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Cognitive Function in the Alcohol Addiction Treatment Population

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Cognitive Function in the Alcohol Addiction Treatment Population

by

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A Dissertation submitted in partial satisfaction of
the requirements for the degree
Doctor of Philosophy in Clinical Psychology

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Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree Doctor of Philosophy.

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ABSTRACT OF THE THESIS

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by

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Chronic alcohol abuse has been linked to several cognitive deficits, such as problems with spatial processing, decreased executive functioning, impaired verbal fluency, poor working memory, response inhibition, and social problems such as aggression and social deviance. In order for patients to benefit from treatment, they must be able to utilize multiple cognitive functions. Research has shown that patients suffering from cognitive impairments are much more likely to drop out of treatment early, thereby lending them to higher relapse rates. This study aimed to identify cognitive deficits present in the alcohol addiction treatment population, demographic factors associated with higher levels of cognitive deficits, and whether these patients' cognitive deficits predict treatment dropout. Results of this study indicated that patients in the addiction treatment program at the LLUBMC evidenced reductions in visuospatial abilities, immediate memory, delayed memory, and overall cognitive function. Further, in this population, below average delayed memory significantly predicted treatment dropout.

CHAPTER ONE

INTRODUCTION

Over 17 million people in the United States are alcoholics or suffer from alcohol abuse problems (NIH). Alcoholism can lead to a variety of different problems, including social, psychological, cognitive, and medical ailments. In 2009 alone, alcohol abuse treatment made up 42% of the near 2 million substance abuse admissions into treatment programs. Further, relapse rates in this population remain relatively high; research findings vary depending on the definition of relapse. With the various implications alcohol addiction and abuse create on society, it is important for us to study the cycle of addiction, as well as the cognitive deficits that may impact treatment completion and efficacy.

There are many neurobiological and social factors that interact in the cycle of addiction. Neurobiologically speaking, there are several neurotransmitters that positively reinforce the effects of alcohol use. Social factors magnify these effects, making it very difficult for an individual to break the cycle of addiction. Effective addiction treatment may be the only solution for many people suffering from alcoholism or alcohol abuse.

Currently, there are a number of treatment modalities that have been shown to be effective. The Minnesota Model, Cognitive Behavioral Therapy, Motivational Enhancement Therapy, and Twelve-step Facilitation are some of the most commonly used addiction treatments. Although these treatments have been shown to have positive results, there is no modality of treatment that directly targets the cognitive deficits experienced by those individuals suffering from alcohol addiction.

Chronic alcohol abuse has been linked to several cognitive deficits, such as problems with spatial processing, decreased executive functioning, impaired verbal fluency, poor working memory, response inhibition, and social problems such as aggression and social deviance. In order for patients to benefit from treatment, they must be able to utilize multiple cognitive functions. It has been shown that patients suffering from cognitive impairments are much more likely to drop out of treatment early, thereby lending them to higher relapse rates.

This study aims to identify the most commonly presented cognitive deficits in the alcohol addiction treatment population. We also aim to explore demographic factors that may be associated with higher levels of cognitive deficits. Finally, we will examine whether patients' cognitive deficits have an effect on completion of the treatment program at the Loma Linda Behavioral Medical Center. By identifying specific cognitive deficits present in this population, a more tailored treatment plan may be implemented in the future in order to increase treatment completion and reduce relapse rates.

CHAPTER TWO

BACKGROUND

The National Institute on Drug Abuse has defined addiction as a "chronic relapsing disease characterized by compulsive drug-seeking and abuse and by long-lasting chemical changes in the brain." Generally, there are genetic, psychosocial, and environmental factors that contribute to the development of this disease.

The following tables from the DSM-IV describe the criteria for substance abuse and substance dependence:

Table 1

DSM Criteria of Substance Abuse

A maladaptive pattern of substance use leading to clinically significant impairment or distress as manifested by one (or more) of the following, occurring within a 12-month period:
1. Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home
2. Recurrent substance use in situations in which it is physically hazardous
3. Recurrent substance-related legal problems
4. Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance

Table 2

DSM Criteria of Substance Dependence

Substance dependence is defined as a maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring any time in the same 12-month period:
1. Tolerance, as defined by either of the following: (a) A need for markedly increased amounts of the substance to achieve intoxication or the desired effect or (b) Markedly diminished effect with continued use of the same amount of substance.
2. Withdrawal, as manifested by either of the following: (a) The characteristic withdrawal syndrome for the substance or (b) the same (or closely related) substance is taken to relieve or avoid withdrawal symptoms.
3. The substance is often taken in larger amounts or over a longer period then intended.
4. There is a persistent desire or unsuccessful efforts to cut down or control substance use.
5. A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects.
6. Important social, occupational, or recreational activities are given up or reduced because of substance use.
7. The substance use is continued despite knowledge of having a persistent physical or psychological problem that is likely to have been caused or exacerbated by the substance

(*DSM–IV–TR* (2000) 4th ed., text rev.).

Alcohol addiction can cause a number of medical, social, and psychological problems. According to the Center for Disease Control, immediate risks associated with excessive alcohol use include unintentional injuries such as car accidents, falls, drowning, and firearm injuries; alcohol poisoning; violence, such as domestic disputes and child maltreatment; risky sexual behaviors; miscarriages and birth related defects. Long term risks associated with excessive alcohol use can lead to the development of chronic diseases, neurological problems, and social problems.

Scope of the Problem

The economic cost of drug abuse in 2002 was estimated at $180.9 billion. This value represents both the use of resources to address health and crime consequences as well as the loss of potential productivity from disability, death and withdrawal from the workforce. Further, alcohol related arrests have significantly contributed to the doubling of the nation's incarceration rate since 1985. Risk for relapse is high and maybe even higher among sensitive subpopulations such as those presenting to treatment with complex comorbidities (Office of National Drug Control Policy).

According to the United States Substance Abuse and Mental Health Services Administration (SAMHSA) in 2009, almost 2,000,000 substance abuse treatment admissions for people aged 12 and older were reported in the United States. Five major substance groups accounted for 96 percent of these 2 million admissions: alcohol (42%), opiates (21%), marijuana (18%), cocaine (9%), and methamphetamines/amphetamines (6%). The average age at admission was 34 years, with non-Hispanic Whites making up 60 percent of all treatment admissions (followed by Blacks at 21%, Hispanics at 14%, and other racial groups at 5%). There was no significant difference in gender at admission; females made up 51 percent of admissions, males made up 49 percent.

Relapse rates for addictive diseases are usually in the range of 50% to 90%; however, these rates vary by definition of relapse, severity of addiction, which drug of addiction, length of treatment, and elapsed time from treatment discharge to assessment, as well as other factors (National Institute on Drug Abuse). A study by Dawson et al. (2007) found that 25% of alcohol dependent subjects had relapsed in a 3-year follow up from an abstinence based treatment program, as evidenced by a recurrence of any alcohol use disorder symptoms. Another study found that one-third of people who enter treatment trials are in full remission from alcohol dependence during the following year (Miller et al. 2001). These figures apply to those who actually enter and participate in treatment, and ignore the majority of alcohol dependent people who do not utilize a treatment program to gain sobriety. A study by Dawson et al. (2006) stated that about three-quarters of people with alcohol dependence reduce or stop drinking without any kind of professional treatment or interaction in support groups such as AA. This is an important consideration to make, as relapse rates among this population are not likely evaluated.

Neurobiology of Addiction

Addiction has been conceptualized as a chronic, relapsing disorder with roots in both impulsivity and compulsivity, with neurobiological mechanisms that influence how an individual moves through the addiction cycle. The typical behavioral cycle progresses as such: binge/intoxication, withdrawal/negative affect, and preoccupation/anticipation. Impulsivity and compulsivity can coexist at different stages of this cycle (Koob, 2009). Further, five specific systems of neurotransmitters have been identified as playing a part in the positive reinforcing effects of alcohol use: dopamine, opioid peptides, γ-aminobutyric acid, glutamate, and endocannabinoids.

