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Personality Traits and Relapse Rates:

A Survival Analysis

by

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A Thesis Submitted in Partial Fulfillment of the  
Requirements for the Degree of Bachelor of Arts

With Honors in Psychology from the

University of Michigan

2009

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## Abstract

The Five-factor model of personality has been applied to the clinical alcoholic, finding that alcoholics, on average, have high Neuroticism, low Agreeableness, and low Conscientiousness when compared to established norms. The current study asks how personality traits, as measured by the NEO Five-factor inventory, influence relapse rates using survival analysis to analyze the day-to-day drinking behaviors of 364 alcohol dependent subjects over a two-year span. In contrast to the small amount of literature on personality and relapse, the current study does not find support for my hypothesis that Neuroticism and Conscientiousness predict relapse -- as univariate predictors or within multivariate models. The statistically derived facets also fail to consistently predict relapse in a similar manner. Treatment site and some other clinical and demographic variables do significantly predict relapse, representing four themes: maturity, treatment effect, severity, and taking action to change. This study is the first to use a quantitative drinking behavior to test the predictive power of personality with survival analysis, and, in turn, offers some insight into the workings of relapse through its quantitative rigor. I discuss ways in which these overwhelmingly nonsignificant personality results add depth to current knowledge on the nature of personality and relapse.

## Personality Traits and Relapse Rates:

### A Survival Analysis

Personality constructs have long been investigated in relation to alcoholism, mostly in the context of describing the cross-sectional personality trends of clinical alcoholics or understanding personality-based predisposition to alcoholism (Barnes, 2000). Some studies have directed this effort to the influence of personality traits on recovery (e.g., Bottlender & Soyka, 2003; Fisher, Elias & Ritz, 1998). Using survival analysis techniques, this study will investigate the predictive effects of personality constructs on one aspect of the recovery process, i.e. relapse behavior.

I will begin this study with an introduction to the literature associated with personality and alcoholism, focusing primarily on studies that have investigated the presence and influence of Five-factor personality traits. After this review, I will describe in detail the methodology of the current study's observation of 364 alcohol-dependent individuals over a two-year span. From there, I will provide the cross-sectional personality makeup of the sample and interpret the survival analyses used in this study, analyzing the influence of personality traits and clinical/demographic variables on relapse drinking behavior over time. In the closing section of this study, I will discuss the results of these statistical analyses within the framework provided by the following literature review.

It has been noted from a clinical perspective that alcoholics seem to carry a reliable constellation of personality traits (Barnes, 1974; Blane 1968; Johnson, 2003). Many researchers have put forth energy to understand this link between personality and alcoholism, with the majority of research in this area concerning itself with either

comparing personality dimensions of alcoholics to non-clinical samples, mapping out the predictors of the development of alcoholism through prospective analysis, or using personality theory to create a taxonomic system.

Gordon Barnes (1974) makes an important distinction in the research of alcoholism and personality, proposing that "the alcoholic personality be broken down into two concepts – the clinical alcoholic personality and the prealcoholic personality." With this study, I heed Barnes's advice and build upon his delineation with a breakdown of my own. I suggest a conceptual division within the clinical alcoholic personality by considering the *cross-sectional* clinical alcoholic personality and the influence of personality *on recovery* in the clinical alcoholic as two related, but separate entities. Cross-sectional characteristics are considered, but the primary scope of this paper is the influence of personality on recovery, achieved by assessing the predictive power of baseline characteristics on relapse drinking behavior. In assuming questions about the clinical alcoholic, this study does not statistically evaluate the influence of prealcoholic factors on present circumstances of alcohol dependence.

The current study concerns itself with Five-factor personality theory operationalized mostly through the work of McCrae and Costa (e.g., Costa & McCrae, 1992a, 1985). Other conceptualizations of personality exist, as do typologies of alcoholics. These theories are certainly not incompatible with the Five-factor model and should be considered complimentary to it. In this spirit, I will provide a brief comparison among the personality theories that relate to alcoholism, using the Five-factor model as a foundation.

Contained in the Five-factor model are Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), and Conscientiousness (C). Lewis Goldberg's (1995) overview of the factors gives groundwork for understanding their meaning. For elaboration on what the each of five factors signify, a chart of Goldberg's relevant synonyms and antonyms for the five factors are supplied in Appendix A.

Of principal interest to an analysis of the cross-sectional personality traits in this sample are N (Neuroticism), C (Conscientiousness), and A (Agreeableness), which have been shown in the literature to be the most apparent in alcoholic populations when compared to established norms (e.g., Martin & Sher, 1994; McCormick et al., 1998). Drawing from the results of previous research, C and N are the focus of my predictions regarding personality and relapse to heavy drinking (Bottlender and Soyka, 2003; Fisher et al., 1998).

### *Personality and Alcoholism*

Many forms of personality constructs, investigative methods, and epistemic perspectives have been used to sharpen knowledge about personality and alcoholism. As often happens in any new area of research, the investigation of an initial question grows into many assorted questions. In the investigation of personality and alcoholism, a question that has stayed with the science from early on (Sutherland, Schroeder & Tordella, 1950), is uncovering the personality characteristics of the alcoholic. Mostly, these investigations have moved from attempts to find a definitive alcoholic character to looking at which personality traits seem to be more pronounced in samples of individuals with alcoholism when compared to established norms (Barnes 1980, Barnes 2000). The idea of a singular alcoholic personality has long been considered debunked, as

characterized by two early reviews (Sutherland et al., 1950; Syme, 1957 as cited in Blaine, 1968).

Although I do heed Barnes's suggestion to be mindful of the differences between the clinical alcoholic personality and the prealcoholic personality, it is still important to note what prealcoholic traits predict the development of alcoholism when considering how these factors predict the clinical alcoholic's later *recovery*. And although I heed my supplementary breakdown between the cross-sectional alcoholic personality and the alcoholic in recovery, the constitution of the cross-sectional clinical personality is important to note when considering how these factors predict movement toward recovery. Through the awareness provided by prealcoholic traits and cross-sectional clinical alcoholic traits, we achieve a rich context for looking at recovery. Do prealcoholic predictors persist to effect recovery? Do the same cross-sectional traits in the clinical alcoholic also predict relapse? Or do demographic, interpersonal, or other factors overwhelmingly account for recovery success?

Results from prospective studies of the prealcoholic personality consistently show the predictive importance of traits relating to impulsivity, sensation seeking, and emotional distress (Barnes, 2000; Shedler & Block, 1990). A recent review has confirmed the influence of traits related to impulsivity and sensation seeking, discussing some evidence for grounding these prealcoholic traits in genetic interactions (Schuckit, 2009). Personality traits particularly related to Neuroticism variably appear as direct predictors of the development of harmful drinking behavior in adolescents (Scheier, 1997).

As attention shifts to the individual in a current state of alcoholism, it seems that other traits become part of the personality constellation. Neuroticism and related trait constructs have consistently been reported as cross-sectional descriptors of the clinical alcoholic personality (e.g., Martin & Sher, 1994; McCormick et al., 1998). This perplexing transformation of Neuroticism's variable presence on the prealcoholic personality and its consistent presence in the clinical alcoholic personality has not been given much direct attention in the literature, but some articles have described this problem (Barnes, 1974; Martin & Sher, 1994).

### *Typologies of alcoholism*

Research concerning the clinical alcoholic personality runs parallel to another research stream: alcoholic types. A brief review of typological perspectives on alcoholism is presented here, and a more extensive review of this literature can be found elsewhere (see Meyer, Babor & Mirkin, 1983 for an extensive review; Sher et al., 1999 for a succinct review). The idea of defining the clinical alcoholic personality characteristics intertwines with efforts toward defining taxonomies of alcoholism, as these taxonomies are partly based on trends in behavior, much like personality theory.

A prominent typology that has accrued attention is the two-type theory, proposed and principally researched by C. Robert Cloninger, which he initially drew from a genetically based adoption study (Cloninger, Bohman & Sigvardsson, 1981). Many recent studies have used this concept, attesting to its plausibility (e.g., Falk et al., 2008; Hansen, 2007; Reulbach et al., 2007). Cloninger proposes two types of alcoholics: type I are late onset alcoholics with high levels of negative affectivity and type II are early onset alcoholics with low levels of negative affectivity (Cloninger et al., 1988). Type II early-

onset alcoholics have been shown to have higher levels of impulsivity (Don, Hulstijn & Sabbe, 2005). Significant relationships between this typology and treatment outcomes have been found. For example, von Knorring found that type I alcoholics were more significantly recovered (i.e. in the “ex-alcoholic” group) than type II alcoholics, despite no differences in length of alcohol abuse at baseline (1985).

Researchers have proposed alternate typologies to the Cloninger's. For example, MacAndrew relates evidence for primary and secondary alcoholics (MacAndrew, 1980), which contain similar qualities to type I and type II of Cloninger. His formulations have been linked to some personality measures (Allen, 1991). A recent dissertation validated a seven-part typology, while also relating aspects of the typology to Five-factor personality theory (Lalone, 2001). Research about alcoholism typologies can compliment alcoholism-personality research by giving layer of understanding to the results of the current study and other studies dealing with personality traits. For example, different alcoholic types may have differently influential personality traits. Using the language of the five-factor model, one type may have much lower levels of C than another type, which may have higher levels of N.

#### *Five-factor Theory and Alcoholism*

The Five-factor theory of personality is one of various that have been applied in research on alcoholism. Other measurements of personality can compliment meaning of the Five-factor model. In fact, some have embarked in active comparison of different models (Costa, Busch, Zonderman & McCrae, 1986; McCrae & Costa, 1985). Martin and Sher (1994) provide a summary of literature relating non-five-factor personality types and alcoholism.



Developed from the work of Donald W. Fiske (1949 as cited in Goldberg 1995), prominence of Five-factor personality research and theory has permeated many fields of study. Certainly, Robert McCrae and Paul Costa have produced much literature in support of the theory along with others (e.g. Bagby et al., 1999; Costa & McCrae 1997; McCrae & Costa, 1998). Along with this, McCrae and Costa have engaged in active debate concerning the existence of five factors in personality, noting empirically supported reasons through their research. They argue, for preview, that the traits are found cross-culturally and that evidence exists suggesting their heritability, therefore their biological basis (Costa & McCrae, 1992b). Eynsenk has responded to these claims with critiques (Eynsenk, 1992). To which, McCrae and Costa have argued back (Costa & McCrae, 1992c), illustrating the active debate in the field on what constitutes the human personality. Supporting their position, a number of studies have shown the viability of the Five-factor model from numerous perspectives (e.g., Johnson, 2000; McCrae et al., 2008, 2004; Piedmont et al., 2002). All in all, there exists evidence to support the empirical validity of the Five-factor perspective on personality traits, whether it is a determined finality or not.

*Cross-sectional assessment of the five factors.* Studies in the alcoholism-personality literature have taken up the Five-factor personality paradigm (e.g. Bottlender & Soyka, 2003; Fisher et al., 1998; Hopwood et al., 2007; Martin & Sher, 1994; Ruiz, Pincus & Dickinson, 2003; Stewart & Devine, 2000). A review of the select studies regarding the cross-sectional clinical alcoholic follows.

