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## Improving Criminal Justice Interventions for People with Alcohol Problems

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### Introduction

Alcohol misuse represents a significant threat to our nation's public health. While approximately 70 percent of adults use alcohol safely and responsibly, and never exceed recommended daily limits for alcohol use, approximately eight percent meet the current diagnostic criteria for alcohol abuse or dependence (1). For people who enter the criminal justice system, the prevalence of alcohol misuse related problems is much higher. Estimates of alcohol use disorders range from 17 to 30 percent for incarcerated men, and 10 to 24 percent for incarcerated women (2). While screening and treatment for alcohol problems is not standard practice in many criminal justice environments, there is a growing awareness in the field that treatment for alcohol and other substance use disorders should be an essential part of successful rehabilitation.

Recent evidence has shown that treatment for alcohol misuse is effective in reducing alcohol consumption and lowering recidivism among criminal offenders. Although many offenders still do not receive adequate substance abuse services, the criminal justice system refers more individuals to alcohol treatment every year than any other source. In 2006, almost half (43 percent) of all referrals to alcohol treatment programs were generated by the criminal justice system (3). Referral to treatment, however, does not ensure rehabilitation for people with alcohol and drug use problems. Because some treatment programs only offer detoxification support, while others may be poorly suited for the long-term mental and emotional withdrawal episodes associated with substance abuse treatment, criminal justice professionals should stay informed about alcohol and drug abuse treatment as well as its effects.

Developing an effective treatment plan for criminal offenders requires an understanding of how long-term alcohol misuse affects a person's physical health, emotional and behavioral well-being, and cognitive abilities. While many treatment programs focus on the physical and emotional effects of alcohol abuse, it is especially important for criminal justice professionals to be informed about the cognitive effects of alcohol abuse.

### Effects of Alcohol Problems on Individuals

Research continues to reveal that excessive alcohol use can have copious negative effects on an individual's health and well-being. Chronic excessive alcohol misuse is associated with an increased prevalence of many diseases, such as cancer, liver disease, pancreatitis and heart disease. Decades of research also indicate that alcohol abuse and dependence can have serious and long lasting effects on brain chemistry and composition, including decreased volume of both the grey and white matter in the frontal lobe of the brain (4). Grey matter is a general term used to describe the regions of the brain involving muscle control, sensory perceptions, memory, emotions and speech. White matter is involved in relaying sensory information from the body to the brain's cerebral cortex; and also regulates autonomic functions like body temperature, heart rate and blood pressure (5).

People with alcohol abuse or dependence disorders, compared to people without these disorders, tend to perform significantly worse on a wide variety of cognitive tasks especially those requiring memory, perception, learning, and emotional regulation. While research suggests that many cognitive functions can be recovered after achieving abstinence from alcohol, significant variations abound regarding the time period necessary to recovery cognitive functioning. Research suggests that almost half of alcoholics demonstrate cognitive deficits three weeks after alcohol abstinence, and 15 percent have deficits that

persist for as long as a year following abstinence (6). These cognitive impairments may hamper an individual's ability to achieve, or maintain abstinence. There is evidence that individuals with higher levels of cognitive impairment are less likely to comply with treatment, and are less likely to reduce drinking than their less impaired counterparts (7). Understanding how these cognitive impairments occur, and how impairment can change over time, can provide substantial insight into how to best help cognitively impaired individuals to achieve recovery.

A considerable amount of research suggests that alcohol dependent individuals may exhibit a number of cognitive deficits related to the "executive functions" of the brain. These executive functions, which are largely controlled by the frontal lobe of the brain, refer to a series of higher order cognitive abilities like planning and organizing one's own behavior. Although researchers tend to disagree about the specific skills associated with executive functioning (8), they generally agree that executive functions include skills such as abstract thinking, cognitive flexibility, judgment and problem solving.

## Alcohol & Cognitive Functioning

Recent research has suggested that many of the cognitive deficits associated with excessive alcohol use can be recovered over time. Although a variety of factors influence the recovery process, Fein (9) suggests that the single most important predictor of cognitive recovery is the length of the alcohol abstinence time period. That is, the longer the length of time since the occurrence of alcohol abuse or dependence, the greater the recovery of cognitive abilities (9). The specific rate of recovery depends on a number of biological and social factors; still, research suggests that cognitive functions may begin to recover as early as a few weeks following abstinence (10). Neuropsychological research—research focused on how the brain and nervous system relate to psychology and behavior—indicates that people with alcohol dependence demonstrate significant brain abnormalities including problems with frontal lobe tasks (11). A brief outline of the cognitive functions that are affected by alcohol, as well as how these functions recover following abstinence is presented below.

