# Patient Predictors of Alcohol Treatment Outcome: A Systematic Review


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## Abstract

**Aim**: To investigate predictors of alcohol use disorder treatment outcome.

**Methods**: A literature search for patient characteristics as predictors of alcohol use disorder treatment outcome yielded 63 published papers describing findings from 51 unique treatment outcome studies, with 31 variables reported in four or more studies. Variables were examined on three levels, identifying whether or not variables were significant predictors of drinking-related outcome in univariate analysis, multivariate analysis, and in multivariate analyses limited to studies including several “key predictors”. Also, a model was developed in order to predict total percentage of variance in treatment outcome accounted for in each study using each of the key predictors and a range of methodological factors.

**Results**: The most consistent predictors overall were dependence severity, psychopathology ratings, alcohol-related self-efficacy, motivation, and treatment goal. The two predictor variables most associated with greater variance accounted for in predictive models, when controlling for broader methodological variables, were baseline alcohol consumption and dependence severity.

**Conclusions**: Few predictor variables were examined in more than a third of studies reviewed and few variables were found to be significant predictors in a clear majority of studies. However a subset of variables was identified which collectively could be considered to represent a consistent set of predictors. Too few studies controlled for other important predictor variables. Attempts to synthesise findings were often hampered by lack of agreement of the best measure for predictor variables.


## Introduction

Prediction of treatment outcome provides the opportunity to deliver three key benefits to the clinical setting: identifying specific client groups achieving poorer outcomes, identifying areas to target in treatment, and improving accuracy of prognosis.

## Methods

### *Study identification and selection*

English-language original peer-reviewed findings (1977-2005) were reviewed. Study requirements included:

- participants must have undergone some form of treatment for their alcohol misuse
- studies must have attempted to predict drinking status at a point at least three months following the completion of treatment,
- prediction must have been based on data gathered prior to or during treatment.

### *Data Analysis*

Predictors of treatment outcome were reported on three levels, identifying whether or not variables were significant predictors of drinking-related outcome in univariate analysis, multivariate analysis, and in multivariate analyses limited to studies including a minimum of four strong predictor candidates (“key predictors”). Furthermore, the influence of different methodological parameters were examined by undertaking univariate and multivariate analysis with percentage of variance in treatment outcome accounted for as the dependent variable

### *References and Further Detail*


The poster summarises the following paper:
Adamson SJ, Sellman JD, Frampton CMA. Patient predictors of alcohol treatment outcome: A systematic review. Journal of Substance Abuse Treatment (in press).


> Prediction is very difficult, especially about the future
> Niels Bohr (1885-1962)

## Results

The literature search yielded 63 published papers describing findings from 51 unique treatment outcome studies. All potential predictor variables were initially examined. Only those reported for four or more studies were included in this review.

### *Predicting Outcome*

Consistency of ability to predict outcome is shown in Table 1 for the 31 identified variables in univariate and multivariate analysis, and limiting studies to those containing four or more “key predictors”.

**Table 1: Univariate & multivariate predictors of alcohol-consumption-related treatment outcome**

| | Univariate | | Multivariate | | All Studies | | Key Predictors (Multivariate) | |
|---|---|---|---|---|---|---|---|---|
| **Variable** | **Studies** | **% Sig** | **Studies** | **% Sig** | **Studies** | **% Sig** | **Studies** | **% Sig** |
| **Demographic and Social Functioning Measures** | | | | | | | | |
| Age | 10 | 30% | 21 | 19% | 26 | 27% | | |
| Employment | 7 | 57% | 16 | 38% | 19 | 47% | 12 | 42% |
| Gender | 6 | 67% | 16 | 44% | 18 | 50% | 12 | 33% |
| Marital status | 7 | 29% | 12 | 17% | 16 | 19% | | |
| Education | 7 | 29% | 12 | 33% | 15 | 33% | | |
| Socio-economic status/income | 2 | 50% | 7 | 57% | 8 | 50% | 5 | 40% |
| Ethnicity | 2 | 0% | 3 | 0% | 5 | 0% | | |
| Religion | 0 | - | 4 | 50% | 4 | 50% | 4 | 50% |
| Social functioning | 0 | - | 4 | 50% | 4 | 50% | | |
| Living circumstances | 1 | 0% | 4 | 25% | 4 | 25% | | |
| **Substance-related Measures** | | | | | | | | |
| Baseline alcohol consumption | 7 | 57% | 22 | 50% | 23 | 52% | 15 | 33% |
| Dependence severity | 5 | 60% | 21 | 43% | 23 | 52% | 11 | 55% |
| Treatment history | 7 | 29% | 13 | 46% | 15 | 47% | 9 | 44% |
| Other substance use | 2 | 50% | 11 | 45% | 12 | 42% | | |
| Alcohol-related self-efficacy | 5 | 100% | 9 | 89% | 9 | 100% | 4 | 100% |
| Motivation | 4 | 75% | 8 | 75% | 9 | 77% | 6 | 83% |
| Duration of alcohol misuse | 5 | 40% | 4 | 50% | 6 | 50% | | |
| Onset of alcohol misuse | 5 | 20% | 2 | 0% | 6 | 17% | | |
| Alcohol-related problems | 0 | - | 6 | 0% | 6 | 0% | | |
| Treatment goal | 2 | 50% | 5 | 0% | 5 | 80% | 4 | 75% |
| Craving/impaired control | 2 | 50% | 4 | 25% | 5 | 40% | | |
| Family history of Alcoho/Drug problems | 3 | 0% | 3 | 33% | 5 | 20% | | |
| Alcohol expectancies | 2 | 100% | 4 | 100% | 4 | 100% | | |
| **Other Clinical Meaures** | | | | | | | | |
| Psychopathology rating | 9 | 67% | 9 | 56% | 15 | 60% | 7 | 57% |
| Depression | 6 | 33% | 11 | 27% | 15 | 27% | | |
| ASPD/criminality | 5 | 40% | 7 | 29% | 12 | 33% | | |
| Neuropsychological functioning | 4 | 25% | 8 | 63% | 11 | 55% | 5 | 40% |
| Anxiety | 5 | 40% | 7 | 29% | 11 | 36% | | |
| Physical health | 1 | 0% | 5 | 40% | 6 | 33% | | |
| Personality | 3 | 100% | 4 | 100% | 5 | 100% | | |
| Other personality disorder or PD global rating | 5 | 40% | 2 | 50% | 5 | 40% | | |