A study of 108 individuals with alcohol dependence in a private inpatient program found that subjects had statistically higher levels of N (86<sup>th</sup> percentile) and lower levels

of C (19<sup>th</sup> percentile), while O, E, and A all remained between the 41<sup>st</sup> to 63<sup>rd</sup> percentiles when compared to established norms (Fisher et al., 1998). Martin and Sher (1994) found significantly low levels of A in their sample of 468 young adults in addition to the same trend (high N and low C). A study of 2,676 substance abusers of the Cleveland Department of Veterans Affairs Medical Center further confirmed the pattern of high N, low C, and low A (McCormick et al., 1998). The McCormick et al. study also featured an investigation into specific sorts of substance abusers, finding that alcoholics, along with polysubstance abusers, had higher levels of N than those using cocaine only or using cocaine and alcohol, interpreting that alcoholism use may be associated with “more global maladjustment” (1998).

This trend of high N, low C and C has been found to predict alcohol-related problems in non-dependent populations. With college students, Grekin, Sher, and Wood (2006), found that high N, low A, and low C correlated with a count of DSM alcohol-dependence symptoms. Another study of alcohol use in non-dependent college students showed concordant results of high N and low C predicting drinking and alcohol-related problems (Ruiz et al., 2003).

Some studies have extended this question, showing the influence of N on non-substance, addictive behaviors. For example, McCormick (1993) found N to be correlated with the severity of a gambling problem. Bagby et al. (2007) found similar results with gamblers using the Five-factor model. They show that, although both pathological and non-pathological gamblers register high on sensation seeking, pathological gamblers have significantly higher levels of N and its facet scales relating to impulsivity and emotional vulnerability.

Overall, evidence suggests that, of the five factors, N, C, and A distinguish the clinical alcoholic from established norms and make up the most powerful traits of the five factors in predicting problem drinking and alcohol related problems in clinical and non-clinical populations. Observations regarding the presence of N seem to translate to the substance-less addiction of gambling as well.

### *Personality and relapse*

Few studies have taken up the specific question of personality as a predictor of relapse in alcoholics. In fact, Fisher, Elias, and Ritz (1998) claimed to be the first study to investigate the influence of baseline personality on relapse in alcoholics. They followed the drinking behaviors of 108 inpatient subjects over time and, using a form of survival analysis, predicted relapse using the five factors as measured by the NEO-PI-R. In order to facilitate these tests, Fisher et al. dichotomized the personality variables into high (above the mean) and low (below the mean) (1998). With these new dichotomized variables, the authors predicted the relapse rates using a rather subjective self-report measure of relapse:

An absolute criterion for relapse in terms of the frequency or amount of alcohol or drug use that was resumed was not employed. Rather, the definition of relapse was based on reported information, indicating that subjects were actively using alcohol or drugs again on an ongoing basis (Fisher et al., 1998).

Findings showed that subjects with high N and low C had significantly higher rates of relapse over the following twelve months than their dichotomous counterparts (Fisher et al., 1998). Equivalent tests of O, E, and A did not predict any significantly different relapse rates. Although there appears to be an initial support for a link between

personality measures and relapse, the statistical design of Fisher et al. (1998) did not allow for multivariate models since the authors employ a Cox  $F$  test (uncited in Fisher [1998]). This may have inflated the influence of personality variables on their statistical findings, as per their own warning at the end of the article.

Bottlender and Soyka (2003) have addressed this question of personality differences in relapse among alcoholics through the Five-factor personality framework as well. In their study, 72 alcoholics were located for follow-up from an intensive outpatient treatment program and were assessed to have remained *abstinent*, *improved*, or *relapsed* at six months and one year. Relapse was defined of having more than three “lapses” (drinking heavily for one week or more) or consistent drinking of three or more standard drinks for women and six or more standard drinks for men. The *improved* condition included those who have less than three lapses, or were drinking consistently under the cutoff described above. Also, a classification of *improved* called for no subjective reports of pathological drinking, physical, or psychiatric disorders due to alcohol. Those placed in the *abstinent* group had no "subjective reports of objective indications of alcohol consumption" (Bottlender & Soyka, 2003). When study participants were contacted for follow-up, the authors found that, according to their criteria, 9% had relapsed at six months and 13.5% had relapsed at one year. At both timepoints, t-tests were used to determine statistical differences between the *abstinent* and *relapsed* groups on a baseline measurement of the five factors (using the NEO-FFI). Analysis showed that, at six months, those who had *relapsed* had lower levels of C and E at baseline than those who were *abstinent*. N was not significantly different between the two groups at this time. At one year, *relapsed* subjects were now significantly higher on N and, again, lower on C

than *abstinent* subjects. At this second follow-up, E was no longer significant between the two groups. It is not clear what accounts for the flip of significance in six months versus one year on E and N; the authors do not speculate this matter.

An inquiry into non-Five-factor personality constructs shows a similar trend of variable significance. Sellman (1997) showed the personality trait, persistence, to be related to relapse versus non-relapse. Meszaros et al. (1999) used time of relapse to any drinking in a logistic regression (a similar test to those used by the current study). Among the personality traits they used as predictors, they found high levels of novelty seeking to predict relapse in the 388 male alcohol dependents. No personality measures were a significant predictor for relapse in females ( $n = 133$ ) in their study.

These results have not found consistent replication. Müller et al. (2008) found no evidence of significance in high N ( $p > .84$ ) and a marginal significance of low C in predicting relapse ( $p = .055$ ) in a sample of 146 alcohol-dependent patients. However, other measurements of personality were found to be significant predictors. Most notable to the authors was the influence of psychoticism as measured by Eynsenk's personality questionnaire ( $p < .001$ ). Defining relapse as any drinking at all, the researchers corroborated alcohol use using at least two information sources, pursuing a more methodologically rigorous paradigm than the relapse studies discussed above. These information sources included primary reports from the subject (via face-to-face or phone interviews) along with secondary verification from partners, relatives, friends, or clinical staff.

In summary, this review has shown that studies with subjective or broad measures of outcome find high N and low C to predict relapse, with low E exhibiting marginal

support. Among studies concerned with a more precise drinking behavior outcome (e.g., Meszaros et al., 1999; Müller et al., 2008), it appears that personality may not have as strong of a predictive power on relapse. Models of personality traits other than the Five-factor models have been successfully linked to drinking outcomes, following conceptually similar trends to the significant NEO Five-factor predictors.

#### *Survival analysis in alcoholism research*

A number of studies have employed survival analysis methods in different avenues of alcoholism research. As described earlier, Fisher et al. (1998) was the first study of its kind (and only, as far as this author knows) to use survival analysis to determine differences in relapse rates based on personality constructs. Diehl, Croissant, Batra, Mundle, Nakovics, and Mann (2007) used survival analysis to investigate gender effects on the course of recovery. Drawing from the same sentiment of the current study, Diehl et al. acknowledges the literature showing gender differences in prealcoholic pathways then stretches this knowledge in assessing treatment outcome (relapse or not), wherein they found no evidence of different relapse rates by gender (2007). Clark et al. (1999) used survival analysis to predict the initiation of substance use in adolescents by evidence of psychopathology. Sartor et al. (2007) performs a survival analysis to consider a parallel question to Clark et al. in their article.

Commentary on alcoholism research has supported enhancing the role of survival analysis. Stout and Papandonatos (2003) present survival analysis as being an underutilized longitudinal research method and note its practical power in the study of relapse phenomena. Collins and Flaherty (2006) echo the same conclusion. The personality-alcoholism pair seems like a great candidate for this method.

### *Hypotheses*

Based on the pervasive results in the cross-sectional studies of personality in samples of individuals with alcoholism, I hypothesized that this sample will have baseline percentiles reflecting high N, low C, and low A, relative to the established NEO-FFI norms.

The literature gives less concrete direction in the case of personality predicting relapse rates -- and even less when considering the effect of personality specifically within the survival analytic framework. I hypothesized that high N and low C would predict relapse in this sample. For the lower-order facets, I hypothesized that Self-reproach (a facet within N) would predict relapse to heavy drinking. The unmentioned factors and facets are investigated in an exploratory fashion.

As for the demographic and clinical variables, I reserved hypothesis. Results for clinical and demographic variables are not the main focus of the current study, but are nonetheless investigated for their predictive power. Pertinent to the central question of this study, significant demographic and clinical variables are controlled in order to retest the predictive power of the personality variables within the context of other significant predictors.

## Method

### *Study design*

The current study is a secondary analysis of data from the University of Michigan Life Transitions Study. The Life Transitions Study is an ongoing longitudinal study following 364 alcohol-dependent individuals from four treatment subsamples over a three-year period. In order to be included in the study, subjects needed to be DSM-IV

alcohol dependent as measured by the Structured Clinical Interview (SCID; First et al., 1997), be over 18 years of age, have no evidence of current psychosis, suicidality or homicidality, and be literate in English. The present analysis will concern itself with the first two years of longitudinal observation. Subjects were interviewed every three months and drinking data was collected using the Timeline Follow-Back method (Sobell & Sobell, 1992).

### *Sites*

*UMATS.* The largest of the four subsamples comes from the University of Michigan Addiction Treatment Services (UMATS, n = 154). UMATS provides an outpatient treatment program of various intensities promoting abstinence from alcohol. Treatment includes urging patients to attend AA, individual treatment, group didactic work, cognitive-behavioral intervention, and medication management. Motivational interviewing is also used when deemed beneficial. UMATS sponsors many weekly AA meetings on-site.

*VA.* Another portion of the sample was also recruited from an outpatient treatment program. These subjects received treatment through the Veterans Affairs Substance Abuse Clinic (VA, n = 80) in group and/or individual settings. Medication management is provided with treatment. It is understood among VA clinicians that a high percentage of their patients have comorbid psychiatric disorders in addition to alcohol dependence. AA attendance is recommended in treatment, and three weekly AA meetings are held on premises.

*DrinkWise.* Subjects were also recruited from a moderated drinking program called DrinkWise (DW, n = 34). This consultation program is designed to promote



awareness of drinking patterns through drinking diaries and other cognitive-behavioral strategies, including educations about alcohol and its effects. The program endeavors to help patients develop coping strategies and enhance their motivation to follow individualized drinking goals.

*COMM.* The community sample (COMM, n = 94) was recruited through local print media advertisements, which solicited study participants who thought they might have a drinking problem and were not currently in treatment. Individuals telephoned the Life Transitions Study and were screened over the phone prior to an in-person meeting.

#### *Site Differences*

Demographic and clinical differences are profound between the treatment site subsamples. Table 2 presents the descriptives of the whole sample and by site for gender, age, years of education, marital status, ethnicity, household income, and employment status. There are significant differences by site for each demographic variable presented in the table when tested via ANOVA and chi-square analyses. Especially pertinent to the concerns of this study are how these large differences across sites in demographics and clinical variables may impact predictors of relapse, which may suggest that treatment site itself may be an overwhelming predictor.

#### *Relapse to heavy drinking*

Relapse to problem drinking in alcoholics has been considered an important measure of success in research on recovery, but it is not without its critics (Yates, Reed Booth & Masterson, 1994). Consistently, lines of inquiry assume relapse to be a considerable predictor -- and often a measurement in itself -- of short-term recovery success. Some examples include clinical practice (Ellery & Stuart, 2007),

psychopharmacology research (Morley, 2006; Rothman, 2008), and even human laboratory paradigms (Koob, 2009). A section of alcoholism relapse research considers the idea of providing context of a drinking episode over time, rather than simply a single day's relapse (Stout, 2000). Many additional formulations of relapse exist (Babor et al., 1994).