The cycle of addiction involves an activation of brain pleasure centers, which involve these different neurotransmitters. First, upon ingesting the drug of choice, there is an increase in extracellular dopamine levels in the nucleus accumbens. Once experienced, drug euphoria promotes the repeated use of the addictive drug, especially if genetic traits enhance the pleasurable effect. Evidence shows that in those with a genetic predisposition toward alcoholism, there may be an exaggerated β-endorphin response, leading to a greater experience of pleasure. Over time, addictive drugs disrupt reward circuits and produce states of withdrawal and craving, which provide negative feedback, leading to drug-seeking behavior. Craving is a phenomena that can be amplified by stimuli that have become associated with drugs through conditioning. Neuroimaging has shown a link between cue-induced craving and brain function, which is arguably the most persistent and insidious clinical component of addiction (Dackis & O'Brien, 2005).

Other neuroimaging studies of brains of individuals with alcohol use disorders show increases in ventricular and sulcal cerebrospinal fluid volumes, suggesting a corresponding loss of cerebral tissue. Further studies have found associations between ventricular enlargement and poor performance on neuropsychological measures (Jernigan & Ostergaard, 1995). Magnetic resonance imagery (MRI) studies have also been conducted among alcoholics, and have shown loss of volume of the grey and white matter, especially in the prefrontal region (Sullivan, 2005). PET imaging has similarly been used to visualize the damage that heavy alcohol consumption has on the living brain. A study by Wong et al. (2003) found deficits in alcoholics, particularly in the frontal lobes, which are responsible for numerous functions associated with learning and memory, as well as in the cerebellum, which controls movement and coordination.

Impact of Alcohol on Cognitive Functions

It is important to distinguish between deficits that occur during alcohol intoxication, and those that persist after the effects of alcohol have worn off, especially in those who abuse the substance. During intoxication, common symptoms experienced include impaired memory, slowed reaction times, slurred speech, blurred vision, poor judgment, and difficulty walking. For most individuals, these impairments subside after drinking has stopped. However, those who drink heavily over long periods of time may experience deficits that persist well after sobriety is achieved.

There are many factors that contribute to the extent to which alcohol affects the brain. Some of these factors include how much and how often alcohol is consumed, how old the person was when he or she started drinking, whether he or she was exposed prenatally to alcohol, familial history of alcoholism, demographic variables, and general health status. It has been found that older age, lower education, health problems, psychiatric diagnoses, familial alcoholism, and duration of heavy drinking, have been inversely related to neuropsychological ability (Bates et al., 2006).

Chronic alcohol abuse has been linked to several cognitive deficits that affect aspects of everyday life. Some of these include deficits in spatial processing (Fein et al., 2006), decreased executive functioning (Glass et al., 2009), and impaired verbal fluency and decision making (Fernandez-Serrano et al., 2010). Other behavioral disturbances that occur with alcohol use include increased impulsivity and aggression (Bjork et al., 2004) and proneness to social deviance and disadvantageous decision making (Fein et al., 2004).

Cummings (1995) examined the relationship between structural and functional damage to the prefrontal and temporal brain areas and related circuits in heavy drinkers and the neuropsychological deficits associated with these areas to be significant, as they are responsible for memory, strategic planning, use of environmental feedback, working memory, goal-setting, and response inhibition. These functions play a major role in treatment outcome, as these abilities are necessary for patients to be successful in alcohol addiction recovery.

Further, when examining neurocognitive deficits in sober alcoholics compared to peer nonalcoholic controls, Parsons (1998) found that both male and female alcoholics had deficits on tests of learning, memory, abstracting, problem-solving, perceptual analysis and synthesis, speed of information processing, and efficiency.

In order to examine the genetic influence on alcohol related cognitive deficits, Gurling et al. conducted a monozygotic twin study in 1991. This study found that a twin with high alcohol consumption performed significantly worse overall on cognitive tests than their co-twin. Specifically impaired were visual spatial ability and recognition, vocabulary, category sorting, and tactual performance. Further, the number of years of problem drinking was correlated with lower scores on subtests of tactual performance.

Recovery of Function

Some of the most severe impairments associated with heavy alcohol consumption may resolve soon after drinking stops, however some functions may take months or even years to recover. Manning et al. (2008) conducted a study on neuropsychological changes that occur in patients after alcohol detoxification. They found that there were significant increases in post-detoxification scores on measures of working memory, verbal fluency, and verbal inhibition, but not in non-verbal executive function tasks, such as mental flexibility and planning ability.

Current Addiction Treatment

The most used addiction treatment modalities are the following:

The Minnesota Model takes a holistic approach, involving a multidisciplinary team of professionals (physicians, nurses, psychologists, social workers, and clergy) and recovering staff members (counselors). It combines the foundational knowledge of recovery with the Alcoholics Anonymous (AA) 12 steps and principles. Treatment consists of individual interviews, small group therapy, psychoeducation, and AA stories of recovery. In this model, connections with AA groups and community members were seen as crucial for maintaining sobriety post-treatment (Anderson, 1999).

Cognitive Behavioral Therapy (CBT) seeks to help patients recognize, avoid, and cope with the situations in which they are most likely to abuse substances. It focuses on teaching skills such as drink refusal and relapse prevention.

Motivational Enhancement Therapy (MET) focuses on addressing ambivalence about and motivation to change.

Twelve Step Facilitation (TSF) focuses on teaching that alcoholism is a disease that requires abstinence and affiliation with Alcoholics Anonymous (AA).

Project MATCH, a clinical trial by the NIAAA that examines patient-treatment interactions, found that for the most part, CBT, MET, and TSF all had highly similar and positive results (Project MATCH Research Group 1998). However, a study conducted by Bates et al. (2005) found that individuals who were assigned to TSF showed more improvement in latent executive ability compared to those assigned to CBT and MET. The rationale given was that the techniques of TSF may have contributed to cognitive recovery by increasing the likelihood of sustained abstinence by breaking down complex, long-term goals into small manageable subgoals, allowing clients to accumulate a history of success.

Alcohol addiction treatment is a complicated process, incorporating many different psychological, social, and medical aspects. In order for treatment to be effective, there are key elements that must be met. In a study conducted by Kellogg and Tatarsky (2010), 25 clinicians in New York convened at a roundtable to discuss what psychosocial factors play a part in successful treatment for addictions. There was agreement that treatment plans should be individually specific and emphasize improving patients' sense of self-efficacy. Further, the relapse prevention model was almost universally endorsed. The group of clinicians also endorsed the idea that long-term recovery is dependent on embracing new personal and social identities that replace those that were based on their substance use.

Cognitive Deficits and Treatment Efficacy and Outcomes

Why is it important to examine cognitive deficits in the addiction population? Research on drug abuse, including alcohol use, has yielded findings suggesting that in order for patients to initiate and maintain behavioral change, they must be able to utilize multiple cognitive functions (Weinstein & Shaffer, 1993); users with cognitive impairments are much more likely to drop out of treatment early, and show less engagement in the treatment process (Aharonovich et al., 2006; Teichner et al., 2002). Another study found that greater cognitive impairment predicted less treatment compliance, and lower self-efficacy, in turn, predicting drinking outcomes, with less treatment and lower self-efficacy leading to fewer days of abstinence and more drinks per drinking day (Bates et al., 2006).

A study by Blume et al. (2005) investigated stage of change and cognitive factors in an alcohol dependent population. They found that lower verbal and higher delayed recall memory scores predicted a precontemplative stage of change, whereas higher verbal memory scores predicted a contemplative stage of change. Further, better attention and concentration predicted reduced drinking at a 3-month follow up.

Currently, there are few studies documenting specific cognitive deficits experienced by those abusing alcohol. However, there are even fewer studies that address how these deficits influence treatment outcomes. This study aims to investigate this relationship, hypothesizing that those patients with more severe cognitive deficits will have poorer treatment outcomes. Clinically, this may be useful in devising new treatment protocols that can target and enhance individual's cognitive deficits, directly improving treatment outcomes.

