ABSTRACT
        Recent research suggests that alcoholic inpatients'
performance on neuropsychological tests is predictive of their
drinking status following discharge from alcohol rehabilitation
programs, although no single test itself has been predictive of
relapse. This study seeks to develop a ecologically relevant memory
test that would predict relapse and could be easily administered to
alcoholic inpatients. Participants were 56 male veterans ranging in
age from 21 to 66 who were inpatients in an alcohol treatment program
which advocated abstinence. Participants completed the Product Recall
Test (PRT), an ecologically relevant test consisting of cut-out
magazine advertisements placed on cards to test memory recall. The
Memory-for-Designs Test (MFD) was administered as an ecologically
irrelevant test for comparison. The results indicated that
significantly more subjects who recalled less than or equal to
one-half of the PRT test items relapsed. The MFD test showed no
relationship to relapse. Poor performance on the ecologically
relevant test may be related to relapse rates because those
individuals with poor recall of real world items may be less socially
effective and therefore more subject to relapse. The pages of
references and statistical tables conclude the report. (ABL)

Ecological Relevance of Memory Tests

and the Prediction of Relapse in Alcoholics

Steve Sussman[1] and Robert G. Rychtarik[2]

VA Medical Center and University of Mississippi Medical

Center

Jackson, Mississippi

Kim Mueser and Shirley Glynn

Camarillo State Hospital

and

Donald M. Prue

VA Medical Center and University of Mississippi Medical

Center

Jackson, Mississippi

Running Head: Ecological Re.   ice of Memory Tests

Correspondence regarding this manuscript should be sent to:

Robert G. Rychtarik, Ph.D.

Alcohol Dependence Treatment Program 116B1

Veterans Administration Medical Center

Jackson, Mississippi   39216

Keywords: Alcoholism, Memory Tests, Neuropsychological

Testing, Ecological Relevance, Predicting Relapse

in Alcoholics.

Ecological Relevance of Memory Tests

and the Prediction of Relapse in Alcoholics

Steve Sussman, Robert G. Rychtarik, Kim Mueser,

Shirley Glynn, and Donald M. Prue

Abstract

Fifty-six males in an inpatient alcohol rehabilitation program were examined with two 10-minute memory tests: the Product Recall Test (PRT), designed by the authors to assess memory for familiar stimuli (assumed to be relatively high in ecological relevance), and the Memory for Designs Test (MFD; Graham & Kendall, 1960), a test of memory for novel patterns of stimuli (assumed to be relatively low in ecological relevance). Approximately 74% of subjects who recalled less than or equal to half the items of the PRT relapsed at 3 months compared to only 33% of the subjects who recalled more than half the items. Performance on the MFD was not related to relapse rate. PRT performance was almost as predictive of relapse at 3 months as aftercare attendance, and combining both of these variables further improved predictability. The results suggest that the familiarity of the stimuli employed in memory tests may be important in tapping cognitive deficits of alcoholics that place these subjects at increased risk for relapse. The implication of these findings for the time-effective identification of early relapsers from alcohol treatment programs are discussed.

Ecological Relevance of Memory Tests

and the Prediction of Relapse in Alcoholics

The performance of alcoholic inpatients on
neuropsychological test batteries has recently been found to
predict their drinking status following discharge from
alcohol rehabilitation programs (Abbott & Gregson, 1981;
Berglund et al., 1977; Gregson & Taylor, 1977; Guthrie &
Elliott, 1980; O'Leary et al., 1979; Walker et al., 1983).
These findings suggest that patients with cognitive
impairments may require novel interventions to overcome
their cognitive deficits in order to improve their treatment
outcomes (Goldman, 1983). However, studies in this area
have tended to rely on lengthy test batteries of
neuropsychological functioning which in the daily operation
of an inpatient alcohol treatment program may be
inconvenient to administer, score and interpret.