Defining relapse proves especially crucial for survival analysis. Looking to the Alcoholics Anonymous model of relapse for guidance, we find that definitions of relapse vary from group to group. Along with this, AA groups often describe relapse as inherently difficult to define due to its highly individual and contextual significance (E. Kurtz, personal communication, January 9, 2009). The general notion in research has oscillated from reserving the label "relapse" for full-blown extended drinking episodes to a much more conservative any-drinking formulation (Donovan, 2005). I will consider what method of relapse best fits the resources and statistical methodology of the current study.

First, let us observe the self-reported drinking goals of this sample. The UMATS and VA outpatient treatment patients reside in programs with overt goals for abstinence, with which the majority of subjects agree. For the UMATS sample, 85.9% said "yes" or "maybe" when asked about their goal for abstinence. The VA sample has an even more overwhelming level of conscious desire for abstinence (92.6% said "yes" or "maybe"). When looking at the DrinkWise (42.9% said "yes" or "maybe") and community (52.7% said "yes" or "maybe") samples, one notices a stark contrast in motivation for complete abstinence. Figure 1 presents a graphical representation of the baseline responses to conscious motivation; notice how these percentages compare in the bar graphs for each

site. Also, the percentage of individuals saying "yes," they want to be abstinent, are significantly different across site,  $F(3, 360) = 28.467, p < .001$ .

This understanding led me to consider a measure for relapse that would account for controlled drinking, drawing from the sentiment expressed in Al-Otaiba et al. (2008), which showed the applicability of accounting for self-selected drinking goals other than complete abstinence in the context of recovery. For example, situations arise where an individual may feel comfortable drinking socially after a year of sobriety. Such an individual would subjectively consider this situation benign and not constitutional of relapse. Or an individual may simply not desire complete abstinence from the beginning. The Life Transitions Study data can make a distinction between drinking-at-all and drinking heavily, which would leave room for these cases of responsible, controlled drinking. Based on the methodology of studies investigating the efficacy of drug treatment in recovering alcoholics (Volpicelli et al., 1992; O'Malley et al., 1992), drinking heavily is defined as 5+ standard drinks on a drinking day for males and 4+ standard drinks for females (1 standard drink = 0.6 oz. of pure alcohol). There is some variation in this heavy drinking vs. controlled drinking distinction in more recent research (Morley, 2006), but I shall use with 5+ drinks for males and 4+ for females as the benchmark for this analysis.

### *Measures*

*Drinking behaviors.* The Timeline Follow-Back (TLFB) method allows for date-specific self-report data (Sobell & Sobell, 1992; Sobell, Brown, Leo & Sobell, 1996). Every three months, each subject completes retrospective drinking calendars with a trained interviewer. Participants are asked to describe their daily drinking amounts in the

last 90 days. The reliability of this self-report method in reporting has been confirmed (Carey, 1997; Sobell, Sobell, Leo & Cancilla, 1988). The TLFB method provides a statistic representing the percentage of heavy drinking days for each three-month period. Using these three-month intervals of time as the final dependent variable would make for a fairly rough estimate, so a more precise measure of *days* from baseline to first episode of heavy drinking was derived.

In order to draw this time measurement from the study resources, I first identified the Life Transitions Study timepoint where relapse to heavy drinking occurred. From there, I determined the specific date of relapse to heavy drinking by leafing through the applicable timeline follow-back calendar for each subject. As will be explained in more detail later, all subjects survival analysis experience one of two outcomes: the event of interest or *censorship* (lost to follow-up or lasting the observation period without experiencing the event). As I found, substantial number of subjects ( $n = 64$ , 17.6%) did not relapse to heavy drinking over the two years of observation. In this case, subjects were censored at expected two-year mark (730 person-days). In the case of the 71 participants (19.5%) censored prior to experiencing relapse (i.e. withdrawn, dead, or otherwise lost to follow-up), I found their last known date of sobriety from heavy drinking days. I subsequently created the person-days variable for each subject by calculating the difference between the date of event (relapse or censorship) and the baseline interview date (where time in days = 0).

Finding the precise date of event or censorship allows for this study to avoid the estimation of interval censoring by making time a continuous variable (Allison, 1984). When considering the imprecise nature of longitudinal follow-up (interviews rarely

occurring exactly in 90-day intervals) and the fairly wide intervals of time being considered, finding continuous days is much more precise than three-month intervals.

*Personality.* The NEO-FFI was administered to all participants at the baseline interview as part of a questionnaire. The NEO Five-Factor Inventory (NEO-FFI) is a shortened version of the longer NEO Personality Inventory (NEO-PI) developed by Costa and McCrae (1992a). This 60-question version has been used in a wide array of research contexts from creativity research (Furnham & Bachtiar, 2008), to measuring correlates to cortisol levels in public speaking situations (de La Banda et al., 2004). Analyses have shown the NEO-FFI to be a durable measurement of Five-factor personality constructs (Costa & McCrae, 1992a).

Saucier (1998) developed facet scales for the NEO-FFI using factor analysis. See Appendix B for a listing of the ten most correlated synonyms and antonyms for each facet, provided by Saucier (1997 as cited in Saucier, 1998). These facets provide a more nuanced look at the broad factors intended by McCrae and Costa in the NEO-FFI. Chapman (2007) empirically supported this additional method of scoring the 60-item questionnaire.

Table 1 provides a succinct look at the NEO descriptives found in the current sample. For each factor and facet, the mean, standard deviation, and Cronbach's alpha coefficient are presented. Each factor construct has a strong internal reliability with all alpha coefficients at a respectable level (factor alphas > .70). All of the facet alpha coefficients were .60 or above, except for the Unconventionality facet of O. Judging by these descriptives, the questionnaire factors and statistically derived facets appear statistically sound for pursuing data analyses.

More generally, the NEO questionnaires have been defended as an accurate reflection of personality in clinical settings. This defense attests to the practical significance of the Five-factor model and adds to the confidence one should have for the real-world applicability of these measures. In one study of subjects from an outpatient mental health program, the NEO-PI-R was administered to patients and verified by "cross-observer, cross-method, [and] cross-time analyses, revealing the durability of the items in a clinically significant way" (Piedmont & Ciarrochi, 1999). An article by Timothy Miller (1991) discusses the utility of the NEO in clinical practice. From his experience, a patient with high N generally has a heavy, prolonged disturbance, while one with low A is related to a poor interaction of the patient with the therapist, and a low C patient generally does less therapeutic work (1991). He also showed significant differences in all facet traits except for O between treatment seekers and non-treatment seekers (Miller, 1991).

*Assessment of alcohol dependence.* At baseline, all subjects were screened using the Structured Clinical Interview for DSM-IV (First et al., 1997). The earlier, DSM-III-R version, of the SCID has reasonable validity and reliability in substance abusers (Kranzler & Kadden et al., 1996). Although data are lacking for the DSM-IV version, it is recommended by Nunes and Hasin (1998) in their review of diagnostic instruments. The SCID symptom count gives a measure of alcoholism severity along with the age of alcoholism onset.

#### *Data analysis method*

*Survival analysis.* In this study, I use two tests that fall within the notion of survival analysis: the Kaplan-Meier test and Cox proportional hazards (Cox PH)

regression (Kleinbaum & Klein, 2005). Basically, survival analysis confronts problems where "the outcome variable of interest is *time until an event occurs*" (Kleinbaum & Klein, 2005). The event of interest used in the current study is the first instance that an individual experiences heavy drinking. With both of these statistical tests, one can observe the relative risk of relapse among subjects. With Kaplan-Meier, the risk of an event of interest occurring is estimated and compared among groups (Efron, 1988; Singer & Willet, 1991) while the Cox PH model performs a hierarchical linear regression with time until event as the dependent variable (Cox, 1972).

For this thesis, Kaplan-Meier test is used as a simple, robust way to compare the subsamples on relapse to heavy drinking. The rest of the analyses will use the Cox PH model, which allows for multivariate predictors. I shall present Kaplan-Meier tests using the chi-squared test statistic and Cox PH regression analyses using the Wald statistic. The Kaplan-Meier survival graph is used for nearly all of the Figures found in this study. Although this graphical method is related by name to the Kaplan-Meier test, it is simply a descriptive graph that allows for a visual comparison of groups in survival over time.

*Time and censoring.* In review, survival analysis uses time as the dependent variable of interest (Kleinbaum & Klein, 2005). For this study, time in person-days until relapse to heavy drinking is the specific dependent variable constituting the event of interest. I began by defining the beginning of time as entrance into the study, avoiding left-censoring (Singer & Willet, 1991). Since this value is not considered tied to a calendar date common across subject, I called entrance into the study time zero. Time to relapse over the survival period is consequently relative for each subject, so this measurement is in "person-days."

Censoring denotes a subject ending observation without experiencing the event of interest and, in fact, is the primary reason for the existence of survival analysis (Gill, 1992). In the context of the current study, this can happen in one of two ways: 1) lost to follow-up or 2) completing the two-year observation period without relapsing to heavy drinking.

*Statistical software.* Cox PH regression and Kaplan-Meier tests were completed using the drop-down dialog of SPSS v. 16.0. All other analyses were also conducted with SPSS v. 16.0. All Figures were produced using SPSS v. 16.0.

## Results

The whole sample had a mean survival time of 319 days and a median time to relapse of 182 days. Only 17.6% percent of the subjects in this sample remained abstinent over two years, following a similar trend shown in a recent NIAAA epidemiological study, which found 18.2% of their 43,093 subjects to remain abstinent at one-year follow-up (Grant & Dawson, 2006). See Figure 2 for a graph of the survival function for the entire sample and Figure 3 for a graph of the overall hazard function. Looking at the survival graph, we can see that, at the end of the two-year observation period, 82.4% had experienced relapse to heavy drinking or censorship at some point during the two years. The hazard function graph (Figure 3) shows how the risk of relapsing to heavy drinking increases over time with a negative acceleration.

### *Personality Variables*

*Cross-sectional comparison to personality norms.* For the whole sample, NEO-FFI five factors percentiles placed the sample in the expected directions compared to the established norms (Costa & McCrae, 1992a), mostly confirming my first hypothesis. This



sample agrees with previous research, and supports my hypothesis in having high levels of N and low levels of C. A placed below the 50th percentile, but not as drastically as hypothesized. The mean score for N placed in the 82nd percentile while C placed in the 16th percentile. A placed in the 36th percentile. Interestingly, E also placed at the 36th percentile and O placed rather high, at the 78th percentile.

*Factors in survival.* Cox proportional hazards for each of the five factors did not predict relapse to heavy drinking. Three different statistical approaches were utilized to assess this question: 1) testing the factors in univariate model for the whole sample, 2) controlling for the effect of site in a multivariate model for each factor, and 3) testing the factors in a univariate model for each site individually. In all cases, analyses found no support for the predictive power of the five factors,  $p > .1$ . This initial look at the independent predictive power of the five factors fails to confirm my second hypothesis that high N and low C would predict relapse to heaving drinking. In stride, these results also fail to replicate Fisher et al. (1998) and related studies.

