAT	.14	.12	-.11	.02	-.16*	-.14	-.14	-.22**	.03
ITS	.25**	.10	.02	-.06	.04	.06	.01	-.09	.08
GTS	-.02	.10	-.02	.04	-.11	-.07	-.11	-.01	-.16*

Table 13 Continued

	Pa	Pt	Sc	Ma	Si	A	R	Es
IHF	.15*	.31**	.37**	.26**	.14	.33**	-.07	-.23**
IHL	.19**	.30**	.37**	.26**	.15*	.32**	-.12	-.24**
OF	-.07	.11	.11	.18*	.06	.12	-.18*	-.04
OL	.08	.08	.07	.13	.05	.06	-.09	-.04
DT	-.04	.03	.03	.01	.10	.05	.06	.06
AT	-.09	-.05	-.05	-.08	.10	-.02	.06	.12
PAT	-.11	-.15*	-.12	-.15*	.01	-.12	-.02	.14
ITS	-.07	.04	.02	-.06	.18*	.06	.08	-.04
GTS	.01	-.07	-.04	-.02	-.06	-.05	-.04	.12

	DA	L	F	K	Hs	D	Hy	Pd	Mf
AA	.20**	.03	.22**	-.16*	.07	.14	.01	.22**	.14
DA		.04	.13	-.01	.07	.17*	.12	.15*	-.03
L			-.27**	-.40**	-.22**	-.13	-.04	-.33**	-.26**
F				-.50***	.59**	.50**	.28**	.67**	.33**

Continued ....

Table 13 Continued

	DA	L	F	K	Hs	D	Hy	Pd	Mf
K					-.43**	-.33**	.12	-.38**	-.22**
Hs						.60***	.60***	.51**	.33**
D							.51**	.60**	.31**
Hy								.38**	.32**
Pd									.36**

	Pa	Pt	Sc	Ma	Si	A	R	Es
AA	.11	.20**	.20**	.20**	.06	.18*	-.06	-.10
DA	.09	.12	.15**	.01	.13	.12	.07	-.03
L	-.21**	-.37**	-.35**	-.31**	-.13	-.42**	.26**	.18*
F	.68**	.76**	.87**	.51**	.46**	.72**	-.05	-.60**
K	-.34**	-.72**	-.66**	-.40**	-.52**	-.75**	.31**	.52**
Hs	.44**	.72**	.70**	.35**	.48**	.65**	.03	-.70**
D	.47**	.67**	.58**	.04	.64**	.64**	.24**	-.47**
Hy	.37**	.33**	.32**	.12	.13	.25**	.26**	-.30**
Pd	.60**	.67**	.69**	.38**	.37**	.66**	-.07	-.44**

Continued

Table 13 Continued

	Pa	Pt	Sc	Ma	Si	A	R	Es
Mf	.44**	.44**	.40**	.29**	.19**	.40**	-.05	-.25**
Pa		.62**	.67**	.37**	.29**	.60**	-.04	-.42**
Pt			.91**	.49**	.65**	.92**	-.08	-.69**
Sc				.59**	.57**	.87**	-.15*	-.69**
Ma					-.07	.48**	-.37**	-.33**
Si						.63**	.30**	-.50**
A							-.14	-.67**
R								.08

Note. ED = Education, QF = Quantity-Frequency Index, Q = Index of Typical Quantity, BII = Behavior Impairment Index, MAC = MacAndrew Alcoholism Scale, AHC = Adverse Health Consequences, MAST = Michigan Alcoholism Screening Test, IHF = Inpatient Hospital Frequency, IHL = Inpatient Hospital Length, OF = Outpatient Frequency, OL = Outpatient Length, DT = Duration of Treatment, AT = Amount of Treatment, PAT = Percent Attendance, ITS = Individual Therapy Session, GTS = Group Therapy Sessions, AA = Attendance, DA = Days Antabuse Taken, L = Lie, F = Frequency, K = Correction, Hs = Hypochondriasis,

Continued ....

120

Table 13 Continued

D = Depression, Hy = Hysteria, Pd = Psychpathic deviate, Mf = Masculinity-femininity, Pa = Paranoia,

Pt = Psychasthenia, Sc = Schizophrenia, Ma = Hypomania, Si = Social introversion, A = Anxiety,

R = Repression, Es = Ego strength.

* $\underline{p} < .05$

** $\underline{p} < .01$

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  manual of mental disorders (third edition): DSM III. Washington,
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- 122

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