The utility of neuropsychological test batteries in
predicting alcohol relapse has been limited to the overall
index score, and no single test within a battery has been
significantly related to relapse (e.g., Berglund et al.,
1977; Guthrie & Elliott, 1980). One possible explanation
for the poor predictive validity of neuropsychological
battery subtests is their lack of "ecological relevance."
Goldman (1983) suggested that neuropsychological tests which
"closely match the behavioral requirements of the real
world" (p. 1052) would have better predictive validity for
alcoholics, than ecologically irrelevant tests. Thus, tests

of cognitive functioning that require skills utilized in the posthospital environment, such as memory for faces, (Becker et al., 1983), might better predict posttreatment adjustment among alcoholics than tests that employ novel or ambiguous stimuli. The neuropsychological tests used in the previously mentioned studies are relatively low in ecological relevance since they primarily tap visual-spatial memory for novel patterns or figures. For example, the Patterned Cognitive Impairment Test (Abbott & Gregson, 1981; Gregson & Taylor, 1977) requires subjects to remember the content and order of arrays of novel visual symbols presented sequentially, and the Brain Age Quotient Battery (O'Leary et al., 1979; Walker et al., 1983) consists of a series of tests of motor skills and visual-motor skills such as the Tactile Perception Test and the WAIS Block Design Test.

Ecologically relevant tests of cognitive functioning have not yet been used to predict relapse. In addition, currently developed ecologically relevant tests, while sensitive to cognitive impairments in alcoholics, are lengthy and complex to administer (e.g., Becker et al., 1983) or score (e.g., Gottschalk et al.; 1983). The present research was undertaken to develop a brief, ecologically relevant memory test that could be easily administered to groups of alcoholic inpatients, and to explore the relationship between this test and relapse following participation in an alcohol dependence treatment program.

The predictive validity of this test was compared with that
of an ecologically irrelevant memory test requiring the same
time to administer and score. Additionally, the relative
contributions of the ecologically relevant test and
aftercare attendance to the prediction of outcome was
assessed.

<div align="center">Method</div>

Subjects

Fifty-six male veterans comprised the study sample.
Subjects ranged in age from 21 to 66 years (mean = 47.1; SD
= 12.5) and reported drinking problem durations that ranged
from 1 to 45 years (mean = 14.6; SD = 10.9). The sample was
predominantly Caucasian (72%) with fewer Black (26%) and
Native American (2%) subjects. Completion of high school
was reported by 76% of the sample and 23% was employed at
the time of admission. Thirty-six percent of the sample was
married at admission. The average daily alcohol consumption
was an equivalent of 12.3 beers (SD = 6.7) reported over the
90 days prior to admission.

All subjects were inpatients in a 28-day alcohol
treatment program which emphasized a social learning
approach (Miller and Mastria, 1978) and advocated an
abstinence goal. Treatment program components included
alcohol education, self-management training, instruction in
problem solving skills, assertion training, leisure skills
training, vocational counseling, individual behavior
therapy, and aftercare.

Test Development

To develop a brief, ecologically relevant test, magazine advertisements (e.g., from "People"), which contained color photos and written labels of common products, were cut out and placed on white 4" by 6" index cards. A total of 10 categories of products (e.g., alcohol, motor oil, sports equipment), with four unique product items per category (i.e., a total of 40 product items all with different brand names), were collected. To create a test of free recall with minimal encoding demands and high ecological relevance the familiarity of the pool of 40 product items was first assessed. Product items were rated in random order, independently, by eight male alcoholic inpatients and eight male alcohol staff members. Raters indicated familiarity of the items on a Likert scale ranging from not familiar (0) to very familiar (2). The five product categories with the highest mean familiarity ratings were chosen for inclusion in the test. The product categories chosen, in order of familiarity were: alcohol, deodorants, cereal, soft drinks, and pick-up trucks. Familiarity was high for all the product categories, with mean Likert ratings ranging from 1.85 (pick-up trucks) to 2.0 (alcohol). These 20 product items were reproduced on slides, controlling for size and angle of presentation of the product. This test is referred to as the "Product Recall Test" (PRT).

The Memory-For-Designs Test (MFD; Graham & Kendall,

1960) was utilized as a brief, ecologically-irrelevant, comparison test. This test consists of 15 novel straight-lined drawings, printed in black on a white background, and usually requires between five and ten minutes to complete (Graham & Kendall, 1960).   It assesses visual memory-motor recall, similar to many of the tests composing the neuropsychological test batteries, and has been demonstrated to discriminate reliably between people differing in levels of cognitive functioning. These 15 items were also reproduced on slides to facilitate group testing.