### Interpersonal Relationships

Research suggests that people with serious alcohol problems tend to display impaired abilities to correctly interpret the emotional responses of others. When presented with a series of cards displaying different facial expressions, alcoholic individuals were less able to correctly identify the type of emotion depicted (e.g., happiness, sadness, anger) than a matched control group. In addition to making more mistakes than the control group, alcoholic individuals in the study were also more likely to make mistakes that attributed negative emotions to positive stimuli. For example, the people in the study with alcohol problems were more likely to mistake a happy face with an emotion such as sadness or disgust than they were to correctly surmise that the smiling face was showing happiness (12). Researchers suggest that the ability to correctly identify emotional responses in others is an important aspect of maintaining healthy interpersonal relationships; conversely, the inability to interpret these responses may hinder an alcoholic individual's ability to maintain and sustain interpersonal relationships (13). The ability to maintain successful interpersonal relationships represents an important aspect of recovery, and a lack of close, supportive relationships has been shown to be a significant risk factor for relapse (14).

#### *Impact on Recovery*

The ability to decode emotional facial expressions may not improve, even with long-term abstinence from alcohol. One recent study suggested that the ability to correctly decode facial expressions does not improve, even with two to 10 months of abstinence (15). However, there is some evidence that these skills can be recovered, and that incorporating social skills training into treatment programs can improve the success of alcohol treatment (16).

### Impulse Control

According to recent research, people with alcohol problems tend to display lower levels of impulse control compared to people without alcohol dependence. Cognitive testing also suggests that alcoholic individuals tend to have higher preference rates for immediate rewards over delayed gratification than do people without alcohol dependence (17).

#### *Impact on Recovery*

Although there is relatively little research examining the effects of alcohol abstinence on impulse control, there is some evidence that abstinent alcoholics continue to display increased rates of impulsivity five weeks into the treatment process. (18).

## **Learning & Memory**

While the effects of acute alcohol intoxication on memory are well-known, there is also considerable evidence that longer term alcohol abuse and dependence are associated with a variety of memory problems. At the extreme end of the spectrum, individuals with chronic alcohol dependence have higher risks for developing Wernicke-Korsakoff syndrome, a brain disorder caused by a thiamine deficiency. Individuals with Wernicke-Korsakoff syndrome tend to display a variety of severe memory and learning problems, such as an inability to form new memories.

Chronic, excessive alcohol use is also associated with a variety of less severe memory and learning problems. Research suggests that alcoholic individuals perform worse on a variety of memory-related cognitive tests including immediate recall and episodic memory, which involves event recollection and emotions that are associated with those events (19). Although the specific mechanisms by which chronic alcohol misuse affects memory are unclear, researchers indicate that alcoholic patients have problems both with encoding new information and retrieving existing information (19).

Alcoholic individuals also tend to perform significantly worse on a number of verbal and non-verbal learning tasks when compared to people without alcohol dependence. Research suggests that alcohol dependent individuals tend to display deficits in the area of information processing, attention and problem solving. People with alcohol dependence also show decreased abilities to change their responses to situations based on updated feedback (9).

### *Impact on Recovery*

Some research suggests that these learning and memory deficits may begin to improve following a significant period of abstinence. In a review of the cognitive literature, Fein (1990) concludes that most alcoholic individuals who had been abstinent from alcohol use for less than two months continued to display a variety of deficits in both problem solving and learning activities. Findings from the review also suggested, however, that these deficits improved with sustained abstinence.

Longitudinal research suggests that alcoholic individuals who maintain sobriety for 13 months display significantly improved levels of problem solving skills and learning skills compared to alcoholics that had resumed drinking (20). Other research suggests that while people who have been abstinent from alcohol for a period of three months tend to display better memory abilities than those that have been abstinent for three weeks, three-month abstainers still perform worse than individuals who were never alcohol dependent (21). Fein (1990) also suggests that there is significant evidence that verbal short-term memory skills tend to recover within the first two months of abstinence, but that non-verbal memory skills tend to persist for significantly longer.

Research examining the long term effects of abstinence on learning and memory problems proposes that these functions are eventually recovered. Fein found that alcoholic individuals that had been abstinent for an average of six and a half years displayed normal patterns of attention and cognitive flexibility (22). Other research of long term abstinent individuals have found that after they have been abstinent for almost seven years they tend to display normal patterns of both learning and memory (23).