Confounding Factors

A few variables have been identified as confounding factors to cognitive functions. Some of these include previous traumatic brain injury, familial alcoholism, childhood behavioral problems, psychopathology, and ongoing medical issues (Bates, 2002). A study conducted by Miller (1995) found that the prevalence of alcohol and drug use disorders is more than 50% among head trauma victims. Head trauma alone lends itself to a host of cognitive deficits, and paired with alcohol use, these deficits may be even more detrimental to an individual. It is important to assess for previous head trauma, in the likelihood that it either serves as a risk factor for alcohol abuse and/or is responsible for some variance of measured cognitive functions.

Clinical Implications

Cognitive rehabilitation may enhance current addiction treatment modalities. It can address deficits in attention, memory, learning, and problem solving, enabling a patient to engage and utilize treatment strategies more effectively. Fals-Stewart and Lam (2010) found that patients who underwent computer-assisted cognitive rehabilitation in addition to standard treatment were more engaged and committed to treatment, and reported better long-term outcomes (higher percentage of days abstinent after treatment).

Aims and Hypotheses

The first aim of this study will be to identify the cognitive deficits present in alcohol addiction treatment patients. The hypothesis is that participants will have below average scores on all five domains and overall score on the RBANS.

The second aim of this study is to evaluate the effect of demographic variables on cognitive function. The hypothesis is that lower income, fewer years of education, heavier drinkers, and those who began drinking at a younger age will have poorer cognitive function.

The third aim of this study will be to evaluate the relationship between cognitive deficits and treatment completion. The hypothesis is that those with poorer cognitive performances will have poorer treatment completion rates.

The fourth, and final, aim of this study will be to evaluate how other risk factors such as comorbid mental health diagnosis and prior termination of rehabilitation programs affect treatment completion. The hypothesis is that those with comorbid mental health diagnoses and/or prior treatment termination will have poorer rates of treatment completion.

CHAPTER THREE

MATERIALS AND METHODS

Participants

Participants will be recruited from consecutive admissions to an intensive outpatient chemical dependency treatment program at the Loma Linda Behavioral Medical Center (LLUBMC). All participants will be detoxified at the LLUBMC, and will be medically stable at outpatient treatment entry. Participants aged 20-89 will be included in the study.

Procedure

Participants of the chemical dependency treatment program will be recruited for the study during their first week at the LLUBMC. Once the patient has completed the inpatient detoxification program, he/she enters the outpatient partial hospitalization program, and will be approached to participate in this study. Informed consent will be obtained by a trained clinical researcher (explaining the study aims, design, and risks/benefits), and signed documents will remain in a secured office. A verbal survey will also be given to the participants at the time of consent. This survey will include questions regarding history of alcohol use, severity, and at what age the subject began drinking. Issues regarding familial alcoholism, childhood behavioral issues, psychopathology, previous head trauma, and medical issues will also be assessed. See Appendix A. During their first two days of the outpatient program, consenting patients will be given a brief neuropsychological battery, the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS).

Instruments

A survey collecting demographic information, alcohol use history, and confounding factors will be verbally administered (see Appendix A).

The RBANS is a brief, individually administered test that helps to determine the neuropsychological status of adults who have neurologic injury or disease. The test consists of five indexes: immediate memory, visuospatial/constructional, language, attention, and delayed memory. There are 12 subtests of the RBANS, including: list learning, story memory, figure copy, line orientation, digit span, symbol digit coding, picture naming, semantic fluency, list recall, list recognition, story recall, and figure recall. The total scale score provides a global measure of neuropsychological functioning. The RBANS utilized a United States population-based normative standardization, and data are scaled using age-based norms and percentiles.

The overall battery takes about 30 minutes to administer, creating a time frame that maximizes patient cooperation and minimizes effects of fatigue on performance. The RBANS was also designed to bridge the gap in cognitive assessment, being sensitive to mild impairment as well as severe dementia, enabling its use for normal older adults as well (Randolph, 1998). The RBANS has two parallel forms, which is ideal for measuring change in the patient's neuropsychological status over time. This measure was originally used as a tool to assess dementia in elderly patients, however it has demonstrated clinical utility amongst a wide range of neuropsychological and psychiatric populations, such as with traumatic brain injury (McKay et al., 2007), schizophrenia and bipolar disorder (Dickerson et al., 2004), and anorexia nervosa (Mikos et al., 2008). It was also used in a study that assessed cognitive ability in college athletes that participated in contact sports

(Killam et al., 2005). In the addiction population, the RBANS has been used with veterans residing in a substance abuse treatment program, and indicated post-treatment increases in immediate memory and attention (Schrimsher and Parker, 2008). Curry and Stasio (2009) also used the RBANS in a study evaluating the effects of alcohol and energy drinks on neuropsychological performance, finding deficits in visuospatial/constructional and language performance scores.

Scoring for the RBANS is as follows: each subtest yields a subtest raw score. These scores are then transferred to a score summary sheet that combines subtests into the specified domains, yielding an index score. Each index score will also be converted to percentile scores, utilizing the age-based normative conversions provided in the RBANS manual.

Variables to be Examined

Demographic Data

Age, gender, years of education, and income will be collected from the multidisciplinary patient assessment conducted at intake to the chemical dependency program. Education will be coded as a continuous variable. Income will be coded as a categorical variable with the following values: <10k, 10-35k, 35-60k, 60-80k, and 80k+.

Substance Abuse History

Information regarding substance abuse history will be collected from the verbal survey given to the participants at the time of consent. The variables of interest are age at first drink, and general number of drinks consumed in one sitting during heaviest period of drinking. Both variables will be coded as continuous variables.

Cognitive Function

Five domains of neuropsychological functioning will be assessed by the RBANS. Each domain consists of two subtests, with the exception of the delayed memory domain, which has four subtests. Each of the following domains will be evaluated:

Immediate Memory

This domain measures one's ability to remember a small amount of information immediately after it is presented. In order to test this domain, the following subtests of the RBANS are used.

List Learning

This consists of a list of 10 unrelated words, read for immediate recall over four trials, for a total maximum score of 40. The words are of moderate-high imagery and low age-of-acquisition, thereby reducing possible education effects on performance and easing translation.

Story Memory

This consists of a 12-item story, read for immediate recall over two trials, for a total maximum score of 24. Scoring is based upon verbatim recall, and the stories contained in the different forms of the RBANS follow the same basic structure.

Visuospatial Ability

This domain allows one to analyze, understand, and recreate spatial relations. For example, this includes ability to mentally rotate objects, estimate distance and depth, and navigate the surrounding environment. The following RBANS subtests are used to evaluate this domain.

Figure Copy

This consists of the direct copy of a complex geometrical figure, similar to the Rey-Osterrieth figure, but somewhat less demanding. There are 10 components of the figure, and a structured simplified scoring guide (contained on the record form) yields a maximum score of 20. There is an additional detailed scoring guideline and associated transparency available as of 2008 to improve inter-rater reliability in scoring this subtest (this is the only subtest for which scoring is not entirely objective).

Line Orientation

Subjects are shown an array of 13 lines, fanning out from a common point of origin through 180 degrees. For each item, two target lines are shown beneath the array, and subjects must identify which lines they match within the array. There are 10 items, each containing two lines to be matched, for a total maximum score of 20.

Language

This domain includes one's ability to acquire and utilize a system of communication, and the ability to respond verbally to naming or retrieving learned material. The following subtests examine this domain.

Picture Naming

This is a confrontation naming task, with 10 line drawings of objects that must be named by the subject.

Semantic Fluency

Subjects are given 60” to provide as many exemplars as they can from a given semantic category (e.g., fruits and vegetables).

Attention

This domain evaluates one’s ability to select a subset of information to focus on for enhanced processing and integration. It examines the examinee’s capacity to remember and manipulate both visually and orally presented information in short-term memory storage. The following two subtests make up this domain.

Digit Span

This is a classic digit repetition test of working memory, with stimulus items increasing in length from 2 digits to 9 digits. Items are administering in order of length, and the test is discontinued after failure of two items at a given string length.

