Mental Health and Substance Use Dual Diagnosis in Impaired Drivers

Impaired driving continues to be the greatest contributing factor in Washington's fatal crashes. Researchers have long recognized that driver alcohol or drug use leads to impairment of driver performance. Since the 1990s, a growing number of researchers have focused on an even more complex issue: that alcohol and drug dependency are more likely to occur among people diagnosed with at least one other mental illness. This is a condition researchers refer to as dual diagnosis, also known as "comorbidity" or "co-occurrence" of substance-use and mental disorders.

U.S. surveys have tried to gauge the extent of this comorbidity for more than seventy years. Today, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) continues this mission. Findings in earlier surveys were troubled by an inability to differentiate between psychiatric symptoms stemming from a primary mental illness versus those rooted in alcohol or drug use. This problem diminished in 1994 when the fourth edition of the *Diagnostic and Statistical Manual of Mental Health Disorders* (DSM-IV) was published with clear guidelines for distinguishing between the symptoms of primary psychiatric conditions and symptoms arising from substance use disorders (SUD).

Results from the 2012-2015 NESARC surveys showed that 30.3 percent of Americans presented with a lifetime alcohol-use disorder (AUD), while 10.3 percent presented with a lifetime drug-use disorder (DUD). In addition, 13.2 percent of those surveyed indicated a lifetime major depressive disorder; 4.4 percent were diagnosed with bipolar disorder; 6.4 percent with post-traumatic stress disorder (PTSD); and 17.2 percent were diagnosed with an anxiety disorder besides PTSD. Follow-up studies based on the NESARC sample show that people with psychiatric disorders have higher rates of AUDs and DUDs. Researchers have also found that people diagnosed with SUDs are more likely to be diagnosed with a mental illness than those without SUDs.

What do these findings have to do with impaired-driving? A group of studies from different regions of the country, including standardized psychiatric evaluations of convicted Driving Under the Influence (DUI) offenders, show that these drivers, especially repeat DUI offenders, have much higher rates of mental illness than the national rates found in the NESARC surveys. One study estimates the extent of SUDs and mental illness to be about two times to over ten times the general-population rates. This variability likely results from contrasting study methods, regional socioeconomic and cultural differences, and the sheer complexity of factors inherent in the problem of comorbidity. Age, gender, and ethnicity are well-known major risk factors for dual diagnosis. In recent research, inadequate or abusive parenting, genetic predisposition, and lower socioeconomic status have also emerged as significant risk factors. In any case, it is crucial that public safety officials, including those who are involved in DUI prevention, start to recognize the extent of co-occurring SUD and mental illness among DUI offenders.

It is equally important to recognize that specific changes to our legal and treatment systems will strengthen efforts to reduce the scope of dual diagnosis disorders. Studies show that DUI offenders with a dual

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diagnosis disorder are much more likely to recidivate. Several recent studies have concluded that traditional legal-punitive approaches and many SUD treatment programs have not reduced DUI recidivism, for two main reasons. First, traditional arrest and punishment measures deter impaired driving only minimally. Several research studies estimate that the average "first-time" DUI driver is arrested after having already driven impaired between 200 and 2,000 times. Thus, the threat of arrest and discipline has not created deterrence, especially for people in the grip of co-occurring disorders. Second, too many SUD treatment programs do not address the core psychological issues linking mental illness with SUDs, since a lack of awareness of the extent of dual diagnosis in DUI offenders means that treatment programs mostly focus on treating SUDs without recognizing and treating underlying mental illness.

In one notable study, a team of research psychiatrists followed DUI offenders required to participate in various SUD treatment programs in Multnomah County, OR. They found that intake screening at those centers failed to diagnose 97.2 percent of clients with clear symptoms of bipolar disorder, 67.5 percent of clients with symptoms of depression, and 37.3 percent of offenders suffering from DUD. Screening for mental health disorders at intake would reduce the impact of this issue. SUD clients with undiagnosed mental illness often continue to use alcohol and drugs to self-medicate the pain of their psychiatric symptoms. In addition, psychiatric symptoms can impair their ability to use the informational and behavioral strategies they are taught during SUD treatment. Even though more DUI drivers would be arrested with the use of policies like sobriety checkpoints, DUI recidivism will only decrease substantially with approaches that integrate treatment for mental health and substance abuse.