*Facets in survival.* Saucier's (1998) facets were tested in the same three methods as the five factors: 1) in a univariate model for the whole sample, 2) controlling for the effect of site in a multivariate model for each facet, and 3) in a univariate model for each site individually. Method 3 found three site-specific predictors of relapse to heavy drinking. For the UMATS sample, Prosocial orientation, a facet of Agreeableness, was found to protect against relapse ( $B = -.09$ ,  $SE = .04$ ,  $Wald = 4.44$ ,  $p < .035$ ). Self-reproach, a facet of Neuroticism, predicted relapse for the VA sample ( $B = .06$ ,  $SE = .03$ ,  $Wald = 4.57$ ,  $p = .032$ ). In the COMM subsample, Orderliness, a facet under C, was protective against relapse ( $B = -.06$ ,  $SE = .03$ ,  $Wald = 3.91$ ,  $p = .048$ ). The sheer number

of tests performed largely inflates the type 1 (false-positive) error rate of this study, so these results do not hold much statistical power and certainly do not remain significant after Bonferroni correction.

Overall, strong support for the influence of personality variables as independent predictors on relapse was not found. I will revisit the NEO five-factors and the Saucier (1998) facets by controlling for significant demographic and clinical variables. This will allow for observation as to how personality traits may predict relapse after extracting some statistical variance.

#### *Demographic and Clinical Variables*

*Site differences in survival.* Being aware of significant demographic and clinical differences between subsamples, I used the Kaplan-Meier test to statistically compare relapse rates (survival) among the treatment subsamples. Testing for any differences in survival among sites, I found evidence that, indeed, the four subsamples differed in relapse rates ( $X^2 = 32.84, df = 3, p < .001$ ). Pairwise comparisons show that the UMATS subsample had significantly less risk for relapse to heavy drinking than the DW subsample ( $X^2 = 13.72, p < .001$ ) and the COMM subsample ( $X^2 = 28.26, p < .001$ ). The VA subsample had significantly less risk for relapse than the COMM subsample ( $X^2 = 8.26, p < .01$ ) Refer to Figure 4 for a Kaplan-Meier survival graph showing the cumulative percentage subjects surviving (without having experienced relapse to heavy drinking) over time for each subsample. Markings on the graph represent subjects who were censored in the analysis, i.e. withdrawn or otherwise lost to follow-up. Treatment subsample visually and statistically appears to be a powerful predictor of relapse to heavy drinking.

A series of Cox PH regressions were conducted with the demographic and clinical variables. First, I present multivariate Cox regressions for each demographic variable controlling for the effect of site. Second, I present multivariate Cox regressions for each clinical variable, also controlling for the effect of site. All categorical variables were dummy-coded automatically by SPSS for each applicable model. The significant predictors of these two series of tests will be compiled into a model with each personality factor and facet.

*Demographic variables.* Demographic variables investigated in the first wave of tests were drawn from the earlier discussion of significant site differences (presented in Table 2) Each demographic variable was tested while controlling for the effect of site to determine their unique effects beyond the influence of site. Thus, variables investigated were gender, age in years, education level in years, marital status, ethnicity, baseline employment status, and household income. Based on descriptives and survival graphs, marital status was collapsed into three values: never married, currently married or living with a partner, and no longer married (divorced, separated, widowed). For ethnicity, group identities were rationally collapsed into white, black, and other. Household income was evaluated as a six-level categorical variable.

Nonsignificant predictors of relapse to heavy drinking were gender, ethnicity, employment status at baseline, and household income, ( $ps > .2$ ). Significant predictors of relapse to heavy drinking were marital status (Wald = 16.60,  $df = 2$ ,  $p < .001$ ), and age ( $B = -.022$ ,  $SE = .006$ , Wald = 16.63,  $p < .001$ ). Education level in years was found to be a marginally significant predictor ( $B = -.049$ ,  $SE = .027$ , Wald = 3.46,  $p = .063$ ). Having more years of education and being older were protective factors against relapse. By

dichotomizing age above and below the sample mean (44.01 years) we see how older subjects have more success in survival when compared to younger via a Kaplan-Meier survival graph (Figure 4). Since marital status is categorical and was only tested as a block of dummy-codes, a single magnitude and direction of effect ( $B$  value) does not exist. View Figure 5 to see a Kaplan-Meier graph showing the influence of marital status over time on survival. Figure 5 shows how being married or currently living with a partner and having been married have similar trajectories, while never having been married has substantially worse survival over the two-year span.

*Clinical variables.* Clinical variables were considered in the next wave of Cox PH regressions. Like the series of demographic variables, each clinical variable was entered into separate multivariate models, each controlling for the effect of site. Included were three different measures of severity: 1) self-reported age of onset, 2) duration of alcohol dependence symptoms in years at baseline (i.e., self-reported age of symptom onset subtracted from baseline age), and 3) a count of DSM alcohol-dependence symptoms from the SCID baseline assessment. Treatment-related variables included prior Alcoholics Anonymous (AA) participation, treatment experience, and conscious motivation for abstinence. Previous AA participation is a yes/no response to the question "Have you ever participated in AA?" Previous treatment experience is also a yes/no response to a direct question. For conscious motivation, each subject was asked, "Do you want to be abstinent?" Responses were coded as Yes, No, Maybe, or Don't know. Maybe and Don't know were collapsed into a third group due to low sample sizes. See Table 3 for a report of descriptives for each of these variables.

Nonsignificant predictors of relapse to heavy drinking for the clinical variables were duration of alcohol dependence symptoms, the count of SCID alcohol dependence symptoms, and previous treatment experience,  $ps > .28$ .

Significant predictors of relapse to heavy drinking were self-reported age of dependence onset ( $B = -.022$ ,  $SE = .006$ ,  $Wald = 13.72$ ,  $p < .001$ ), previous AA experience ( $B = -.424$ ,  $SE = .150$ ,  $Wald = 7.97$ ,  $p < .005$ ), and baseline conscious motivation for abstinence ( $Wald = 7.28$ ,  $df = 2$ ,  $p < .05$ ). Developing alcoholism later in life was protective against relapse to heavy drinking. Figure 7 shows the Kaplan-Meier survival graph of alcoholism onset age split dichotomously at the mean ( $M = 28.50$ ). Having previous AA experience was protective against relapse to heavy drinking. For conscious motivation for abstinence, those who said "yes" and "maybe" or "don't know" performed better than those who said "no." Refer to Figure 8 for a visual representation of how the categories of conscious motivation compare in survival over time.

#### *Personality within a Multivariate Model*

I returned to the question of personality and alcoholism once more for a fourth statistical approach, controlling for the significant demographic and clinical variables of those presented above (see Table 4 for the first step of the model). Personality variables in the form of factors and facets all failed to show significance when each was tested separately as a second step of the model. According to these results, NEO-FFI personality factors and facets do not convincingly predict time until relapse to heavy drinking when controlling for significant demographic and clinical variables in a multivariate model.

Table 4 gives the results of the Cox PH regression on the seven significant clinical and demographic variables. Years of education and conscious motivation for abstinence

failed to show significance ( $ps > .09$ ) while controlling for site, age, age of alcoholism onset, AA experience, and marital status. Thus, it seems the most powerful predictors of relapse in this study were treatment site, age, age of alcoholism onset, AA experience, and marital status since these predictors remained significant in the final model.

## Discussion

### *Comparison to Norms*

As hypothesized, this sample mostly followed the cross-sectional trend of high N, low C, and low A, relative to established norms. A was marginally low when compared to established norms in the current study. This aspect of the clinical alcoholic seems to be well supported by many studies and has mostly continued to find support in the current analysis (Grekin et al., 2006; Ruiz et al., 2003; Martin & Sher, 1994; Barnes, 2000). The causal antecedent of this phenomenon has not yet been established fully, though some prospective analyses have found impulsivity, sensation seeking, and emotional distress to predict the development of alcoholism (Barnes, 2000; Schuckit, 2009; Shedler & Block, 1990). The question of how N fits into the picture is less clear, as related measures only variably predict drinking behaviors in adolescents (Scheier, 1997), but N seems to show up fairly strongly in the clinical alcoholic personality. This study do not explore the nature of the prealcoholic personality, but in supporting the previous literature, does give a strong basis observing relapse behavior in the current sample.

### *Personality and Relapse*

Shifting attention to how personality predicts the recovery of the clinical alcoholic, the current study found little evidence to support its role. These results failed to support my second hypothesis that high N and low C would predict relapse in the current

sample. The influence of personality constructs on the event of relapse to heavy drinking is a question that has not been given much attention in the literature prior to this study. The prior research suggested that personality constructs predict relapse to alcohol use. Most specifically, Fisher et al. (1998) showed evidence that split-mean levels of N and C predict significantly different relapse rates using survival analysis techniques.

The current study took this question to a more rigorous end by using a specific, well-defined quantitative measurement of relapse than previous research. In fact, it is the first to investigate the influence of personality on such a precise, objective outcome measure. In the case of the current study, the five factors did not predict relapse to heavy drinking on their own, on their own separately for each site, controlling for the effect of treatment site, or controlling for significant demographic and clinical variables,  $ps > .1$ . Thus, these results failed to support my hypothesis that high N and low C would consistently predict relapse. These results came as a surprise, considering the strong support of the literature surveyed earlier on personality and relapse (e.g., Fisher et al., 1998; Bottlender, 2003) and the influence of personality on other return-to-drinking measures (Ponzer et al., 2000). However, there exists some evidence suggesting that perhaps my hypothesis that N and C would predict relapse to heavy drinking was not laid on unequivocally solid ground (Meszaros et al., 1999; Müller et al., 2008).

The analysis did find site-specific, facet-level predictors of relapse in three of the four subsamples. For the VA subsample, the Self-reproach facet under N was a significant predictor of relapse, partially supporting my second hypothesis,  $p < .05$ . For the UMATS subsample, Prosocial orientation, a facet under A, significantly protected

against relapse,  $p < .05$ . For the COMM subsample, Orderliness was shown to significantly protect against relapse,  $p < .05$ .

Why significant facets and not factors? These facet-level predictors may uncover more precise aspects of personality that translate into behavior more clearly than the higher order traits. Ruiz et al. (2003) encountered a similar issue, expressing my same sentiment, while also addressing how incongruence between facets and factors may be specific to the type of personality measure used. The implications of these issues should urge researchers to pay attention to these facets. For example, a single facet could account for the entire effect of its higher-level factor. This is important to keep in mind, since considering the factor alone might be misleading.

Probably most important to consider is the sheer number of regressions presented in this study. Type 1 (false-positive) error increases with each additional test, so this study is substantially limited in the strength of conclusions that can be drawn from the significant facets. Because of these concerns, I shall consider the implications of the three significant facets only on a speculative level.

A possible explanation for the significant facets considers a multi-faceted vision of personality and relapse, devoid of a direct cause-effect relationship. High levels of psychiatric comorbidity are known to exist in the VA subsample, which may make for a more severe case of alcohol dependency. Perhaps soliciting for a more symbiotic interaction of Self-reproach, a trait full of self-doubt and guilt, and existing psychiatric comorbidity. Hand in hand with this idea, measures of guilt have been shown significantly greater in non-recovered versus recovered alcoholics (Ziherl, Travnik, Plesnicar, Tomori & Zalar, 2007). These interactions might create a ruminating flow of



guilt that would quickly wear on resistances to drinking and hinder the effectiveness of treatment support. In addition, not meeting abstinence expectations in treatment could augment personal guilt, feeding into the harmful ruminating flow.