Coding

This processing speed subtest is very similar to the Digit Symbol subtest of the Wechsler scales. Subjects must fill in digits corresponding to shapes as quickly as they can on the basis of a coding key. After completing practice items, subjects have 90” to complete as many items as they can.

Delayed Memory

This domain explores one’s ability to remember information after a period of time. In order to test this domain, these subtests are given to participants 20 minutes after original presentation.

List Learning Free Recall

Free recall of the words from the initial List Learning subtest (max=10).

List Learning Recognition

Yes/No recognition for the words from List Learning, with 10 foils (max=20).

Story Memory Free Recall

Free recall of the story from the Story Memory subtest (max=12).

Figure Free Recall

Free recall of the Figure from the Figure Copy subtest (max=20).

Total Score

This score is a combination of all domain scores that represents a global measure of neuropsychological functioning.

Completion of Treatment

A binary variable will be created in order to evaluate whether subjects completed the intensive outpatient treatment.

Planned Analyses

The first aim of this study will be to identify the cognitive deficits present in alcohol addiction treatment patients. The hypothesis is that participants will have below average scores on all five domains and overall score on the RBANS. The analyses that will be conducted to evaluate this hypothesis will include: computing subtest and index scores using RBANS normative data, descriptive data analysis in order to see most common deficits, Welch's t-tests to investigate significant differences between sample and normative performances on each subtest, and one-sample t-tests to evaluate whether the group index scores are significantly different from an average index score of 100.

The second aim of this study is to evaluate the effect of demographic variables on cognitive function. The hypothesis is that lower income, fewer years of education, heavier drinkers, and those who began drinking at a younger age will have poorer cognitive function. The analyses to be performed for this hypothesis will include six stepwise linear regressions (one for each domain and overall score on the RBANS), with the independent variables including income, education, severity of drinking, and age at first drink, and the dependent variable being each cognitive domain index score.

The third aim of this study will be to evaluate the relationship between cognitive deficits and treatment completion. The hypothesis is that those with poorer cognitive performances will have poorer treatment completion rates. Logistic regressions will be utilized to test this hypothesis. In each of the six regressions, the independent variable will be each cognitive domain index score, and the dependent variable will be the dichotomous treatment completion variable.

The fourth, and final, aim of this study will be to evaluate how other risk factors such as comorbid mental health diagnosis and prior termination of rehabilitation programs affect treatment completion. The hypothesis is that those with comorbid mental health diagnoses and/or prior treatment termination will have poorer rates of treatment completion. Two separate logistic regressions will be performed. To investigate the effect of mental health on treatment completions, the regression will include mental health comorbidity as the independent variable, and completion of treatment as the dependent variable. In order to investigate the effect of prior termination of treatment, a sub-dataset will be created for only those who attended a previous addiction treatment program. Using this sub-dataset, a logistic regression will be utilized, with prior dropout being the independent variable, and treatment completion as the dependent variable.

CHAPTER FOUR

RESULTS

Statistical Analyses

The primary outcome measure was completion of treatment. Risk factors of primary interest were individual's index scores for the following cognitive domains: attention, language, visuospatial, immediate memory, delayed memory, and overall cognitive functioning. Also of interest were demographic factors (age, gender, race, marital status, education, income), severity of consumption (drinks per sitting, age at first drink), comorbid mental health diagnoses, and prior treatment dropout. For the analyses conducted, a *p* value of 0.05 was considered significant, and a 95% confidence interval (CI) was used. The computer statistical software package SPSS (version 22) was used for all analyses. GraphPad software was also utilized for Welch's unpaired t-test analyses.

The cognitive domain variables were also transformed from index score variables into dichotomous ability classification variables (below average vs. average and above) for ancillary analyses in order to further examine their effects.

Patient Population

Patients admitted to the outpatient Chemical Dependency Partial Hospitalization Program (PHP) at the LLUBMC from May of 2013 through March 2014, with a primary alcohol abuse diagnosis were considered in the final analysis. 2 patients were excluded due to missing information. The total number of patients included in this data analysis amounted to 25.

The clinical characteristics of patients enrolled in the Chemical Dependency PHP are shown in Table 3. Information on age, gender, race, marital status, education, and income were assessed upon admission. The average age at admission was 46.3. Males made up the majority of the treatment population, constituting 56% of the patient pool. The ethnic majority of this population was Caucasian (56%), and 60% of patients were married. Patient's educational background varied, with 40% of patients having a high school diploma or GED, 28% completing some college, 24% completing a Bachelor's degree, and 2 patients (8%) held graduate level degrees. About half of the patients reported an annual income of over $80,000, followed by 40% of patients making between $35,000-$80,000, and only 3 (12%) of patients making less than $35,000 a year. In regard to treatment completion, 16 out of 25 patients (64%) completed treatment.

Table 3

Descriptive Statistics for the LLUBMC patient population

Total N = 25	N (%)
Gender	
Male	14 (56)
Female	11 (44)
Race	
Caucasian	14 (56)
Hispanic	7 (28)
African American	1 (4)
Asian	1 (4)
Other	2 (8)
Marital Status	
Married	15 (60)
Separated	3 (12)
Divorced	2 (8)
Single	5 (20)
Education	
High School	10 (40)
Some College	7 (28)
Bachelor's	6 (24)
Master's/Doctorate	2 (8)
Income	
<10k	1 (4)
10-35k	2 (8)
35-60k	5 (20)
60-80k	5 (20)
80k+	12 (48)
	Mean
Age	46.3

Cognitive Deficits Among Patients

The first hypothesis of this study was that the patients undergoing alcohol addiction treatment will have poorer cognitive functioning than the general population.

In order to evaluate the profile of cognitive deficits present within this sample, a frequency analysis was conducted in order to identify frequencies of individual's index scores on each cognitive domain. In conjunction with standard neuropsychological cutoffs that identify scores equivalent to 1 standard deviation below the mean to signify reduced functioning, the number of patients in this population that scored in the below average range, and the sample means by domain, are depicted in Table 4 below.

Table 4

Cognitive Deficits Among Participant Sample

Cognitive Domain	Attention	Language	Visuospatial	Immediate Memory	Delayed Memory	Total
Mean of Index Score	97.72	98.32	91.84	92.2	93.84	92.76
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Below Average	6 (24)	3 (12)	7 (28)	10 (40)	6 (24)	8 (32)

In regard to attention, 24% of the participants scored below average. On the test of language abilities, 12% performed below average. In regard to visuospatial functioning, 28% of the participants scored below average. On tests of memory, 40% of participants scored below average on immediate memory, and 24% of participants scored below average on delayed memory. Finally, participants' overall cognitive function was also evaluated and 32% of participants scored in the below average range.

Normality of Distributions

To further investigate the normality of the distributions present in this sample, Shapiro-Wilk tests of normality, skew, and kurtosis analyses were run. According to these analyses, this sample's performance did not significantly differ from a normal distribution. See Tables 5 and 6 below.

Table 5

Shapiro-Wilk Tests of Normality

Cognitive Domain	Statistic	df	*p*
Attention	.929	25	.084
Language	.952	25	.271
Visuospatial	.974	25	.755
Immediate Memory	.971	25	.660
Delayed Memory	.967	25	.565
Overall Cognitive Function	.957	25	.360

Figures 1 through 6 below illustrate the distributions present in this sample on each domain of the RBANS, including a normal distribution curve for reference.