Test Administration

The memory tests were administered to groups of eight subjects who were consecutive admissions to an inpatient alcohol treatment program. Tests were given in the 3rd week of inpatient treatment, after at least 3 weeks abstinence. Each group of eight subjects sat at tables facing a wall onto which the slides were projected. They were provided with pads of white paper and with a piece of 8-1/2" by 11" white paper. Subjects were informed that they would be given two tests, one which assessed visual-verbal memory and one which assessed visual-motor memory. They were first administered the PRT. Each slide was shown for 10 seconds (total presentation time was 200 seconds), and subjects were instructed not to write anything down until after all slides had been shown. Slides were shown in random order. Each page of the pad provided spaces to indicate the product type

(e.g., cereal) and brand name (e.g., Post). Subjects were
instructed to list in any order all the product items that
they recalled, using one sheet of paper per item, and
without looking back at previous items. The slowest subject
required 10 minutes to complete the PRT.

For the MFD test, each of the 15 slides was shown for 5
seconds in accordance with the test procedure. Subjects
were instructed to write down their responses (i.e.,
reproduce a figure from memory) after each slide was shown.
The slowest subject took 10 minutes to complete this test.

Manipulation Check

After each test was completed, the subjects'
familiarity with, and the visibility of, the PRT product
items and the MFD drawings were examined. All inpatients
reported being very familiar with and being able to see at
least 19 of the product items, and each item was recognized
and visible to at least 18 people. None of the subjects
reported being familiar with any of the MFD drawings and all
subjects reported being able to see all 15 drawings.

Test Scoring

The PRT was scored as follows. Each response was
scored as correct (score = 1) or incorrect (score = 0),
based on whether the judges could recognize the brand name
(e.g., Post) and product category (e.g., cereal, flakes).
Scoring time was about one minute per subject. The MFD was
scored according to the guidelines of Graham and Kendall
(1960), in which each response was given a score between

zero points (no errors) and three points (the figure is
rotated, grossly incomplete, and/or grossly distorted in
shape).

Both tests were scored by a psychology resident
assigned to the inpatient alcohol unit and a psychology
graduate student who had never seen the subjects and was
blind to the purpose of the study. Inter-rater reliability
correlations were high for both tests: .93 for the PRT total
score and .90 for the MFD total score. (N = 56 for both
tests).

Assessment of Drinking and Demographic Variables

Drinking-related behavior and dependence symptoms were
assessed using the Alcohol Use Inventory - General Scale
(AUI-G; Wanberg et al., 1977) and the Alcohol Dependence
Scale (ADS; Skinner & Allen, 1982), both of which were
self-report measures. Data were also collected on the
length of the drinking problem and average daily intake 90
days prior to admission (in 12-ounce beer equivalents), as
reported by the subject and his significant others.

Follow-up

Attempts were made to contact all 56 subjects by phone
3 months post-discharge. This time period was chosen
because relapse rates have been shown to level out at about
that time (e.g., Hunt et al., 1971). Furthermore, Abbott &
Gregson (1981) found that neuropsychological measures
significantly predicted relapse at 3 months following
discharge. The follow-up phone interviews were conducted by

the program evaluator who was blind to the purposes of the study. A standardized interview, based on the one used in the Rand Report (Polich et al., 1980) was used to evaluate the subject's drinking status and social functioning. Subjects estimated the number of drinking days and amount consumed on a typical drinking day for each month following their discharge from the treatment program. A similar interview was conducted with significant others to corroborate subjects' self-reports.

Aftercare sessions were scheduled every 2 weeks for the first 2 months postdischarge, and once every month for the next four months. Subjects were provided with this schedule of appointments at the time of discharge and were automatically reminded and rescheduled (via letter) if one appointment was missed without cancellation. Upon failing to report for two consecutively scheduled appointments, subjects were not reminded further. Aftercare attendance was recorded at the fifth scheduled appointment, 3 months postdischarge. This measure was a simple tabulation of whether the subject was actually present for the appointment or not.