Conversely, having a high level of Prosocial orientation could aid an individual in the use of treatment support systems for the UMATS subsample. The individual may more effectively access the support system inherent in these programs, which may, in turn, protect against relapse. A more prosocial orientation might allow an individual to engage in sharing the burden of their daily struggle for sobriety on the group. Supporting this finding, Noone, Dua, Markham (1999) showed how social support protected against relapse rates for alcoholics at one-year follow-up.

Orderliness, a facet under C, significantly protected against relapse in the community (COMM) subsample. Perhaps for those not currently in treatment, alcoholism may be more manageable when one has a clearer, more organized vision of life. To date, no research has been completed on this specific notion as it relates to relapse in alcoholism, but Craig and Olson (1988) do show how orderliness can increase after drug abuse treatment.

The bulk of these results, however, suggest that that the inherently broad nature of personality factors does not have a direct influence on a proximal event of first relapse to heavy drinking. Other studies have suggested that personality may in fact have an influence on relapse with more subjective outcome measures, but this does not seem to stand up to the objective rigor of the current study. Fitting with this notion, much of the research showcasing the predictive power of N and C in alcoholism severity and alcohol-related problems more broadly than a precise measurement of drinking behavior, which

may not give such a direct bearing to the current outcome measure of time in days until relapse to heavy drinking (Grekin et al., 2006; Ruiz et al., 2003).

From here, I will use two articles that have presented significant and impressive finding -- Fisher et al. (1998) and Bottlender and Soyka (2003) -- for concrete contrasts, permitting the elucidation of a number of concerns both statistical and methodological. These two articles are methodologically and conceptually similar to the current study, so they provide good reference points for anchored discussion. After those discussions, I will discuss more generally applicable concerns and evaluate the results from the series of demographic and treatment predictors.

#### *Methodological Comparisons*

*Comparison to Fisher et al. (1998).* As mentioned, the current study produced results largely in contrast to the survival analysis completed by Fisher et al. (1998). A graphical comparison of is provided in Figure 9. In this figure, the top image is a key survival graph of N split dichotomously at the mean from the Fisher (1998) study. Below that image is this study's replication produced using the UMATS subsample of the current study. Note the dramatic (and significant) differences between the high and low groups in the Fisher et al. (1998) results. The same differences are far from apparent (and are non-significant) in the UMATS subsample and all other subsamples constituting the current study. Also, comparisons of the high and low C groups from Fisher et al. (1998) to the UMATS and other subsamples of this study show the same incongruence found in the N comparisons presented in Figure 9.

One explanation for the current study's differences from Fisher et al. (1998) is that their inpatient sample may simply be a magnification of extreme ends on the N and C

scales, foreseeably causing dramatic differences in relapse rates. In contrast to Fisher et al. (1998), the current sample represents a more diverse populations hailing from many walks of life and in vastly different degree of dependency. One would expect five-factor percentiles presented in Fisher et al. (1998) to be equally different when compared to those of the current study. However, this theory does not hold when performing this comparison. In fact, the five-factor percentiles are strikingly similar. An inpatient population may somehow express the five factors in a qualitatively different way than the UMATS subsample, for example, but the current evidence shows no quantitative differences in any of the five factors from their sample.

Vastly different survival analysis results between the current study and Fisher et al. (1998) may also have to do with another aspect of the personality-treatment relationship. Perhaps the five factors act on relapse through mediating variables, such as treatment type to influence relapse. Or when outside of a well-controlled inpatient environment, as is the case for UMATS and all of the current samples, external factors may acquire much of the effect that would otherwise be attributed to personality. In this case, personality may still be important, but may only be reflected through such variables as age, conscious motivation, or severity of alcoholism. Supporting this notion, Loukas et al. (2000) show the importance of personality as a mediator in predicting alcohol-related problems. Mojtabai, Nicholson, and Neesmith (1997) demonstrated the importance of interactions in survival analysis, when they found a strong effect of age by living situation in recidivism to a psychiatric institute. These interaction perspectives can often lead to more nuanced findings, and are certainly worth inquiry -- especially when trying to understand how personality plays a role.

The Fisher et al. (1998) case is also a great example of the outcome subjectivity that exists in some of the literature on relapse in the clinical alcoholic. The outcome measure used in their study was a subjective definition of relapse that did not consider frequency or amount of alcohol use but was "based on reported information, indicating that subjects were actively using alcohol or drugs again on an ongoing basis" (Fisher et al., 1998). This imprecise measure could easily hold different meanings for both the researchers and the study subjects. Much variability divides these conceptual gaps, variability that may be susceptible to personality confound. These differences may very well account for most of the drastic differences between, for example, Fisher et al. (1998) and the current study.

As is the case with Fisher et al. (1998), subjective relapse measures in the literature tend to stand for a broader impression of a more severe relapse. Perhaps using a clinician's assessment of relapse holds a higher severity threshold, which may be necessary for deriving the influence of personality. Or upon a close consideration, it could be that these differences between subjective and objective measures simply stand for the need for objective drinking outcomes to represent more severe drinking behavior in order to find significance in personality measures.

*Comparison to Bottlender and Soyka (2003).* The Bottlender and Soyka (2003) study encounters similar concerns as Fisher et al. (1998) regarding outcome subjectivity. Along with being a broadly based self-report over a long period of time, their outcome measures represent quite severe drinking behavior (*relapsed* = drinking heavily for a week or more three different times). Under their definition of relapse only 9% had relapsed at 6 months and 13.5% had relapsed at 1 year. For comparison of percentages

meeting criteria, 49.8% of subjects had relapsed to heavy drinking at 180 days (~6 months) and 61.9% had relapsed to heavy drinking at one year. As discussed when comparing the current study's methods to those of Fisher et al. (1998), this may suggest that personality measures have more of an impact in differentiating mild to moderate relapse behavior from severe relapse drinking behavior.

Results presented in Bottlender and Soyka (2003) can also give special context to the meaning of a survival analytic perspective on relapse, like the perspective presented in the current study. They performed t-tests on two groups, those who had *relapsed* and those who were *abstinent* after six months and at one year, finding significant differences between the two groups on certain personality traits. This difference highlights an important point. A method such as Bottlender and Soyak's (2003) is not exactly translatable to survival analyses like the Cox PH regression and Kaplan-Meier test. Survival analyses constitute a prospective, rate-based inquiry (Allison, 1998), which lie in contrast to the follow-up outcome model demonstrated in the Bottlender and Soyka (2003) article. A main difference appears to be that survival analysis observes relapse rates over the breadth of time, while outcome-based t-tests consider only the culmination of the relapse process. More investigation into what these different methods mean would potentially benefit disparate literature on personality and relapse in alcoholism.

#### *General Concerns on Personality and Relapse*

Inconsistent alcoholism outcome measures are a large contributor to the hazy results derived from the personality-alcoholism research literature (Babor et al., 1994). Sharply defining the dependent variable in this research is paramount. From solid, mindful outcome indicators, research could flesh out the scope of questions concerning

the clinical alcoholic. Hand in hand with this concern, much of the research in the area of personality and relapse has varying definitions of relapse. This makes cross-study interpretation difficult, although efforts have been made to systematically review the evidence (Barnes, 1974; Sher et al., 1999). Alcoholism research has yet to move forward with a statistically rigorous focus on what relapse means in terms of drinking behavior (Babor et al., 1994; Yates et al., 1994), or a common language to describe how different relapse measures complement each other.

Heterogeneity of alcoholism may add further complexity to how personality factors act on recovery (Martin & Sher, 1994). Perhaps a misrepresentation takes place when we address this question with the basic assumption that the mean response is the most representative response. Research on multiple types of alcoholic would suggest this suspicion holds some bearing, but since the current sample does not have bimodal (or more) distributions of personality responses -- in fact the distributions are quite normal -- this idea becomes much more layered than a simple look. Research reviewed earlier has much bearing on this position (Cloninger, 1988; MacAndrew, 1980). It could be the case that, for example, Cloninger's late-onset type I alcoholic experiences and expresses personality traits differently than the early-onset type II alcoholic. These are concerns that deserve to be investigated, reinforcing similar conclusions made by McCaul and Monti (2003).

#### *Demographic and Clinical Predictors of Relapse*

The five strongest predictors of relapse for the current sample were site, age, age of alcoholism onset, marital status, and having attended AA or not. Taken as a whole, these variables seem to reflect a mixture of maturity, treatment effect, severity, and taking

action to change. Concerning gender's lack of significance in predicting relapse to heavy drinking, these results replicate those found in a survival analysis performed by Diehl et al. (2007).

Considering the influence of maturity on relapse rates, age was a significant predictor of relapse, with younger individuals at a higher risk for relapse. A number of other studies have encountered this finding (Bishop et al., 1998; Dawson, Goldstein, & Grant, 2007). Current findings regarding marital status also find considerable support, namely with a 2001-2002 NIAAA United States epidemiological survey (Dawson et al., 2006). Marital status could also be considered an aspect of maturity -- a separate, emotional maturity. Moreover, a literature review by Coombs (1991) suggests that married individuals are less stressed and happier than non-married individuals, especially for males, which may aid in protecting against relapse. Since this variable had an effect above and beyond the effect of age, it suggests there is more to marital status than just representing life duration. Not only did currently having a spouse or partner protect against relapse, but having had and lost a spouse significantly protected against relapse, all relative to never having a spouse or partner (see Figure 6 for the Kaplan-Meier survival graph of the marital status categories). This may suggest that the emotional maturity inherent in marriage or long-term committed relationships is what protects against relapse, not just the influence of physically having a partner.

The treatment site effect was quite strong and seemed to account for most of the differences in demographics and clinical variables as the sites differed so greatly (refer back to Tables 2 and 3 for a breakdown of the differences). As the presented results show, individuals participating in abstinence-based programs that urge AA attendance

(UMATS and VA) were at a lower risk of relapse to heavy drinking than the individuals in a moderated drinking program (DW) and those not currently in treatment (COMM).

Severity of alcoholism poses an intricate puzzle. The SCID symptom count did not predict relapse, but alcoholism age of onset did. Another age-related variable, length of dependent symptoms, was not a significant predictor, suggesting that having alcoholism for a longer period of time does not necessarily which leads an individual into remission. When considered alongside age itself (a significant predictor of relapse), these two results may suggest that being older does seem to protect against relapse independently of having alcoholism for a longer period of time.

Age of onset may signify some form of alcoholism severity that cannot be accounted for by the DSM-IV SCID criteria. The DSM-IV may even measure severity slightly different than age of onset or the SCID symptom count may be less accurate of a measure. In fact, Naltrexone drug treatment for alcoholism has been show to be more effective for Cloninger's early-onset, type II alcoholic, than the late-onset, type I alcoholic, (Falk et al., 2008) likely attesting to the aspects of physiological severity that early onset may hold. Cloninger's early-onset, type II alcoholic has also been shown to have more trouble in recovery (von Knorring, 1985).