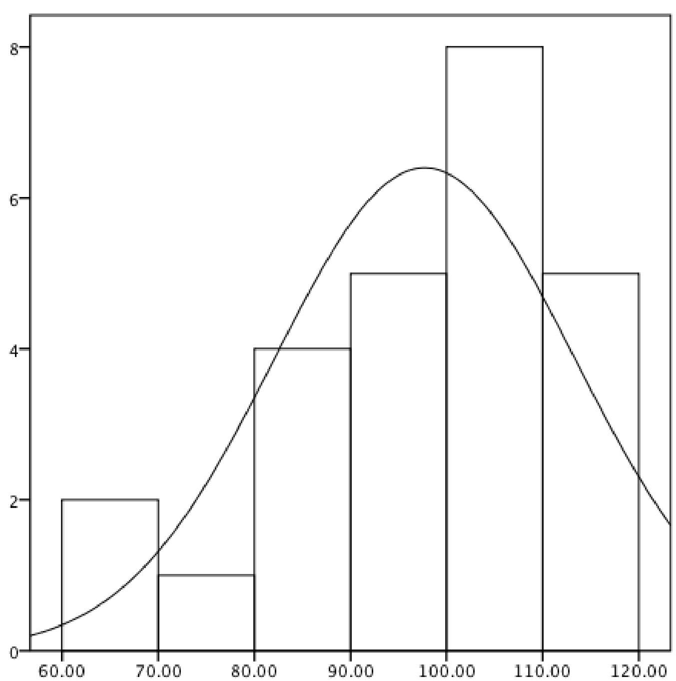

Figure 1. Bar graph showing this sample's performance on the Attention domain compared to a normal distribution curve.

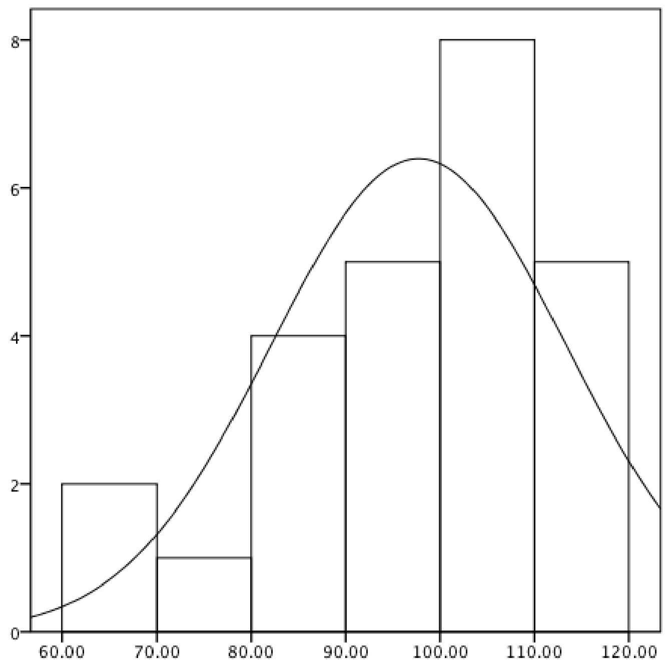

Figure 2. Bar graph showing this sample's performance on the Language domain compared to a normal distribution curve.

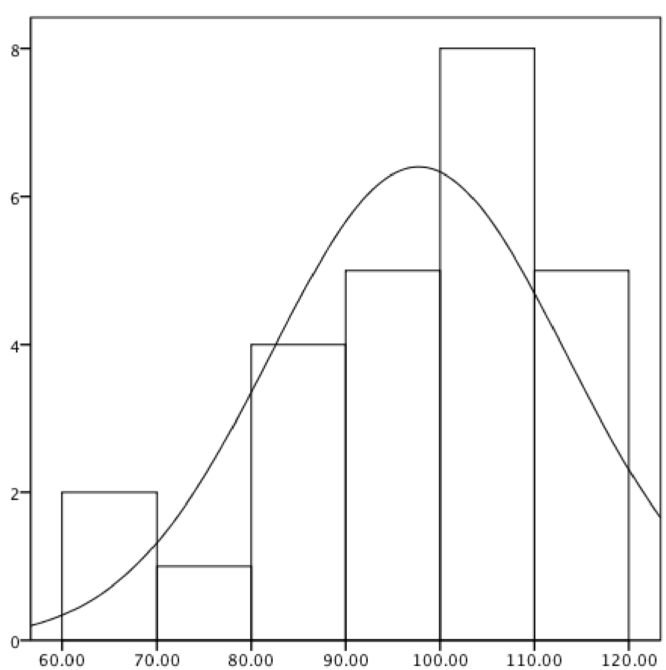

Figure 3. Bar graph showing this sample's performance on the Visuospatial domain compared to a normal distribution curve.

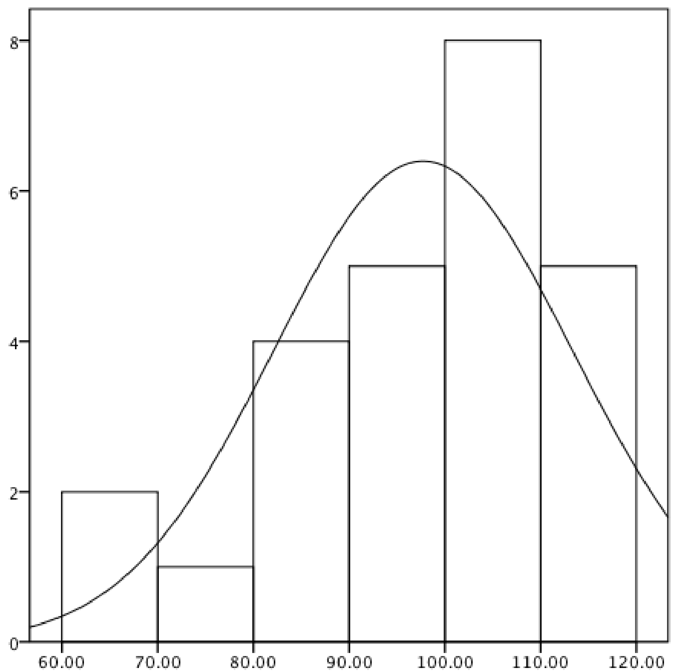

Figure 4. Bar graph showing this sample's performance on the Immediate Memory domain compared to a normal distribution curve.

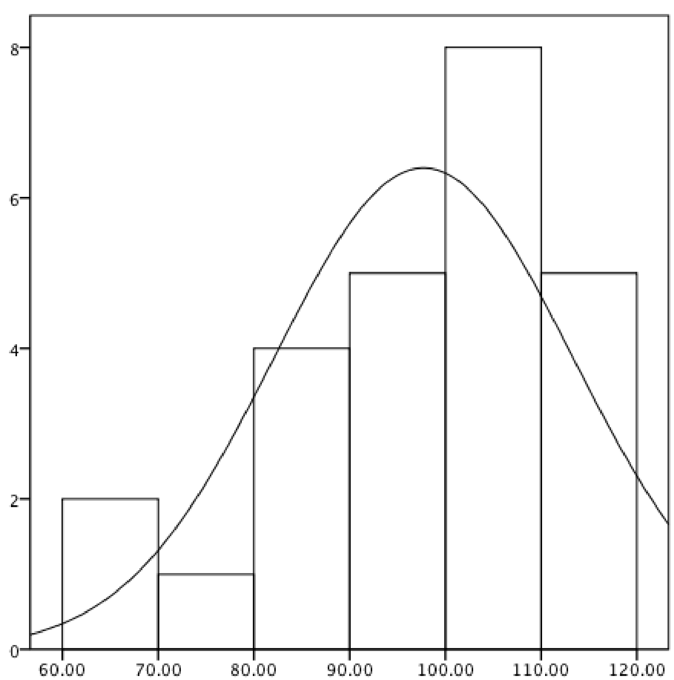

Figure 5. Bar graph showing this sample's performance on the Delayed Memory domain compared to a normal distribution curve.