## **Motor Skills**

It is well-established that acute alcohol intoxication has a significant impact on motor skills. Intoxicated individuals often demonstrate a variety of problems with gross motor coordination (e.g., walking, sitting up) and fine motor coordination (e.g., writing, buttoning). In addition, research has also established that chronic alcoholism is associated with structural abnormalities and functioning in areas of the brain that are commonly associated with motor skills, such as the frontal lobe (11). These changes seem to have significant clinical implications, and alcohol dependent individuals tend to show significantly worse performance on a variety of tests measuring motor skills than their non-dependent counterparts. Significant deficits have been shown on measures of motor speed (24), muscle strength, and visual motor integration such as hand-eye coordination (25).

There is also a significant amount of clinical research suggesting that actively alcoholic patients tend to display characteristic disturbances in both posture and movement (26). The motor problems exhibited by alcohol dependent individuals are likely to make everyday activities such as driving a car significantly more difficult. Whether actively intoxicated or not, these motor problems are likely to leave alcohol dependent individuals at greater risk for accidents and injuries than their non-dependent counterparts (27).

## *Impact on Recovery*

There is some evidence that certain motor functions can be restored in alcoholic individuals who have been abstinent for approximately two months. Tarter and Jones (25) reported that motor functioning can improve during a two month abstinence period, especially for individuals with shorter histories of alcohol dependence. Compared to alcoholic individuals with a long history of alcohol dependence (more than 10 years), those with shorter lifetime alcohol dependence displayed normal patterns of motor speed, muscle strength, and visual motor integration at two months following abstinence.

## **Independent Predictors of Cognitive Functioning**

The length of time abstinent from alcohol is an important predictor of cognitive recovery. Still, research has identified a number of other factors that affect cognitive recovery in people dependent on alcohol. Some of these factors are important independent predictors of cognitive functioning, while others mediate and moderate the effects of abstinence on cognitive recovery. Understanding how these factors impact cognitive functioning and the recovery process can provide useful guidance when planning treatment options.

### **Length of Time Abusing Alcohol**

While it is clear that alcohol abuse and dependence are associated with a variety of cognitive deficits, the relationship between the amount of alcohol consumed, and overall cognitive functioning is less clear. Early research suggested that only relatively long-term alcohol dependence is associated with neuropsychological damage. However, more recent research suggests that cognitive damage can occur in a much shorter span of time than previously described. Research examining the effects of the duration of alcoholism on cognitive functioning shows no differences in neuropsychological functioning among individuals who abused alcohol for four to nine years compared to those that had abused alcohol for 10 years or longer. Additional research supporting the idea that cognitive damage associated with alcohol dependence occurs relatively quickly has identified cognitive impairments in even relatively young adolescents with alcohol problems (28).

### **Dose-Response Relationship**

Research has also attempted to examine whether a dose-response relationship exists between alcohol consumption and cognitive performance. The results of this research are also unclear. While some research suggests that the quantity of alcohol use over a specific time period is correlated with cognitive performance, other research has failed to document these findings. Research attempting to clarify these issues indicates that the quantity of alcohol consumed in the relatively short-term past may impact current cognitive functioning, but the total amount of lifetime alcohol consumption may not have a significant impact on cognitive functioning.

### **Age**

Research examining the hypothesis that older brains may be more susceptible to the damaging effects of chronic alcohol use shows mixed results. While some research suggests that age moderates the effects of alcohol use on cognitive functioning, (22), other research has found that older alcoholics are not more impaired than their younger counterparts (29). However, research examining the effects of alcohol in older populations must be examined with caution, since the prevalence of alcoholism declines steadily with age. Research has consistently demonstrated that alcoholism is associated with increased levels of accidents, injuries and deaths. To complicate the matter further, it is also necessary to note that alcoholic individuals with higher levels of cognitive functioning tend to survive longer than those with lower levels of functioning. In either case, there is evidence that decreased cognitive functioning can be reversed, even in elderly populations. One recent study found that elderly alcoholics who were alcohol dependent for as many as 40 years could demonstrate normal, and even superior cognitive functioning, compared to a matched control group after a period of abstinence (22).

### **Family History of Alcoholism**

Some research suggests that having a family history of alcoholism may place alcoholic individuals at greater risk for cognitive deficits than alcoholics who do not have family histories (30). There is also some evidence that having a family history of alcoholism may affect the recovery of cognitive functioning once abstinence is achieved. Alcoholics without a family history of alcoholism tend to show improved performance, especially in the areas of memory and attention, at seven weeks abstinence compared to alcoholics with a family history of alcoholism (31).



## Other Comorbid Conditions

There is significant research suggesting that alcoholics with serious comorbid conditions such as head injuries, seizures, psychiatric disturbances, and cirrhosis, display increased deficits compared to alcoholics without such conditions (9). There is some evidence that cognitive functioning can improve if these co-morbid conditions are addressed. One recent study suggested that sober alcoholics with alcoholic liver disease showed improved functioning after liver transplantation surgery compared to similar patients who have not received a transplant (32).