By "taking action to change", I propose that having gone to AA represents a deeper motivation for abstinence or controlled drinking than what conscious motivation could account for, since conscious motivation failed to show significance in the full model. Although AA attendance can be court-mandated, attending AA is often a choice that requires a certain profundity in a motivation to heal. Having attended AA also strongly suggests that a person has made the step to admit that they have alcoholism.



Along with this notion, having had previous treatment experience did not significantly protect against relapse. Treatment experience may often be less of a personal choice, therefore less often an expression of personal desire, than the community-based AA meetings.

#### *Limitations and Future Directions*

The current study is equipped to address the question of personality traits predicting relapse as measured with an objective drinking behavior over two years, but additional research in this area is needed for a full picture of the recovery process.

First, using drinking behavior measure as a dependent variable holds some inherent limitations. In fact, some might argue that relapse to heavy drinking is somewhat limited in claiming a measurement of "recovery" (e.g., Yates et al., 1994). As has been much discussed, the outcome measure holds a critical role in the assessment of recovery from alcoholism. Especially noting how the current study utilizes a considerable (two-year) span of time, this is a critical measurement for an aspect of recovery, but it may be limited in representing other areas of recovery, such as life success and degree of alcohol-related problems. Also, this study is statistically limited in observing relapse episodes, as it treats the individual who relapses for one day only equivalent to the individual who relapses to drinking heavily for two weeks straight (see Stout, 2000).

Second, with such differences across the four subsamples, results may become muddled when attempting to apply to real-world experience. Especially limiting is the current study's lack of control over the range of individual treatment experiences within each subsample, forcing analysis of how personality fits within broad descriptions of treatment programs. Further research using survival analysis in this area would do well to

investigate how personality traits mediate or moderate treatment experiences on an individual level. An equivalent study outside of personality-alcoholism research on psychiatric recidivism poses a good model of mediation in survival analysis (Mojtabai et al., 1997). Having such differences across treatment sites does allow for a substantial level of context for these results, but along with the limitations addressed above, the entire sample is limited in representing individuals from a midwestern university town of the United States.

Third, the current study does not consider the influence of substance abuse comorbidity in the trajectory of relapse risk to alcohol. An NIAAA epidemiological study showed that 12.7% of subjects with an alcohol use disorder had a comorbid substance use disorder (Grant et al., 2005), and it is known that some subjects in the current study do use other substances. This study was limited in its ability to take into account the possible effect of non-alcohol substance abuse symptoms for these subjects. Future research could expand upon this question. Likewise, levels of non-substance psychiatric comorbidity were not considered.

Fourth, the current study used the 60-question NEO-FFI instead of the longer NEO-PI or NEO-PI-R, which might decrease its predictive power. A substantial decrease seems unlikely since the NEO-FFI has been verified statistically (Costa & McCrae, 1992a; Herzberg & Brähler, 2006). Besides, the nonsignificant effects of the personality (especially factors) are far from borderline significance in the current study, suggesting that use of the NEO-FFI may not be a huge limitation. Use of the Saucier (1998) facets would experience a more limiting reduction in predictive power, though these facets have been shown reliable and valid (Chapman, 2007).

The current study took a novel approach to the question of personality and relapse using survival analysis. Performing a more quantitatively rigorous design than preceding research, I found no evidence to support the claim that personality traits consistently predict relapse to heavy drinking behavior, which lies in apparent conflict with other studies in this area (Bottlender & Soyka, 2003; Fisher et al., 1998). Concerning direct benefit of this study to clinical practice, it resides as a warning against the over-reliance of baseline personality assessment as a tool for first-episode relapse prediction, directing clinicians to more pertinent predictors of drinking behavior. Treatment site, age, age of alcoholism onset, previous AA experience, and marital status were this study's main predictors of relapse to heavy drinking, suggesting a mixture of maturity, treatment effect, alcoholism severity, and behavior-manifest motivation as predictors of relapse to heavy drinking in individuals with alcohol dependence.

## References

- Allen, J. P. (1991). Personality correlates of the MacAndrew alcoholism scale: A review of the literature. *Psychology of Addictive Behaviors, 5*(2), 59-65.
- Allison, P. D. (1984). *Event history analysis: Regression for longitudinal event data*. Sage Publications Inc.
- Al-Otaiba, Z., Worden, B. L., McCrady, B. S., & Epstein, E. E. (2008). Accounting for self-selected drinking goals in the assessment of treatment outcome. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors, 22*(3), 439-443.
- Babor, T. (1994). Issues in the definition and measurement of drinking outcomes in alcoholism treatment research. *Journal of Studies on Alcohol, 12*(1), 101.
- Bagby, R. M., Costa, P. T. J., McCrae, R. R., Livesley, W. J., Kennedy, S. H., Levitan, R. D., et al. (1999). Replicating the five factor model of personality in a psychiatric sample. *Personality and Individual Differences, 27*(6), 1135-1139.
- Barnes, G. E. (1979). The alcoholic personality. A reanalysis of the literature. *Journal of Studies on Alcohol, 40*(7), 571-634.
- Barnes, G. E. (1980). Characteristics of the clinical alcoholic personality. *Journal of Studies on Alcohol, 41*, 894-910.
- Barnes, G. E., Murray, R. P., Patton, D., Bentler, P. M., & Anderson, R. E. (2000). *The addiction-prone personality*. Dordrecht Netherlands: Kluwer Academic Publishers.
- Blane, H. T. (1968). *The personality of the alcoholic: Guises of dependency* Joanna Cotler Books.

- Bottlender, M., & Soyka, M. (2005). Impact of different personality dimensions (NEO five-factor inventory) on the outcome of alcohol-dependent patients 6 and 12 months after treatment. *Psychiatry Research, 136*(1), 61-67.
- Carey, K. B. (1997). Reliability and validity of the time-line follow-back interview among psychiatric outpatients: A preliminary report. *Psychology of Addictive Behaviors, 11*(1), 26-33.
- Chapman, B. P. (2007). Bandwidth and fidelity on the NEO-five factor inventory: Replicability and reliability of saucier's (1998) item cluster subcomponents. *Journal of Personality Assessment, 88*(2), 220-234.
- Clark, D. B. (1999). Psychopathology and substance-related problems during early adolescence: A survival analysis. *Journal of Clinical Child Psychology, 28*(3), 333-341.
- Collins, L. M., & Flaherty, B. P. (2006). Methodological considerations in prevention research. *Handbook of Drug Abuse Prevention: Theory, Science, and Practice, 557-574*.
- Coombs, R. H. (1991). Marital status and personal well-being: A literature review. *Family Relations, 40*(1), 97-102.
- Costa, P. T., & McCrae, R. R. (1992a). Professional manual: Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI). *Odessa, FL: Psychological Assessment Resources*.
- Costa, P. T., & McCrae, R. R. (1992b). Four ways five factors are basic. *Personality and Individual Differences, 13*(6), 653-665.

- Costa, P. T., & McCrae, R. R. (1992c). 'Four ways five factors are not basic': Reply. *Personality and Individual Differences, 13*(8), 861-865.
- Costa, P. T., Jr, Busch, C. M., Zonderman, A. B., & McCrae, R. R. (1986). Correlations of MMPI factor scales with measures of the five factor model of personality. *Journal of Personality Assessment, 50*(4), 640-650.
- Costa, P. T. J., & McCrae, R. R. (1997). Stability and change in personality assessment: The revised NEO personality inventory in the year 2000. *Journal of Personality Assessment, 68*(1), 86-94.
- Cox, D. (1972). Regression models and life-tables. *Journal of the Royal Statistical Society. Series B (Methodological)*, 187-220.
- Craig, R. J., & Olson, R. E. (1988). Changes in functional ego states following treatment for drug abuse. *Transactional Analysis Journal, 18*(1), 68-72.
- Dawson, D. A., Grant, B. F., Stinson, F. S., Chou, P. S., Huang, B., & Ruan, W. J. (2006). Recovery from DSM-IV alcohol dependence: United states, 2001-2002. *Alcohol Research & Health, 29*(2), 131-142.
- de la Banda, G.G., Martínez-Abascal, M. Á, Pastor, M., Riesco, M., Pérez, G., & Doctor, R. (2004). Extraversion and neuroticism as predictors of salivary cortisol levels in public speaking. *Análisis y Modificación De Conducta, 30*(134), 935-948.
- Diehl, A., Croissant, B., Batra, A., Mundle, G., Nakovics, H., & Mann, K. (2007). Alcoholism in women: Is it different in onset and outcome compared to men? *European Archives of Psychiatry and Clinical Neuroscience, 257*(6), 344-351.

- Dom, G., Hulstijn, W., & Sabbe, B. (2006). Differences in impulsivity and sensation seeking between early- and late-onset alcoholics. *Addictive Behaviors, 31*(2), 298-308.
- Donovan, D. M. (2005). Assessment of addictive behaviors for relapse prevention. In D. M. Donovan, G. A. Marlatt, D. M. Donovan & G. A. Marlatt (Eds.), *Assessment of addictive behaviors (2nd ed.)*. (pp. 1-48). New York, NY US: Guilford Press.
- Efron, B. (1988). Logistic regression, survival analysis, and the kaplan-meier curve. *Journal of the American Statistical Association, 83*(402), 414-425.
- Ellery, M., & Stewart, S. H. (2007). Assessment of addictions in clinical and research settings. In M. Al'Absi, & M. Al'Absi (Eds.), *Stress and addiction: Biological and psychological mechanisms*. (pp. 285-300). San Diego, CA US: Elsevier Academic Press.
- Evren, C., Evren, B., Yancar, C., & Erkiran, M. (2007). Temperament and character model of personality profile of alcohol- and drug-dependent inpatients. *Comprehensive Psychiatry, 48*(3), 283-288.
- Eysenck, H. J. (1992). Four ways five factors are not basic. *Personality and Individual Differences, 13*(6), 667-673.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. (1995). Structured clinical interview for DSM-IV axis I disorders.
- Fisher, L. A., Elias, J. W., & Ritz, K. (1998). Predicting relapse to substance abuse as a function of personality dimensions. *Alcoholism: Clinical and Experimental Research, 22*(5), 1041-1047.

- Fiske, D. W. (1949). Consistency of the factorial structures of personality ratings from difference sources. *Journal of Abnormal and Social Psychology, 44*, 329-344.
- Furnham, A., & Bachtiar, V. (2008). Personality and intelligence as predictors of creativity. *Personality and Individual Differences, 45*(7), 613-617.
- Gill, R. D. (1994). Lectures on survival analysis. *Lecture Notes in Mathematics*, 115-241.
- Goldberg, L. R. (1995). What the hell took so long? Donald Fiske and the big-five factor structure. *Personality Research, Methods, and Theory: A Festschrift Honoring Donald W. Fiske*, 29-43.
- Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, S. P., Dufour, M. C., Compton, W., et al. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry, 61*(8), 807-816.
- Grant, B. F., & Dawson, D. A. (2006). Introduction to the national epidemiologic survey on alcohol and related conditions. *Alcohol Research & Health, 29*(2), 74-78.
- Grant, B. F., Hasin, D. S., Stinson, F. S., Dawson, D. A., Ruan, W. J., Goldstein, R. B., et al. (2005). Prevalence, correlates, co-morbidity, and comparative disability of DSM-IV generalized anxiety disorder in the USA: Results from the national epidemiologic survey on alcohol and related conditions. *Psychological Medicine, 35*(12), 1747-1759.
- Grekin, E. R., Sher, K. J., & Wood, P. K. (2006). Personality and substance dependence symptoms: Modeling substance-specific traits. *Psychology of Addictive Behaviors, 20*(4), 415.