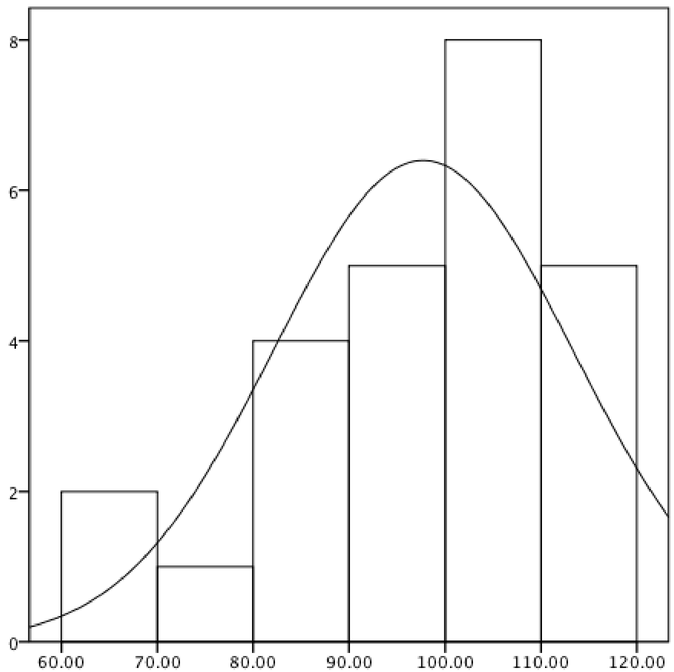

Figure 6. Bar graph showing this sample's performance on the Overall Cognitive domain compared to a normal distribution curve.

Comparison to General Population

In order to evaluate the hypothesis that this sample will perform below the normative sample, the means of this sample's performances on each subtest were compared to those of the general population, using subtest means established in the RBANS manual, which were derived from a standardized sample of 540 people. According to Welch t-test results, the mean scores on the list learning subtest were significantly lower in this sample population (M = 25.6, SD = 3.85) than in the general population (M = 28.45, SD = 4.48), t(41) = 3.165, p = .003. Mean scores on the figure copy subtest were also significantly lower in this sample population (M = 17.04, SD = 2.11) than in the general population (M = 18.43, SD = 1.45), t(29) = 3.115, p = .004. See Table 6 below for all subtest means.

Table 6

Comparison of Sample Group Subtests to Normative Group means

	Sample Group		Normative Group	
Subtests	Mean	SD	Mean	SD
List Learning*	25.6	3.85	28.45	4.48
Story Memory	17.16	3.54	17.98	3.43
Figure Copy*	17.04	2.11	18.43	1.45
Line Orientation	16.76	3.27	16.3	2.95
Picture Naming	9.68	0.63	9.53	0.8
Semantic Fluency	21.64	5.45	21.1	4.58
Digit Span	10.88	2.30	10.75	2.3
Coding	47.88	10.22	49.68	8.43
List Recall	5.60	2.08	6.45	2.0
List Recognition	19.44	0.87	19.58	0.88
Story Recall	8.68	2.48	9.35	2.05
Figure Recall	12.80	3.58	14.18	3.38

*comparison is significant at the .01 level

In order to identify if these performances are significantly different from a mean index score of 100, one sample t-tests were performed, comparing the means of each domain of cognitive function against a test value of 100. The results of this analysis show that in this sample population, their mean performances on domains of visuospatial, immediate memory, and overall cognitive function were significantly lower than mean index scores. See Table 7 below.

Table 7

One-sample t-tests of Cognitive Domain Means Against a Test Value of 100

Cognitive Domain	t	df	*p*	Mean Difference	95% C.I.	
Attention	-.731	24	.472	-2.28000	-8.7152	4.1552
Visuospatial*	-.603	24	.552	-1.68000	-7.4315	4.0715
Language	-2.678	24	.013	-8.16000	-14.448	-1.8720
Immediate Memory*	-2.713	24	.012	-7.80000	-13.733	-1.8671
Delayed Memory	-1.951	24	.063	-6.16000	-12.677	.3565
Overall Cognitive Function*	-2.827	24	.009	-7.24000	-12.525	-1.9548

* significant at the 0.05 level

Cognitive Profile of this Population

In order to create a cognitive profile of this sample, the mean index scores of each domain were evaluated. The graph below (Figure 7) depicts the overall performance of this sample. T-tests were utilized in order to identify if there was a significant difference between domains. There was no statistical difference domain by domain, but in conjunction with the above t-tests, the profile suggests higher scores on attention and language, and lower scores on visuospatial abilities, immediate memory, and overall cognitive function.

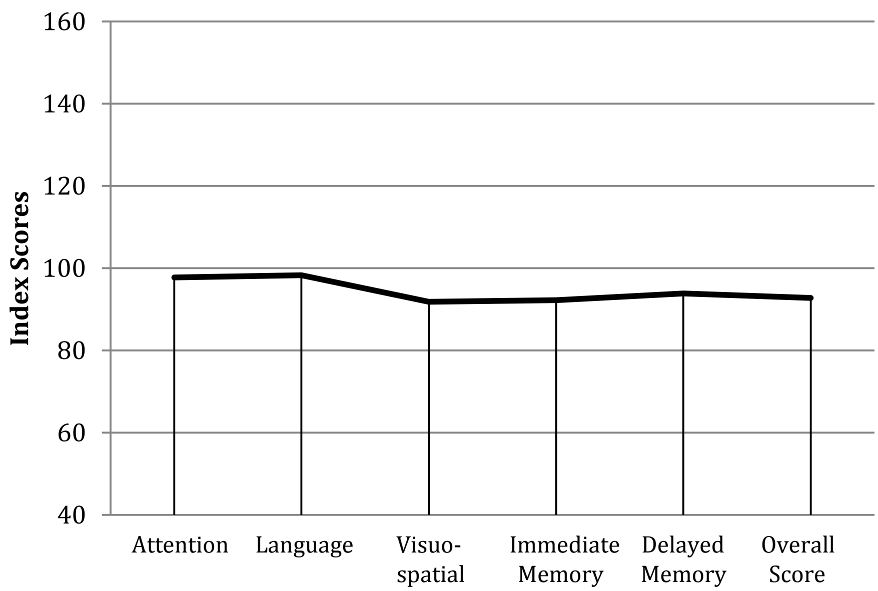

Figure 7. Sample Performance on RBANS using Index Score Means

Predictors of Cognitive Function

The second hypothesis of this study was that lower income, fewer years of education, younger age at first drink, and more drinks per day would negatively affect each domain of cognitive function. Six stepwise linear regressions were run in order to determine if these four variables predicted performance on each domain index of cognitive function: attention, language, visuospatial, immediate memory, delayed memory, and overall cognition. In four of the six analyses, years of education was the only significant predictor of cognitive functions, and entered into the regression equations. See Tables 8-11 below. Contrary to the hypothesis, income, age at first drink, and number of drinks per day were not significant predictors of cognitive functioning ($p > .05$). However, years of education was significantly related to: visuospatial ability, $F(1, 23) = 9.754$, $p = .005$, indicating that approximately 30% of the variance of the visuospatial score could be accounted for by years of education; immediate memory, $F(1, 23) = 4.536$, $p = .044$, indicating that approximately 17% of the variance of the immediate memory score could be accounted for by years of education; delayed memory, $F(1, 23) = 6.068$, $p = .022$, indicating that approximately 21% of the variance of the delayed memory score could be accounted for by years of education; and overall cognitive function, $F(1, 23) = 11.742$, $p = .002$, indicating approximately 34% of the variance of the overall cognitive score could be accounted for by years of education.

Table 8

Linear Regression of Visuospatial Ability

	B	SE	t	*p*	95% C.I.	
Entered into Equation					Lower	Upper
Education	3.784	1.212	3.123	.005	1.278	6.290
Excluded from Equation					Partial Correlation	
Income	.016	-	.086	.932	.018	
Age at first drink	.156	-	.828	.416	.174	
Drinks per day	-.029	-	-.151	.882	-.032	

Table 9

Linear Regression of Immediate Memory Ability

	B	SE	t	*p*	95% C.I.	
Entered into Equation					Lower	Upper
Education	2.655	1.247	2.130	.044	.076	5.234
Excluded from Equation					Partial Correlation	
Income	.089	-	.449	.657	.095	
Age at first drink	-.170	-	-.824	.419	-.173	
Drinks per day	.169	-	.824	.419	.173	

Table 10

Linear Regression of Delayed Memory

	B	SE	t	*p*	95% C.I.	
Entered into Equation					Lower	Upper
Education	3.283	1.333	2.463	.022	.526	6.040
Excluded from Equation					Partial Correlation	
Income	-.093	-	-.484	.633	-.103	
Age at first drink	.031	-	.152	.881	.032	
Drinks per day	-.144	-	-.718	.480	-.151	

Table 11

Linear Regression of Overall Cognitive Function

	B	SE	t	*p*	95% C.I.	
Entered into Equation					Lower	Upper
Education	3.388	.989	3.427	.002	1.343	5.434
Excluded from Equation					Partial Correlation	
Income	-.093	-	-.528	.603	-.112	
Age at first drink	-.004	-	-.024	.981	-.005	
Drinks per day	-.114	-	-.619	.543	-.131	

Predictors of Treatment Completion

The third hypothesis of the study was that poor index scores on each domain of the cognitive assessment (RBANS) would have a negative effect on treatment completion. A preliminary analysis of bivariate correlations was conducted in order to assess the relationships between cognitive variables and completion. No variables were significantly correlated with treatment completion. See Table 12.