Results

The Study Sample

Eighty-four percent of the original sample subjects (N = 47) were contacted at follow-up. According to Polich et al. (1980), and given the results of LaPorte et al. (1981), this is a more than sufficient proportion of the original

sample to draw conclusions unbiased by attrition.
Demographic characteristics for the dropout group are
displayed in Table 1.

Insert Table 1 about here

Abstinence Data

Total abstinence was used as the dependent measure for
these analyses since abstinence was the stated treatment
goal, and over 90% (N = 23) of those who resumed drinking
reported levels of alcohol intake approaching pre-treatment
levels by three months post-discharge. Of 47 patients who
were contacted 3 months after discharge, 22 abstained from
drinking (47%) and 25 (53%) did not. The drinkers did not
differ from the abstainers in any of the demographic or
pretreatment drink-related variables (all p's $>$ .05; Table
1).

Memory Test Analyses

Since none of the drink-related, or demographic
variables differed between the abstainers and the drinkers
at the 3-month follow-up period, these variables could be
ruled out as mediating any differences found in the PRT or
MFD scores. Differences between the abstainers and drinkers
on the MFD and PRT were examined with t-tests. To protect
against alpha inflation with multiple t-tests, the
Bonferroni Procedure (Green, 1978) was used. The overall
significance level of p $<$ .05 was divided by two (the

number of t-tests performed) so that only p values less than .025 on each t-test were considered significant.

Abstainers differed from drinkers or the PRT ($t(45)$ = 2.4, $p < .01$, one-tailed), with abstainers having better recall than drinkers (abstainers' mean score = 12.1, SD = 4.5; drinkers' mean score = 9.1, SD = 4.2). However, abstainers did not differ from drinkers on the MFD (abstainers' mean score = 7.1, SD = 5.8, non-abstainers' mean score = 8.8, SD = 8.4; $t(45)$ = 0.8, ns).

Different PRT cutpoints were evaluated to maximize discrimination between the abstainers and drinkers. Preliminary chi square analyses indicated that a cut-off score of 10 on the PRT most accurately discriminated the abstainers from the drinkers at the 3-month follow-up time ($x^2(1)$ = 7.77, $p < .005$). Using this PRT cut-off point, 70.2% of the subjects were correctly classified with respect to outcome status. Subjects with a score of 10 or below were at increased risk for relapse. Seventy-four percent of the subjects who had scor   ᴑw or equal to the cut-off relapsed, compared to only 33% of the subjects whose scores were above. Overall, the percentage of abstinent and nonabstinent subjects accurately classified was 72.7% and 68%, respectively. To further assess the predictive ability of the PRT, subjects' classification based on the PRT cut-off score (i.e. < 11 = 0, > 10 = 1) was entered into a logistic regression analysis (Harrell, 1983) with relapse (abstinent = 1, relapsed = 0) as the dichotomous dependent

14

variable.   The resulting regression model was highly significant (X^2 (1, N=47) = 8.01, p = .0047), and resulted in an R^2 of .12.   This statistic is similar to R^2 in multiple correlation analysis, but due to the nature of the dependent variable, R^2 in this case, represents the proportion of log-likelihood, rather than variance, explained by the model.

Aftercare Attendance

Preliminary analysis failed to demonstrate any significant association between PRT performance and aftercare attendance (X^2 (1, N=47) = 1.79, p = .18; phi coefficient = .19).   Since prior research has shown a strong positive relationship between alcohol treatment outcome and aftercare attendance (Ahles et al., 1983, Walker et al., 1983), the separate and combined effects of aftercare attendance and PRT classification were compared.   The percentage of subjects accurately classified based only on whether or not they attended their fifth aftercare appointment was 72.3%.   Overal 1, 71.4% of those subjects who attended this aftexcare appointment were abstinent.   On the other hand, only 26.9% of subjects who failed to attend this appointment were abstinent.   The predictive power of aftercare attendance was evaluated by entering attendance at the 3 month aftercare appointment (attendance = 1, non-attendance = 0) as an independent variable in a logistic regression analysis of relapse.   This aftercare attendance model was also highly significant in the prediction of

outcome (x^2 (1, $N = 47$) = 9.55, p = .002). The proportion of log-likelihood accounted for by aftercare attendance was 15%.