- Hansen, R. K. (2007). The differences in experience of anxiety among alcoholics classified with Cloninger's two-type model of alcoholism. *ProQuest Information & Learning. Dissertation Abstracts International: Section B: The Sciences and Engineering*, 67 (12), 7374-7374.
- Herzberg, P. Y., & Brahler, E. (2006). Assessing the big-five personality domains via short forms: A cautionary note and a proposal. *European Journal of Psychological Assessment*, 22(3), 139.
- Hopwood, C. J., Baker, K. L., & Morey, L. C. (2008). Personality and drugs of choice. *Personality and Individual Differences*, 44(6), 1413-1421.
- Hopwood, C. J., Morey, L. C., Skodol, A. E., Stout, R. L., Yen, S., Ansell, E. B., et al. (2007). Five-factor model personality traits associated with alcohol-related diagnoses in a clinical sample. *Journal of Studies on Alcohol and Drugs*, 68(3), 455-460.
- Johnson, B. (2003). Psychological addiction, physical addiction, addictive character, and addictive personality disorder: A nosology of addictive disorders. *Canadian Journal of Psychoanalysis*, 11(1), 135-160.
- Johnson, J. A. (2000). Predicting observers' ratings of the big five from the CPI, HPI, and NEO-PI-R: A comparative validity study. *European Journal of Personality*, 14(1), 1-19.
- Kiefer, F., Jiménez-Arriero, M. A., Klein, O., Diehl, A., & Rubio, G. (2008). Cloninger's typology and treatment outcome in alcohol-dependent subjects during pharmacotherapy with naltrexone. *Addiction Biology*, 13(1), 124-129.
- Kleinbaum, D. G., & Klein, M. (2005). *Survival analysis: A self-learning text*. Springer.

- Koob, G. F. (2009). New dimensions in human laboratory models of addiction. *Addiction Biology, 14*(1), 1-8.
- Lalone, L. V. (2001). The personality of alcoholism: Merging the five-factor model of personality with a typologic model of alcohol dependence. ProQuest Information & Learning. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 62* (1), 554-554.
- MacAndrew, C. (1980). Male alcoholics, secondary psychopathy and eysenck's theory of personality. *Personality and Individual Differences, 1*(2), 151-160.
- Martin, E. D., & Sher, K. J. (1994). Family history of alcoholism, alcohol use disorders and the five-factor model of personality. *Journal of Studies on Alcohol, 55*(1), 81-90.
- McCaul, M. E., & Monti, P. M. (2003). Research priorities for alcoholism treatment. In M. Galanter, & M. Galanter (Eds.), *Recent developments in alcoholism, volume 16: Research on alcoholism treatment*. (pp. 405-414). New York, NY US: Kluwer Academic/Plenum Publishers.
- McCormick, R. A., Dowd, E. T., Quirk, S., & Zegarra, J. H. (1998). The relationship of NEO-PI performance to coping styles, patterns of use, and triggers for use among substance abusers. *Addictive Behaviors, 23*(4), 497-507.
- McCrae, R. R., Costa Jr, P. T., Del Pilar, G. H., Rolland, J. P., & Parker, W. D. (1998). Cross-cultural assessment of the five-factor model: The revised NEO personality inventory. *Journal of Cross-Cultural Psychology, 29*(1), 171.
- McCrae, R. R., & Costa, P. T. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*(1), 81-90.

- McCrae, R. R., Costa, P. T., Martin, T. A., Oryol, V. E., Rukavishnikov, A. A., Senin, I. G., et al. (2004). Consensual validation of personality traits across cultures. *Journal of Research in Personality, 38*(2), 179-201.
- McCrae, R. R., Costa, P. T. J., Del Pilar, G. H., Rolland, J., & Parker, W. D. (1998). Cross-cultural assessment of the five-factor model: The revised NEO personality inventory. *Journal of Cross-Cultural Psychology, 29*(1), 171-188.
- McCrae, R. R., Costa, P. T. J., Martin, T. A., Oryol, V. E., Rukavishnikov, A. A., Senin, I. G., et al. (2004). Consensual validation of personality traits across cultures. *Journal of Research in Personality, 38*(2), 179-201.
- McCrae, R. R., Yamagata, S., Jang, K. L., Riemann, R., Ando, J., Ono, Y., et al. (2008). Substance and artifact in the higher-order factors of the big five. *Journal of Personality and Social Psychology, 95*(2), 442-455.
- Meszaros, K., Lenzinger, E., Hornik, K., Füreder, T., Willinger, U., Fischer, G., et al. (1999). The tridimensional personality questionnaire as a predictor of relapse in detoxified alcohol dependents. *Alcoholism: Clinical and Experimental Research, 23*(3), 483-486.
- Meyer, R. E., Babor, T. F., & Mirkin, P. M. (1983). Typologies in alcoholism: An overview. *International Journal of the Addictions, 18*(2), 235-249.
- Miller, T. R. (1991). The psychotherapeutic utility of the five-factor model of personality: A clinician's experience. *Journal of Personality Assessment, 57*(3), 415-433.
- Mojtabai, R., Nicholson, R. A., & Neesmith, D. H. (1997). Factors affecting relapse in patients discharged from a public hospital: Results from survival analysis. *Psychiatric Quarterly, 68*(2), 117-129.

- Morley, K. C., Teesson, M., Reid, S. C., Sannibale, C., Thomson, C., Phung, N., et al. (2006). Naltrexone versus acamprosate in the treatment of alcohol dependence: A multi-centre, randomized, double-blind, placebo-controlled trial. *Addiction, 101*(10), 1451-1462.
- Müller, S. E., Weijers, H., Böning, J., & Wiesbeck, G. A. (2008). Personality traits predict treatment outcome in alcohol-dependent patients. *Neuropsychobiology, 57*(4), 159-164.
- Noone, M., Dua, J., & Markham, R. (1999). Stress, cognitive factors, and coping resources as predictors of relapse in alcoholics. *Addictive Behaviors, 24*(5), 687-693.
- Nunes, E.V. & Hasin, D.S. (1998). Overview of diagnostic methods: Diagnostic criteria, structured and semi-structured interviews, and biological markers. In Kranzler, H.R. & Rounsaville, B.J. (Eds.) *Dual Diagnosis and Treatment: Substance Abuse and Co-morbid Medical and Psychiatric Disorders* (pp. 55-85). New York, NY: Marcel Dekker.
- O'Malley, S., Jaffe, A., Chang, , & Schottenfeld, R. (1992). Naltrexone and coping skills therapy for alcohol dependence: A controlled study. *Archives of General Psychiatry, 49*(11), 881-887.
- Piedmont, R. L., Bain, E., McCrae, R. R., & Costa, P. T. (2002). The applicability of the five-factor model in a sub-saharan culture: The NEO-PI-R in shona. In R. R. McCrae, & J. Allik (Eds.), *The five-factor model of personality across cultures*. (pp. 155-173). New York, NY, US: Kluwer Academic/Plenum Publishers.

- Piedmont, R. L., & Ciarrocchi, J. W. (1999). The utility of the revised NEO personality inventory in an outpatient, drug rehabilitation context. *Psychology of Addictive Behaviors, 13*(3), 213-226.
- Ponzer, S., Johansson, S., & Bergman, B. (2002). A four-year follow-up study of male alcoholics: Factors affecting the risk of readmission. *Alcohol, 27*(2), 83-88.
- Reulbach, U., Biermann, T., Bleich, S., Hillemacher, T., Kornhuber, J., & Sperling, W. (2007). Alcoholism and homicide with respect to the classification systems of Iesch and Cloninger. *Alcohol and Alcoholism, 42*(2), 103.
- Rothman, R. B., Blough, B. E., & Baumann, M. H. (2008). Dual dopamine/serotonin releasers: Potential treatment agents for stimulant addiction. *Experimental and Clinical Psychopharmacology, 16*(6), 458-474.
- Sartor, C. E., Lynskey, M. T., Heath, A. C., Jacob, T., & True, W. (2007). The role of childhood risk factors in initiation of alcohol use and progression to alcohol dependence. *Addiction, 102*(2), 216.
- Saucier, G. (1998). Replicable item-cluster subcomponents in the NEO five-factor inventory. *Journal of Personality Assessment, 70*(2), 263.
- Saucier, G. (1997). Effects of variable selection on the factor structure of person descriptors. *Journal of Personality and Social Psychology, 73*, 1296-1312.
- Scheier, L. M., Botvin, G. J., & Baker, E. (1997). Risk and protective factors as predictors of adolescent alcohol involvement and transitions in alcohol use: A prospective analysis. *Journal of Studies on Alcohol, 58*, 652-667.
- Schuckit, M. A. (2009). An overview of genetic influences in alcoholism. *Journal of Substance Abuse Treatment, 36*(1), S1-S14.

- Sellman, J. D., Mulder, R. T., Sullivan, P. F., & Joyce, P. R. (1997). Low persistence predicts relapse in alcohol dependence following treatment. *Journal of Studies on Alcohol, 58*(3)
- Shedler, J., & Block, J. (1990). Adolescent drug use and psychological health. A longitudinal inquiry. *The American Psychologist, 45*(5), 612-630.
- Sher, K. J., Bartholow, B. D., & Wood, M. D. (2000). Personality and substance use disorders: A prospective study. *Journal of Consulting and Clinical Psychology, 68*(5), 818-829.
- Sher, K. J., Trull, T. J., Bartholow, B. D., & Vieth, A. (1999). Personality and alcoholism: Issues, methods, and etiological processes. In K. E. Leonard, H. T. Blane, K. E. Leonard & H. T. Blane (Eds.), *Psychological theories of drinking and alcoholism (2nd ed.)*. (pp. 54-105). New York, NY US: Guilford Press.
- Singer, J., & Willett, J. (1991). Modeling the days of our lives: Using survival analysis when designing and analyzing longitudinal studies of duration and the timing of events. *Psychological Bulletin, 110*(2), 268-290.
- Sobell, L.C., Brown, J., Leo, G.I., & Sobell, M.B. (1996). The reliability of the Alcohol Timeline Follow-back when administered by telephone and by computer. *Drug and Alcohol Dependence, 42*(1), 49-54.
- Sobell, L.C. & Sobell, M.D. (1992). Timeline Follow-back: A technique for assessing self-reported alcohol consumption. In Litten, R., & Allen, J. (Eds.), *Measuring Alcohol Consumption: Psychosocial and Biochemical Methods*. Totowa, NJ: Humana Press.