Table 12

Bivariate Correlations between Cognitive Domains and Completion

Cognitive Domain	Pearson Correlation	Significance (2-tailed)
Attention	.003	.990
Language	.396	.050
Visuospatial	-.058	.782
Immediate Memory	.159	.449
Delayed Memory	.375	.065
Overall Cognition	.238	.252

Six hierarchical logistic regressions were conducted in order to investigate if any of the domains of cognitive function significantly predicted treatment completion, while controlling for education. In of these six models, years of education were entered in the first step, and each domain index score was entered in the second step. There were no significant effects of any of the domains on completion.

In order to further investigate the effect of cognitive function on treatment completion, the cognitive domain index variables were transformed into dichotomous variables reflecting: below average, or average and above. A series of six hierarchical logistic regressions were then performed, with years of education in the first step, and each dichotomous cognitive domain variable in the second step. According to these analyses, average and above delayed memory was a significant predictor of treatment completion, χ^2 (1) = 4.910, p = .027. See Table 13 below for coefficients.

Table 13

Hierarchical Logistic Regression Results Predicting Treatment Completion

	B	SE	Wald	*p*	95% C.I.	
					Lower	Upper
Years of Education	.033	.246	.017	.895	.637	1.674
Delayed Memory	2.112	1.014	4.343	.037	1.134	60.276

Other Risk Factors and Treatment Completion

The final hypothesis of this study was that a comorbid mental health diagnosis and dropout from prior rehabilitation treatments would have a negative effect on treatment completion. A preliminary frequency analysis indicated that 16 of the 25 participants had a co-occurring diagnosed mental health condition. 15 of the 25 participants had previously enrolled in an addiction treatment program, with 6 of them dropping out of treatment. Logistic regressions were used to evaluate the hypothesis regarding the effect of these variables on treatment completion. The first logistic regression evaluated whether a co-occurring mental health condition impacted treatment completion. The second logistic regression analyzed a subset of the original data, including only those who had previously enrolled in a treatment program. In this subdataset, a logistic regression evaluated whether prior dropout from treatment impacted current treatment completion. Neither variable significantly predicted treatment completion. See Tables 14 and 15.

Table 14

Logistic Regression of Comorbid Mental Health on Treatment Completion

	B	SE	Wald	*p*	95% C.I.	
					Lower	Upper
Mental Health	-1.001	.947	1.118	.290	.057	2.351

Table 15

Logistic Regression of Prior Dropout on Treatment Completion

	B	SE	Wald	*p*	95% C.I.	
					Lower	Upper
Prior Dropout	-.693	1.080	.412	.521	.060	4.153

CHAPTER FIVE

DISCUSSION

This study examined cognitive deficits in the outpatient Chemical Dependency Partial Hospitalization Program at the Loma Linda University Behavioral Medical Center. There were a total of 25 patients who had a primary alcohol diagnosis recruited for this study during the months of May 2013 to March 2014.

The purpose of this investigation was to identify the cognitive deficits present in this sample in order to understand the challenges that might be present in this type of population. Previous studies have suggested that chronic alcohol abuse has been linked to several cognitive deficits that affect aspects of everyday life, including learning, memory, abstracting, problem-solving, information processing (Parsons et al., 1998), spatial processing (Fein et al., 2006), decreased executive functioning (Glass et al., 2009), and impaired verbal fluency and decision making (Fernandez-Serrano et al., 2010). Other behavioral disturbances that occur with alcohol use include increased impulsivity and aggression (Bjork et al., 2004) and proneness to social deviance and disadvantageous decision-making (Fein et al., 2004). Further older age, lower education, health problems, psychiatric diagnoses, familial alcoholism, and duration of heavy drinking, have been inversely related to neuropsychological ability (Bates et al., 2006).

In this study, participants were given a brief neuropsychological battery, the repeatable battery for the assessment of neuropsychological status (RBANS). This measure uses twelve subtests to assess cognitive domains of attention, language, visuospatial ability, immediate memory, delayed memory, and yields an overall cognitive function score. An analysis of this sample’s subtest scores in comparison to a normative sample indicated lower mean scores on the list learning and figure copy subtests, indicating lower performances on immediate verbal memory and visuospatial ability. Further, when this sample's mean index scores were compared to an average index score of 100, analyses indicated lowered scores on visuospatial abilities, immediate memory, and overall cognitive function. These results are in agreement with previous research (mentioned above).

The next hypothesis of this study was that lower income, education, age at first drink, and higher severity of drinking (measured by number of drinks per day) would be inversely related with cognitive function. While this study did not entirely confirm these hypotheses, it did indicate that a higher number of years of education influenced higher rates cognitive functioning, which is not surprising. One reason the other hypotheses were not supported could in great part be due to the skewness of high income in this sample, with half of the participants making over $80,000, which is well over the average income of $61,000 in the US, according to the US Census Bureau. Further, given the small sample size, the range in age at first drink and number of drinks per day may not have been sufficient in detecting a relationship with cognitive function.

Another goal of this study was to examine variables that may be negatively related to treatment completion. In the addiction treatment program at the Loma Linda Behavioral Medical Center, of the 25 patients recruited, 16 (64%) patients completed treatment. This is consistent with previous studies, which report completion rates of 65.2% (Fishman et al., 1999), and attrition rates of 10-30% (Rabinowitz and Marjefsky, 1998). This study hypothesized that lower cognitive function would predict lower levels of treatment completion, as previous research has suggested (Aharonovich et al., 2006;

Teichner et al., 2002). While the index scores of the domains of cognitive function did not significantly predict treatment completion, the analysis comparing completion rates of those with below average scores to those with average or above delayed memory scores yielded a result indicating that below average delayed memory scores negatively impacted treatment completion. The most direct explanation for this finding is that those with poor delayed memory may find it more difficult to carry over information learned during their treatment program, directly influencing their motivation to remain in treatment. With such strong biological and social drives to return to alcohol use, if one cannot remember the reasons to abstain, treatment compliance may become too difficult. It is highly likely that the other domains were not predictive of treatment completion due to insufficient sample size.

The last hypothesis of this study was that other risk variables, such as comorbid mental health diagnoses and/or previous dropout from treatment would impact treatment completion rates. Again, this study did not uphold this hypothesis. This could be due to insufficient sample size, or may suggest that there are other more relevant factors that influence treatment completion. Investigating symptomatology related to mental health diagnoses may prove to be more relative to treatment completion than the diagnosis itself.

Limitations

The present study has a number of limitations. First off, the sample size recruited for this study was very small (n = 25). With a sample of this size, options for data analyses are not only limited, but are poorly utilizable in establishing significant relationships between variables. The data regarding alcohol use history should have been more specific. For example, the interview should have ascertained how many years each participant struggled with alcohol abuse versus years of subclinical alcohol use. Further, the neuropsychological test use, chosen for its short administration time, which was determined by the treatment program, is not as sensitive as one would need for an investigation of this nature. A more comprehensive battery, including individual tests for each domain of cognitive function would be much more appropriate. The ideal battery, while still accounting for participant effort and time considerations, would include the Wechsler Adult Intelligence Scale IV - Digit Span subtest, Trail Making Test A & B, Controlled Oral Word Association tests of Semantic and Phonemic Fluency, California Verbal Learning Test II, Rey Figure Copy Test, Wechsler Memory Scale IV – Logical Memory and Visual Reproduction Subtests, and Wisconsin Card Sorting Test. Beck Depression Inventory and Beck Anxiety Inventory would also be relevant.