To assess the combined and relative contribution of the PRT and aftercare attendance both variables were entered simultaneously in a logistic regression analysis of relapse status. This combined model was highly significant (X^2 (2, N=47) = 15.77, p = .0004). When both variables were considered together the proportion of log-likelihood explained by the model increased to 24%, 12% above that explained when the PRT was considered alone, and 9% above that explained by the aftercare model alone. The combined predictive ability of the two variables is evident in the fact that 85% of the subjects who scored above 10 on the PRT and who attended aftercare appointments 3 months after discharge remained abstinent from alcohol, whereas only 13% of the subjects who both performed poorly on the PRT and did not attend 3-month aftercare appointments were abstinent (See Figure 1.). Importantly, both PRT performance (regression coefficient = 1.70, X^2 (1, N=47) = 5.69, p = .02, partial R^2 = .06) and aftercare attendance (regression coefficient = 1.88, X^2 (1, N=47) = 6.97, p = .008, partial R^2 = .08) were positively and significantly related to outcome, even when the effect of the other variable was controlled for. Hence, the PRT appeared almost equal to aftercare attendance in its predictive ability, and this could not be accounted for by any redundancy in the two

variables.

Insert Figure 1 about here

Discussion

The present study examined the relationship between the performance of alcoholics on two brief memory tests and their subsequent rate of relapse 3 months following their discharge from an inpatient alcohol treatment program. The Product Recall Test (PRT) was constructed to measure memory for familiar visual stimuli (commercial products), and significantly more subjects who recalled less than or equal to half the items on this test relapsed (74%) than subjects who recalled more than half (33%). In comparison, the Memory-For-Designs Test (MFD; Graham & Kendall, 1960), which measures memory for novel designs was not significantly related to relapse at 3 months. In addition, the PRT was almost as powerful as aftercare attendance in predicting relapse at 3 months (12% vs. 15% of log-likelihood accounted for, respectively), and the model combining both variables further improved the prediction (Figure 1).

The predictive utility of the PRT in contrast to the MFD suggests that ecologically relevant memory tests may be more appropriate than irrelevant tests for assessing cognitive deficits in alcoholics. The PRT requires that subjects encode, store and recall real-world items, which may lend it predictive strength. Subjects who have

difficulty recalling a variety of common products would also, presumably, have difficulty recalling daily activities and recent events. Such deficits might limit their variety of conversational topics and general fund of information and make them less socially effective individuals. To compensate for these inadequacies, they may resume drinking. Memory deficits for real world items among some alcoholics might also interfere with the amount or rate of skill acquisition in a rehabilitation program.

The PRT predicted relapse at a level comparable to several previous studies that employed lengthy neuropsychological test batteries to assess cognitive deficits (i.e., Berglund et al., 1977; Guthrie & Elliott, 1980; O'Leary et al., 1979; Walker et al., 1983). These findings, while in need of replication, suggest that memory tests that are simpler to score and administer, than full neuropsychological test batteries, may be useful in screening alcohol rehabilitation patients who are at high risk for relapse. This would facilitate individual programming by requiring a minimum of time and expertise from the staff providing the clinical services.

Several limitations to the present study must be noted. First, the PRT was designed to measure memory for familiar stimuli (commercial products), a skill that we assumed would be a behavioral requirement for functioning well in the real world. However, the actual need for this skill in the real world has not been assessed, and thus its validity as an

ecologically relevant test (Goldman, 1983) is unknown.
Other studies employing "ecologically relevant" tests have
also not addressed the relation between performance of these
tests and real world functioning (Becker et al., 1983;
Gottschalk et al., 1983). Even if the PRT did tap
ecologically relevant functioning, information is lacking
regarding its reliability and construct validity (e.g.,
specificity to alcohol-related dysfunction). Replication-
extension studies are needed that: (1) compare performance
on the PRT (or some analogous test) between alcoholics and
nonalcoholics; and (2) correlate PRT performance with
post-hospital functioning (e.g., conversational skills,
performance of daily tasks, etc.).