- Sobell, L. C., Sobell, M. B., Leo, G. I., & Cancilla, A. (1988). Reliability of a timeline method: Assessing normal drinkers' reports of recent drinking and a comparative evaluation across several populations. *Addiction*, *83*(4), 393-402.
- Stewart, S. H., & Devine, H. (2000). Relations between personality and drinking motives in young people. *Personality and Individual Differences*, *29*(3), 495-511.
- Stout, R. L. (2000). What is a drinking episode? *Journal of Studies on Alcohol*, *61*(3), 455-461.
- Stout, R. L., & Papandonatos, G. (2003). Advances in research design and analysis for alcohol treatment. In M. Galanter, & M. Galanter (Eds.), *Recent developments in alcoholism, volume 16: Research on alcoholism treatment*. (pp. 39-52). New York, NY US: Kluwer Academic/Plenum Publishers.
- Sutherland, E. H., Schroeder, H. G., & Tordella, C. L. (1950). Personality traits and the alcoholic; a critique of existing studies. *Quarterly Journal of Studies on Alcohol*, *11*(4), 547-561.
- Syme, L. (1957). Personality characteristics and the alcoholic: A critique of current studies. *Quarterly Journal of Studies on Alcohol*, *18*, 288-302.
- Volpicelli, J., Alterman, A., Hayashida, M., & O'brien, C. (1992). Naltrexone in the treatment of alcohol dependence. *Archives of General Psychiatry*, *49*(11), 876-880.
- Yates, W. R., Reed, D. A., Booth, B. M., & Masterson, B. J. (1994). Prognostic validity of short-term abstinence in alcoholism. *Alcoholism: Clinical and Experimental Research*, *18*(2), 280-283.

Ziherl, S., Travnik, Z. C., Plesnicar, B. K., Tomori, M., & Zalar, B. (2007). Trait aggression and hostility in recovered alcoholics. *European Addiction Research*, *13*(2), 89-93.



## Appendix A

### Goldberg (1995) overview of NEO factors

Factor I - E - *Surgency or Extraversion* contrasts

+Talkativeness, Assertiveness, and Activity Level

-Silence, Passivity, and Reserve

Factor II - A - *Agreeableness or Pleasantness* contrasts

+Kindness, Trust, Warmth

-Hostility, Selfishness, and Distrust

Factor III - C - *Conscientiousness or Dependability*

+Organization, Thoroughness, Reliability

-Carelessness, Negligence, and Unreliability

Factor IV - N - *Emotional stability vs. Neuroticism*

+Imperturbability, Calmness

-Nervousness, Moodiness, and Temperamentality

Factor V - O - *Intellect or Openness to Experience*

+Imagination, Curiosity, and Creativity

-Shallowness and Imperceptiveness (Goldberg, 1995).

## Appendix B

Saucier (1998) overview of NEO-FFI facets derived from factor analysis with the 10 highest adjective correlates in order of correlation strength from a collection of 525 person-descriptors (Saucier, 1997 as cited in Saucier, 1998)

### Neuroticism (N)

#### *Negative affect:*

Depressed, Sad, Worried, Afraid, Anxious, Scared, -Well-adjusted,  
Moody, Troubled, Insecure.

#### *Self-reproach:*

Sad, Afraid, Insecure, Depressed, -Self-assured, Ashamed, -Self-confident,  
Scared, Troubled, -Confident.

### Extraversion (E)

#### *Positive affect:*

Joyful, Cheerful, Laughing, Enthusiastic, Happy, Optimistic, Good-humored,  
Positive, Glad, Lively.

#### *Sociability:*

Sociable, Social, Outgoing, Extraverted, -Withdrawn, Entertaining, Talkative,  
Warm, Enthusiastic, Lively.

#### *Activity:*

Energetic, Active, Exciting, Lively, Busy, Athletic, Excited, Powerful, Awesome,  
Influential.

### Openness (O)

*Aesthetic interests:*

Liberal, Artistic, Open-minded, -Conservative, Imaginative, Tolerant, Expressive,  
Curious, Creative, -Narrow-minded.

*Intellectual interests:*

Intellectual, Philosophical, Deep, Thinking, Complex, Knowledgeable,  
Intelligent, Unusual, Complicated, Brilliant.

*Unconventionality:*

-Religious, -Conservative, Liberal, -Traditional, Open-minded, Rebellious, -Strict,  
Weird, Unusual, Complicated.

Agreeableness (A)

*Nonantagonistic orientation:*

-Grouchy, -Arrogant, -Irritable, -Crabby, -Hot-tempered, -Argumentative, -  
Hostile, -Rough, -Harsh, -Cranky.

*Prosocial orientation:*

Friendly, Kind-hearted, Pleasant, Kind, Considerate, Helpful, Warm-hearted,  
Warm, -Cold, Caring.

Conscientiousness (C)

*Orderliness:*

-Disorganized, Organized, -Messy, -Efficient, Neat, -Sloppy, -Inefficient, -  
Procrastinating, Systematic, Thorough.

*Goal-striving:*

Systematic, Organized, -Procrastinating, Dedicated, Efficient, Thorough,  
Ambitious, Persistent, Productive, -Disorganized.

*Dependability:*

Efficient, Reliable, Thorough, Dependable, Organized, -Inefficient, -  
Disorganized, Consistent, Practical, -Procrastinating.

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I thank my two thesis mentors who helped with the writing process, with the caveat that both have personally meant much more. I would first like to thank my primary thesis mentor, Dr. Elizabeth A R. Robinson. Her incredible advising through the better part of my undergraduate career has allowed me to genuinely grow as a researcher and an individual. I would also like to thank my secondary thesis mentor, Dr. James Hansell, for opening doors that I never even knew existed and for helping me discover a profundity from Psychology. Thanks to Daniel Brickman for giving me countless tools for approaching Statistics - most of all, the confidence. Thanks to Dr. Bin Nan for inspiring a random undergraduate and Ken Guire for helping me work through some of the trickier aspects of this study's statistical flow. Thanks also to my parents, my sister, and my girlfriend. And to the unnamed, thank you.

Table 1

*Internal Reliability and Descriptives of the NEO Five-Factors and the Saucier Facets*

	Alpha coefficient	Number of items	M	SD
Neuroticism	0.842	12	25.25	8.74
<i>Self-reproach</i>	0.794	7	13.1	5.57
<i>Negative affect</i>	0.656	5	12.18	3.98
Extraversion	0.83	12	25.73	7.99
<i>Activity</i>	0.704	4	8.55	3.27
<i>Sociability</i>	0.664	4	7.94	3.19
<i>Positive affect</i>	0.72	4	9.28	3.36
Openness	0.758	12	28.71	7.24
<i>Unconventionality</i>	0.356	4	8.44	2.6
<i>Intellectual interests</i>	0.681	3	8.03	2.61
<i>Aesthetic interests</i>	0.737	3	7.24	2.97
Agreeableness	0.72	12	30.77	6.39
<i>Prosocial orientation</i>	0.599	4	12.49	2.54
<i>Nonantagonistic orientation</i>	0.657	8	18.32	4.88
Conscientiousness	0.849	12	30.08	7.84
<i>Dependability</i>	0.701	4	10.48	2.9
<i>Goal striving</i>	0.725	3	7.51	2.48
<i>Orderliness</i>	0.75	5	12.14	4.03

*Note.* Saucier (1998) facets are italicized and organized under the corresponding facet.

Table 2

*Descriptives of Demographic Variables*

	Total	UMATS	VA	DW	COMM
	N = 364	n = 157	n = 80	n = 34	n = 93
Gender, % male	65.70%	59.20%	98.80%	41.20%	57.00%
Age, years	44	42.5	48.7	45.2	42.1
Education, years	14.3	14.6	13.2	16.2	14.3
Marital status:					
Never married	28.80%	26.80%	25.00%	14.70%	40.90%
Currently with partner/spouse	38.20%	42.70%	20.10%	76.50%	32.30%
No longer with spouse	32.90%	30.60%	55.10%	8.80%	26.90%
Ethnicity:					
White	81.90%	93.00%	75.00%	97.10%	63.40%
Black	10.40%	3.80%	15.00%	0.00%	21.50%
Other	7.60%	3.20%	10.00%	2.90%	15.10%
Income:					
< \$15,000	29.50%	9.10%	67.50%	9.40%	37.60%
> \$85,001	22.00%	28.60%	0.00%	62.50%	16.10%
Unemployed	44.00%	32.50%	75.00%	23.50%	43.00%

*Note.* UMATS = University of Michigan Addiction Treatment Services, VA = Veterans Affairs Hospital Ann Arbor, DW = DrinkWise, COMM = Community sample.

Table 3

*Descriptives of Clinical Variables*

	Total	UMATS	VA	DW	COMM
	N=364	n=157	n=80	n=34	n=93
Age of dependence onset	28.5	29.68	29.87	27.41	25.74
Length of depend. sx.	15.5	14.94	12.35	17.03	14.3
Number of SCID depend. sx. (max = 8)	6.55	6.58	6.65	5.74	6.71
Want to be abstinent? % responding "Yes"	72.00%	83.40%	91.30%	38.20%	48.40%
Previous alcohol treatment?	52.70%	51.60%	82.50%	11.80%	44.10%
Previous AA experience?	68.10%	63.70%	88.80%	29.40%	72.00%

*Note.* UMATS = University of Michigan Addiction Treatment Services, VA = Veterans Affairs Hospital Ann Arbor, DW = DrinkWise, COMM = Community sample.



Table 4

*Cox PH Regression Model of Significant Clinical and Demographic Variables, Step 1*

	B	SE	Wald	df	Sig.	Exp(B)
Site**			15.4	3	0	
Marital status*			6.46	2	0.04	
Education year	-0.03	0.03	1.11	1	0.29	0.97
Age at baseline*	-0.01	0.01	5.26	1	0.02	0.99
Conscious motivation for abstinence			4.65	2	0.1	
Previous AA experience***	-0.56	0.16	12.86	1	0	0.57
Age of alcoholism onset*	-0.02	0.01	6.31	1	0.01	0.98

*Note.* Cox PH regression predicts the hazard ratio; therefore a negative value for B is protective against relapse to heavy drinking. Categorical variables were tested as a block of dummy-codes, so a single magnitude and direction of effect does not exist. Wald = Wald statistic. \*p = .05, \*\*p = .01, \*\*\*p = .001.

## Figure Captions

*Figure 1.* Three-dimensional bar graph of responses to the conscious motivation question organized by site.

*Figure 2.* Survival graph of entire sample. Markings are points of censorship.

*Figure 3.* Hazard graph of entire sample. Markings are points of censorship.

*Figure 4.* Kaplan-Meier survival graph of the sample split by site. Markings are points of censorship.

*Figure 5.* Kaplan-Meier survival graph of the sample with age split dichotomously above and below the mean (44 years). Markings are points of censorship.

*Figure 6.* Kaplan-Meier survival graph of the sample split by marital status categories: currently married or living with partner, no longer married, and never married. Markings are points of censorship.

*Figure 7.* Kaplan-Meier survival graph of the sample split by conscious motivation for abstinence categories: Yes, No, and other (Maybe and Don't know). Markings are points of censorship.

*Figure 8.* Kaplan-Meier survival graph of the sample with age of alcoholism onset split dichotomously above and below the mean (26 years)

*Figure 9a.* From Fisher et al., (1998): " Survival functions plotted with dichotomized NEO-PI Neuroticism Scores. Squares represent low Neuroticism patients (patients scoring below the sample mean on Neuroticism). Darkened circles represent the entire sample. Open circles represent high Neuroticism patients (patients scoring above the sample mean on Neuroticism)."

*Figure 9b.* Kaplan-Meier survival graph of the current sample with Neuroticism, as measured by the NEO-FFI, split dichotomously (high and low) above and below the mean ( $M = 25.25$ , 82nd percentile). Markings are points of censorship.



