## Timeline of Cognitive Recovery Following Abstinence

Although many factors affect the rate at which cognitive functioning is recovered, there is substantial evidence that one of the most important factors contributing to substantial cognitive recovery is the length of time following alcohol abstinence. And while individual outcomes vary widely, there is relatively little evidence to suggest that substantial cognitive recovery occurs within the first few weeks following abstinence. Indeed, most cognitive research does not even attempt to test alcoholic individuals in the first two weeks of alcohol abstinence because these individuals are likely to be in the active phases of detoxification during this time period. Many common side effects, such as sleep disturbances, tremors, and irritability—are likely to make any type of cognitive testing during this same time period completely unreliable. These side effects can present similar problems for individuals attempting to begin treatment during this time period. Individuals in the active phases of alcohol withdrawal may have a limited ability to meaningfully engage in the treatment process and some adjustments to the treatment process may be necessary.

Similar considerations must be made to account for the various cognitive deficits exhibited by individuals beginning alcohol abstinence. These cognitive deficits, which can persist for a significant amount of time, even after alcohol abstinence is achieved, may present difficulties for individuals that are attempting to make major life changes. Indeed, researchers have suggested that many of the skills that are necessary to change behavior such as those outlined in Prochaska and DiClemente's Stages of Change Model are among those impaired during the early phases of alcohol abstinence. The Stages of Change Model (33, 34) is a theory based on the principle that change is cyclical; meaning a person often repeats the same stages before true change occurs. The stages identified by Prochaska and DiClemente include pre-contemplation, contemplation, preparation/determination, action/willpower, maintenance and relapse. And while cognitive impairment may complicate the therapeutic process, there is some evidence that the Stages of Change Model can be modified to be effective with patients that have suffered various forms of brain injuries.

One of the most successful methods of treatment for substance abuse is cognitive therapy, which requires the use of functions that are commonly affected by alcohol dependence. The degree to which an individual's cognitive skills are affected by excessive alcohol use, and the timeline at which they are recovered, can have a significant impact on a person's ability to meaningfully benefit from cognitive behavioral therapy. Understanding how alcohol affects cognitive processes, and how these effects abate over time, may provide useful insights regarding how to best help individuals achieve and sustain recovery.

## Implications for the Criminal Justice System

Given substantial evidence that substance abuse is prevalent among individuals incarcerated for a variety of offenses (2), screening and brief intervention for substance abuse problems should be routine for all individuals coming into contact with the criminal justice system. When the results of screening suggest that an individual has a serious substance abuse problem, they should be offered access to treatment to address their substance abuse issues. If screening suggests a less serious problem, a brief intervention, emphasizing risk and the importance of setting reasonable limits, may prove to be helpful in reducing alcohol misuse.

Understanding the impact of chronic, excessive alcohol use on cognitive functioning, and how alcohol abstinence can influence cognitive recovery can help criminal justice officials to develop better treatment plans for people with alcohol problems. While the majority of offenders with substance abuse problems do not receive adequate treatment services, it is becoming increasingly common for criminal justice officials to take advantage of a variety of alternative strategies to reduce recidivism among affected offenders. These strategies, which are designed to help individuals maintain abstinence from alcohol for longer periods of time, and to reduce recidivism, may also help to assist in the recovery of cognitive functioning.

Decades of research have suggested that sanctions alone are not sufficient to alter the behavior of everyone with an alcohol or drug problem. While there is significant evidence that deterrence efforts such as DUI campaigns do work, there appears to be a subset of the larger population that remains immune to deterrence efforts. Although increased awareness and enforcement of DUI have been successful in reducing DUI-related fatalities during the past twenty years, the effectiveness of these campaigns may have reached a plateau, with rates remaining virtually unchanged since 1997 (35). One possible explanation for this finding is that while traditional deterrence efforts have been successful in appealing to a majority of the population, the subset of individuals that continue to offend are essentially immune from traditional deterrence methods such as jail and fines, and will require different, and more intensive strategies such as treatment and monitoring.