A second limitation is that the two tests in the
present study require different processing skills, and may
not be directly comparable. The PRT requires the recording
of verbal information, whereas the MFD requires the
reproduction of spatial material. There are, however, no
data to indicate that these differences in recall demands
are of any predictive importance. Another concern is that
the MFD has not been demonstrated to be more sensitive to
cognitive dysfunction in alcoholics than previous
neuropsychological tests employed in this line of research.
Studies that compare the PRT to a variety of time effective
but ecologically irrelevant tests are needed to make
stronger claims about relative predictive abilities.

Finally, we examined relapse rates over a 3-month

period, in contrast to some other studies that examined
longer outcome periods.   The subgroup of subjects who
performed poorly on the PRT were rapid relapsers, and the
longer range prediction of the PRT awaits further
investigation.   However, if these results are replicated
over a 3-month period, the existence of such a subgroup of
rapid relapsers identified by the PRT is potentially
relevant to treatment, whether or not the PRT also predicts
relapse at longer intervals.

Aftercare attendance was comparably predictive of
relapse as the subjects' performance on the PRT, in contrast
to Walker et al., (1984), who found that aftercare
attendance was a more powerful predictor of relapse at 6
months post-discharge than neuropsychological test
performance.   These findings suggest that individual
difference variables reflecting deficits in cognitive skills
utilized in the real world may operate as well as, and
independently of, compliance with treatment interventions to
determine the likelihood of a subject resuming drinking
after participating in an alcohol rehabilitation program.

In conclusion, the present study found that a brief,
ecologically relevant test of cognitive functioning (the
PRT) was predictive of relapse among alcoholics and that an
ecologically irrelevant test of similar length was not (the
MFD).   Furthermore, the prediction of relapse achieved by
the PRT was as strong as that reported for lengthy
neuropsychological test batteries in several of the previous

studies, although over a shorter period of time (3 versus 6
months).   Future steps towards reducing relapse rates may be
to involve high risk subjects in lengthier stays to allow
them more time to recover from their cognitive impairment
(Goldman; 1983) and to better learn self-management skills
necessary for abstinence.   Social learning interventions
might also need to be simplified and rely more on repetition
for high risk subjects than v :h inpatients with better
cognitive functioning.   Finally, new techniques may need to
be developed to enable such subjects to overcome or adapt to
permanent cognitive deficits, with possible attention to the
environment to which the subject returns.

References

Abbott, M. W., and Gregson, A. M.   Cognitive dysfunction in the prediction of relapse in alcoholics.   J. Stud. Alcohol 42: 230-243, 1981.

Ahles, T. A., Schlundt, L. G., Prue, D. M., and Rychtarik, R. G.   Impact of aftercare arrangements on the maintenance of treatment success in abusive drinkers.   Addict. Behav. 8: 53-58, 1983.

Becker, J. T., Butters, N., Hermann, A., and D'Angelo, N.   A comparison of the effects of long-term alcohol abuse and aging on the performance of verbal and non-verbal divided attention tasks.   Alcsm, Clin. Exp. Res. 7: 213-219, 1983.

Berglund, M., Leyonquist, n., and Horlen, M.   Prognostic significance and reversibility of cerebral dysfunction in alcoholics.   J. Stud. Alcohol 38: 1761-1770, 1977.

Goldman, M. S.   Cognitive impairment in chronic alcoholics. Am. Psychol. 38: 1045-1054, 1983.

Gottschalk, L. A., Eckardt, M. J., Hoigaard-Martin, J. C., Gilbert, R. L., Wolf, R. J., and Johnson, W. Neuropsychological deficit in chronic alcoholism: Early detection and prediction by analysis of verbal behavior. Substance Alc. Act./Misuse 4: 45-58, 1983.

Graham, F. K., and Kendall, B. S.   Memory-For-Designs Test: Revised general manual.   Percept. Mot. Skills 11: 147-188, 1960.   (Monograph Supplement 2-VII)

Green, P. E.   Analyzing multivariate data.   Hinsdale, IL:

The Dryden Press, 1978.

Gregson, R. A. M., and Taylor, G. M.   Prediction of relapse in
    men alcoholics.   J. Stud. Alcohol 38: 1749-1760, 1977.