### *Outcome Measure*

While choice of outcome measure was too diverse to be examined for the small sample of studies providing $R^2$ values, the frequency with which different outcome measures were associated with the various predictor values (i.e. the mirror image of the primary question for this review) was examined and showed that continuous consumption measures (drinks per drinking day, percent days abstinent, and combined consumption measures) were more often predicted by baseline variables than were categorical measures (usually abstinence status) or time to lapse/relapse measures.

## Conclusions

The most consistent univariate predictors of better treatment outcome were:

- lower baseline alcohol consumption
- lower dependence severity
- employment
- female gender
- lower psychopathology rating
- less treatment history
- better neuropsychological functioning
- higher alcohol-related self-efficacy
- higher motivation
- higher socio-economic status/income
- treatment goal of abstinence
- greater religiosity.

- When key predictors were combined into multivariate analyses, baseline alcohol consumption and gender showed substantial reductions in predictive consistency while the remaining variables were not greatly affected.
- The most consistent predictors overall were dependence severity, psychopathology ratings, alcohol-related self-efficacy, motivation, and treatment goal.
- Stronger predictive models were developed in studies not limited to those meeting criteria for alcohol dependence, including variables measured after baseline, and with mixed gender samples
- The two predictor variables most associated with greater variance accounted for in predictive models, when controlling for broader methodological variables, were baseline alcohol consumption and dependence severity.
- Few predictor variables were examined in more than a third of studies reviewed and few variables were found to be significant predictors in a clear majority of studies. However a subset of variables was identified which collectively could be considered to represent a consistent set of predictors.

### *Predicting Prediction: Associations with Total Variance Accounted For*

Amongst studies reporting on the predictive power of the models developed, the total percentage of variance accounted for varies widely from $R^2$=0.03 to $R^2$=0.62, with a mean $R^2$=0.30.

In total, 21 studies with 41 $R^2$ values were available for analysis. Associations between these and a number of methodological factors are summarised in Table 2.

**Table 2: Methodological variables predicting percentage variance accounted for ($R^2$) in multivariate models of alcohol treatment outcome**

| Variable | *T* | *R* | *p* |
|---|---|---|---|
| Alcohol dependent only | -3.93 | | .000 |
| Inpatient only | -3.42 | | .001 |
| Mixed gender | 3.00 | | .005 |
| Including variables measured after baseline | 1.69 | | .099 |
| Sample size | | -.244 | .124 |
| Treatment completers only | -1.00 | | .310 |
| Follow-up rate | | -.137 | .394 |
| Publication date | | .095 | .556 |
| Follow-up interval | | -.067 | .679 |

Entering the four variables significant to p<.10 into a conditional stepwise regression produced a model accounting for 43.6% of variance in $R^2$ values. This model indicated that samples not limited to those meeting criteria for alcohol dependence (β=.485, t=3.63, p=.001), including variables measured after baseline (β=.388, t=3.21, p=.003), and mixed gender samples (β=.274, t=2.07, p=.045) were all independently associated with more predictive models. The same solution was generated from both forwards and backwards conditional models.

When key predictors were examined, higher $R^2$ values were predicted in univariate analysis by studies using baseline alcohol consumption (t=5.38, p<.001), dependence severity (t=2.19, p=.034), treatment goal (t=3.09, p=.004), and those not using neuropsychological functioning variables (t=3.20, p=.003), while there was a trend for those studies not using psychopathology ratings (t=1.88, p=.069). Number of key predictor variables used in a study was positively correlated with total variance accounted for (r=.348, p=.026). These six variables and the four p<.10 methodological variables were entered into stepwise conditional regression models. In the backwards conditional model $R^2$=.533, from including variables measured after baseline (β=.340, t=2.81, p=.008), baseline alcohol consumption (β=.555, t=5.01, p<.001), not using a psychopathology rating (β=-.299, t=-2.46, p=.019), and dependence severity (β=.236, t=2.15, p=.038). In the forwards conditional model $R^2$=.397 from baseline alcohol consumption alone (β=.642, t=5.23, p<.001).