### **Monitoring**

The threat of incarceration can be an extremely powerful motivator to encourage criminal offenders to initiate treatment, and probationary periods can provide courts with the opportunity and means to ensure treatment compliance. There is some evidence that regular contact with probation officers or court-designated monitors who have training in addiction can help reduce recidivism. In one study, first-time offenders who reported to weekly alcohol monitoring had substantially fewer DUI re-arrests than those who were not required to report. Despite evidence demonstrating the efficacy of alcohol monitoring, the relationship between monitoring intensity and treatment outcomes remains unclear. A meta-analysis examining monitoring intensity reached no conclusions; however, the meta-analysis did indicate that probation in combination with treatment reduced recidivism more effectively than probation alone (36). More recent research with drug courts has suggested that more intensive monitoring benefits high-risk individuals, such as those with a prior history of treatment, but may be ineffective with low-risk offenders (37). More research is needed to identify monitoring strategies that can be adapted for use with varied populations and that have been proven cost-effective.

Technological advances in monitoring and testing are already in widespread use and can be used to both track individual-level outcome, and to help court officials and treatment professionals to evaluate treatment effectiveness. Devices such as ignition interlocks can prevent an offender from driving their vehicle, and can provide parole officials with written records of the event. Newer devices allow continuous transdermal monitoring of offenders from remote locations, such as the ankle bracelet made popular by high-profile celebrity DUI cases. These ankle bracelets track Transdermal Alcohol Content (TAC) levels and can be used to encourage offenders to abide by the rules of their treatment programs and abstain from alcohol for a sufficient time in order for recovery to take hold.

### **Medications**

Medications such as naltrexone and other anti-craving medications offer extremely promising outcomes (38). Results from clinical trials suggest that naltrexone is successful in helping patients in treatment for alcoholism remain abstinent by blocking alcohol pleasure effects and the intense cravings. However, the ability of naltrexone to reduce alcohol cravings is most effective when the medication is taken as part of a treatment program that includes therapy or counseling focused on changing alcoholic behaviors (39, 40). Adherence to treatment programs that utilize naltrexone may be simplified by a newer version of the medication, Vivitrol, that allows administration in doses that last for as long as one month. An additional advantage of Vivitrol, which is administered by a healthcare professional, is that tracking adherence to treatment can be done easily since the provider can report whether or not the medication was administered. Although some programs for DUI offenders have begun to use medications as an adjunct to more traditional therapeutic approaches, effectiveness in reducing recidivism in this population has yet to be thoroughly established. In addition, the cost of these medications—whether paid for by the state or the offender—may limit the utility of this approach in large-scale settings; at least until more conclusive evidence demonstrating their effectiveness in criminal justice settings are identified.

### **Testing**

Frequent and random testing for alcohol and other drug use during the probationary period can help determine whether relapse has occurred. Further, the consequence for violating the conditions of their probation (i.e. testing positive for alcohol or drug use) provides offenders with a strong and socially acceptable reason to remain abstinent from alcohol and other drugs. This motivation can be invaluable in their recovery efforts, especially if they maintain relationships with people who are unsupportive about abstaining from alcohol. Testing is also a way to determine whether the alcohol treatment program is effective.

# Conclusion

The criminal justice system has made significant efforts to address alcohol and drug abuse issues. However, most experts agree that the vast majority of criminal offenders requiring treatment for substance abuse do not receive adequate services. The high social costs of criminal behaviors and the soaring financial costs associated with arresting, prosecuting, and incarcerating criminal offenders, offer good reason to improve the alcohol interventions that criminal offenders receive. Listed below are options professionals in the criminal justice system can advocate for in order to improve criminal justice interventions for people with alcohol problems.

- 1. The criminal justice system should strive to increase rates of screening for alcohol and drugs given the high probability of alcohol and drug problems.**
  - a. Screen persons entering the system for alcohol and drug problems. Since screening everyone is likely to be extremely difficult or impossible in most jurisdictions given existing time and resources, efforts should be made to first provide services to those that are most likely to exhibit alcohol problems (e.g. repeat offenders, individuals whose crime involved alcohol or drugs).
  - b. Employ brief intervention and education programs that motivate behavior change for those with less serious problems
  - c. Offer individuals with more serious problems access to treatment services, designed to address substance abuse and other comorbid problems
- 2. Take into consideration a person's cognitive functioning when assessing treatment options and criminal sanctions.**
  - a. Understand how cognitive functioning is affected by alcohol, and how these effects abate over time.
  - b. Provide individuals access to treatment programs that take cognitive functioning into account.
  - c. Combine criminal sanctions with treatment programs that incorporate social skills training
- 3. The longer an individual is abstinent from alcohol, the greater the opportunity for cognitive recovery.**
  - a. Consider treatment options and technologies that help offenders to remain abstinent from alcohol where necessary and allow rehabilitation to be monitored
  - b. Strive to reduce long delays between arrests and treatment initiation
  - c. Evaluate treatment programs using standardized performance measurements, which can be enhanced by using technological advances and tracking relapse patterns

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