Clinical Implications

With these limitations established, it is important to note that this study is still innovative and fully applicable to the clinical setting at hand. This is the first study conducted at the Loma Linda BMC that has evaluated cognitive function in their treatment population. Further, given that half of this sample scored below average on overall cognitive function, it suggests an area in which program development could identify as an area of focus. Utilizing this data, the staff and counselors can immediately start to apply this knowledge to the treatment program. Baseline cognitive assessments can be helpful in identifying those with cognitive deficits, who may be at higher risk of dropping out of treatment. If the treatment staff can target and engage these patients, they may be able to keep them in treatment longer. With studies showing that longer time in treatment directly impacts future abstinence (Moos et al., 1995), this can be a very important clinical factor.

Research Implications and Future Directions

In regards to research implications, this study shows that there may be factors that affect treatment completion that have not yet been investigated. It will be important to identify what these factors are in order to improve treatment, and its direct influence on future abstinence. This study may also generate a need to evaluate site-specific treatment programs, in order to identify risks for treatment dropout. Further, it may suggest that individually tailored treatment plans are even more important to treatment, as patients with different cognitive deficits and associated symptoms may benefit from different types of interventions.

In regard to future directions, this study has incorporated a repeated measures protocol, in which participants are being given a cognitive assessment at baseline, and also at the end of their treatment. This will allow our researchers to investigate whether participant's cognitive function changes over time, and in what way. By identifying deficits that improve, remain constant, or decrease over time, we can theoretically implement cognitive remediation strategies into the treatment protocol that can directly address cognitive deficits, and aspire to improve treatment completion rates.

Conclusion

In summary, this study aimed to identify cognitive deficits in the addiction treatment population at the Loma Linda Behavioral Medical Center. According to previous research and literature, cognitive deficits related to learning, memory, abstracting, problem-solving, information processing (Parsons et al., 1998), spatial processing (Fein et al., 2006), decreased executive functioning (Glass et al., 2009), and impaired verbal fluency and decision making (Fernandez-Serrano et al., 2010) were all found to be associated with alcohol use and abuse. Although not all of these findings were not replicated in this population, there were trends in this sample's data that suggested reductions in visuospatial abilities, immediate memory, delayed memory, and overall cognitive function. Further, it was found that below average scores on delayed memory significantly predicted treatment dropout. This discovery can be utilized in this, and all, treatment populations, as cognitive deficits can directly impact a patient's engagement in and completion of treatment. By identifying those with memory difficulties as having a lower rate of treatment completion, staff and counselors can target these patients in order to deepen their engagement in treatment. By retaining these patients in treatment longer, not only could the LLUBMC's chemical dependency treatment program have higher rates of completion, these patients may show benefits of longer rates of abstinence after finishing treatment. Further, other risk factors such as lower income, younger age at first drink, and drinking severity as they related to cognitive function were investigated; however, the results did not support they study hypotheses. This may have been in part due to small sample size, undetectable range in prevalence, or simply that these variables are not significantly predictive of cognitive function. Comorbid mental health diagnoses and prior treatment dropout were also examined as they related to treatment completion. Again, while the findings of this study did uphold the study hypotheses, this may be due to small sample size or poor range in variable data. This suggests a need for continued research in this area and further investigation into factors that effect treatment completion. By identifying these factors, treatment programs may be able to target patients who are at risk for not completing treatment. By targeting at risk patients, treatment programs may be able to increase treatment retention rates, improve treatment completion, and in turn, reduce national rates of addiction relapse in the future.

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APPENDIX A

PARTICIPANT INFORMATION SURVEY

NAME (first and last name):

____

Today's Date___________________________________

Demographic Questions

1. Date of Birth: (mm/dd/yyyy) ______/______/__________

2. Gender: Male/Female (circle one)

3. What city do you live in?

   City: _______________________________________

4. Approximately how long have you lived at this address? (Years/Months) _____________________

5. Race/Ethnicity: (please check one)

   _____ Caucasian
   _____ Hispanic
   _____ African-American/Black
   _____ Asian
   _____ Other (specify) ____________________________

6. What is your marital status:
   [ ]1 Married
   [ ]2 Remarried
   [ ]3 Widowed
   [ ]4 Separated
   [ ]5 Divorced
   [ ]6 Single, never married

7. What is your highest level of education?
   [ ]1 Grade School or Less Education
   [ ]2 High school diploma or equivalent (trade school certificate)
   [ ]3 Some college or Vocational, Business or Trade School
   [ ]4 Associate or Bachelors college degree

[ ]5 Masters or Doctoral degree

8. Do you have a profession, trade, or skill? ____________________________

9. What is your employment status?
    a. Employed full time
    b. Employed part time
    c. Student
    d. Unemployed

10. What type of health insurance do you currently have?
    [ ]1 I don't have any health insurance
    [ ]2 Private Insurance, Blue Cross, HMO
    [ ]3 Medicare/Medicaid/Medical
    [ ]4 Champus/ Champus VA/other military
    [ ]5 Other type of insurance:

11. What is your average household income?
    a. <10,000
    b. 10,000-<35,000
    c. 35,000-<60,000
    d. 60,000-<80,000
    e. 80,000+

Drug and Alcohol history questions

12. Have you previously been in treatment prior for alcohol addiction or drug rehab?
    No, skip to question 16
    Yes

13. How many times previously have you been in treatment for alcohol addiction or drug rehab?___________________

14. Did you terminate any of the previous treatments early?
    No, skip to question 16
    Yes

15. Why did you choose to terminate the previous treatments early?
    ____

16. At what age did you begin drinking alcohol? ___________________

17. On average, how many drinks do you have per day? ___________________

18. On average, how many drinks do you consume in one sitting? _____________

19. Are there any other drugs you take either regularly or even on occasion?

    a. Heroin: (#times)___________________ (#years)________________________
    b. Methadone: (#times)________________ (#years)________________________
    c. Benzodiazepines (Xanax, Valium, etc.): (#times)_______ (#years)_________
    d. Cocaine: (#times)___________________ (#years)________________________
    e. Amphetamines (meth, speed, etc.): (#times)_________ (#years)___________
    f. Cannabis: (#times)________________ (#years)________________________
    g. Hallucinogens (LSD, PCP, mushrooms, etc.): (#times)_____ (#years)______
    h. Inhalants: (#times)___________________(#years)________________________

20. When was the last time that you had any alcohol or took drugs, other than the medications given to you in treatment?________________________

21. How important is it for you to complete treatment for your alcohol/drug problems? (0-5; 0:not at all, 5:extremely important) ____________

General Health Questions

22. Have you ever had an injury to your brain? (like concussion, trauma..etc.)
    No
    Yes, please specify____

23. Are you being treated for any medical illness at this time?
    No
    Yes, please specify____

24. Have you ever been diagnosed with a chronic medical illness? (like cancer, diabetes, etc.)
    No
    Yes, please specify____

25. Have you ever been diagnosed with a mental health condition (like depression, bipolar…etc.)
    No
    Yes, please specify____

26. Have you ever been diagnosed with a learning disability? (like ADHD, reading disability, writing disability, etc.)
    No
    Yes, please specify____

27. Are you currently taking any medication?
    No
    Yes, please specify____

Stress

28. What do you feel is your current stress level on a scale of 0-10 with 10 the worst and 0 no stress at all?

Legal History

29. Was this admission prompted by the criminal justice system?
    No
    Yes, please specify____

30. Are you on probation or parole?
    No
    Yes

Family History

31. Do you have any relatives that have/had a significant drinking or drug use problem?
    a. Mother
    b. Grandmother
    c. Grandfather
    d. Uncle
    e. Aunt

    f. Father
    g. Grandmother
    h. Grandfather
    i. Uncle
    j. Aunt

    k. Siblings