Guthrie, A., and Elliott, W. A.   The nature and reversibility
    of cerebral impairment in alcoholism.   J. Stud. Alcohol 41:
    147-155, 1980.

Harrell, F. E., Jr.   The LOGIST procedure.   In SAS Users Group
    International Supplemental Library User's Guide (1983
    edition), Cary, NC: SAS Institute, Inc., 1983, pp. 181-202.

Hunt, W. A., Barnett, L. W., and Branch, R. S.   Relapse rates
    in addiction programs.   J. Clin. Psychol. 27: 455-456, 1971.

LaPorte, D. J., McLellan, A. T., Erdlen, F. R., and Parente, R.
    J.   Treatment outcomes as a function of follow-up difficulty
    in substance abusers.   J. Consult. Clin. Psychol. 49:
    112-119, 1981.

Miller, P. M., and Mastria, M. A.   Alternatives to alcohol
    abuse: A social learning model.   Champaign, IL: Research
    Press, 1977.

O'Leary, M. R., Donovan, D. M., Cheney, E. F., and Walker, R.
    D.   Cognitive impairment and treatment outcome with
    alcoholics: Preliminary findings.   J. Clin. Psychiat. 40:
    397-398, 1979.

Polich, J. M., Armor, D. J., and Braiker, H. B.   The course of
    alcoholism: Four years after treatment.   Report
    #R-2433-NIAAA, Santa Monica, CA: Rand Corporation, 1980.

Skinner, H. A., and Allen, B. A. Alcohol dependence syndrome: Measurement and validation. J. Abnorm. Psychol. 91(3): 199-209, 1982.

Walker, R. D., Donovan, D. M., Kivlahan, D. R., and O'Leary, M. R. Length of stay, neuropsychological performance, and aftercare: Influences on alcohol treatment outcome. J. Consult. Clin. Psychol. 51: 900-911, 1983.

Wanberg, K. W., Horn, J. L., and Foster, F. M. A differential assessment model of alcoholism: The scales of the alcohol use inventory. J. Stud. Alcohol 37: 512-543, 1977.

Footnotes

[1]Dr. Steve Sussman is now at the Health Behavior
Research Institute, University of Southern California, Los
Angeles.

[2]Reprint requests to Dr. Robert G. Rychtarik, Alcohol
Dependence Treatment Program 116B1, Veterans Administration
Medical Center, Jackson, Mississippi   39216.

Table 1

Demographic and Drink-related Characteristics
of Dropouts, Abstainers, and Drinkers

Characteristic	Dropouts (N = 9)	Abstainers (N = 22)	Drinkers (N = 25)	Differences between Abstainers and Drinkers
Number of Married Patients	1	10	7	$X^2(1) = 1.5, p > .10$
Race	7 Whites 2 Blacks	16 Whites 6 Blacks	18 Whites 6 Blacks 1 Native American	$X^2(2) = 1.1, p > .10$
Age: M(SD) in years	42.7(10.0)	47.2(11.4)	46.9(13.6)	$t(45) = 0.1, p > .10$
Number of Employed Patients	0	14	8	$X^2(1) = 3.3, p < .08$
Education: M(SD) in years	12.6(0.9)	12.8(1.7)	11.6(1.9)	$t(45) = 0.3, p > .10$
Length of Drinking Problem: M(SD) in years	19.2(8.8)	15.7(6.4)	13.6(13.9)	$t(45) = 0.7, p > .10$
Daily intake 90 days prior to admission: M(SD) in beer equivalents	8.6(4.6)	12.3(2.1)	11.3(0.6)	$t(45) = 0.4, p > .10$
AUI-G score: M(SD)	36.9(12.3)	31.6(13.9)	27.7(13.1)	$t(45) = 1.0, p > .10$
ADS score: M(SD)	22.3(12.2)	18.6(10.4)	17.7(9.4)	$t(45) = 0.3, p > .10$

Figure Caption

Figure 1. Relations between aftercare attendence, PRT

performance, and abstinence at 3 months.

Figure 1

ATTENDED
AFTERCARE

DID NOT
ATTEND
AFTERCARE

% ABSTINENT AT 3 MONTHS

100

50

0

(N)   (13)   (8)   (11)   (15)

PRT > 10

PRT < 11