To lessen impaired driving incidents, traffic safety professionals must address all factors leading to an individual's choice to consume alcohol or drugs and then drive. A 2017 study from the Substance Abuse and Mental Health Services Administration (SAMHSA) found that 44.7 million American adults were suffering from mental illnesses, but only 19.2 million of them received any mental health services (43.1 percent). Moreover, in the U.S. less than one in five SUD treatment programs and less than one in ten mental health treatment programs meet guidelines and standards for serving those with co-occurring SUD and mental illness. Ineffective and disconnected mental health and SUD treatment systems result in public health consequences, impaired driving being just one. Even if the traffic safety system successfully removed all repeat DUI drivers from the road, the problem of impairment would only be displaced: yesterday's repeat DUI driver prevented from driving by legal, administrative, or other sanctions, may well wind up as today's impaired pedestrian killed while improperly crossing a road.

For all of these reasons, we urgently need to move beyond traditional impaired driving prevention and treatment practices toward a deeper consideration of the social, economic, and medical factors contributing co-occurence of mental illnesses and SUDs. Stronger, more enlightened, and more integrated mental health and SUD treatment programs by themselves—without any changes to our traffic safety approaches—would go far toward producing a substantial and positive impact on the problem of impairment among drivers and nonmotorists alike.

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Reference Summaries:

Ahlin EM, Zador PL, Rauch WJ, Howard JM, and Duncan GD (2011). **First-time DWI offenders are at risk of recidivating regardless of sanctions imposed.** *Journal of Criminal Justice*. 39:137-142. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3095888/pdf/nihms265653.pdf

This study investigated outcomes of various administrative sanctions and more severe punishments for the driving records of licensed Maryland drivers with at least one recorded DWI offense between 1973 and December 31, 1998. Using data from the Maryland Motor Vehicle Administration, the authors classified all licensed drivers by one of eight separate "disposition sequences" and then applied proportional hazard models to estimate the probability that drivers in the study sample would remain DWI-free through December 31, 2004. Covariates in the model included age, gender, the number DWI offenses on each driver's record, and the number of days since the driver's "index" (i.e., first) DWI offense. Results of this longitudinal study showed that first-time DWI offenders, regardless of the legal consequences they received, were just as likely to recidivate as repeat offenders, and those who received administrative sanctions only "had a risk of recidivating similar to that of drivers who were convicted" (1). The findings challenge the notion, commonplace among judges and state legislators, that first-offenders are "social drinkers who have only driven alcohol-impaired once," when numerous empirical estimates have shown that drivers "can drive alcohol-impaired between 200 and 2,000 times before being arrested even once for DWI" (3). Based on this and other studies, the authors conclude that "punitive approaches to DWI employed by the judiciary have failed to significantly reduce recidivism" (1).

Ahrnsbrak R, Bose J, Hedden SL, Lipari RN, & Park-Lee E (2017). **Key substance use and mental health indicators in the United States: Results from the 2016 national survey on drug use and health** (HHS Publication No. SMA 17-5044, NSDUH Series H-52). Rockville, MD: Center for Behavioral Health Statistics, Substance Abuse and Mental Health Services Administration (SAMHSA).

This is the most recent version in an annual series of national surveys initiated in 1971. The 2016 survey screened a sample of 135,188 households and completed individual interviews with 67,942 Americans ages 12 and over in order to estimate the nationwide prevalence and manner of substance use – including tobacco (cigarettes, cigars, pipes, and smokeless), alcohol (binge-drinking and otherwise), therapeutic drugs of abuse, and illicit drugs (all sorts). The survey also assesses the prevalence and treatment (or lack thereof) of major depressive episodes among adolescents and adults, and the adult occurrence of any mental illness (AMI) and serious mental illness (SMI). Finally, the survey estimated the prevalence of substance use disorders that co-occurred with adolescent and adult mental illnesses. Survey results showed that 44.7 million American adults reported AMI in 2016, and 10.4 million of these suffered from SMI. Only 19.2 million (43 percent) of those with AMI received any treatment, though a higher proportion of subjects diagnosed with SMI reported receiving mental health services. Of the 44.7 million AMI sufferers, 8.2 million (18.3 percent) were diagnosed with a co-occurring substance use disorder.

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Akirav I, (2013). **Targeting the endocannabinoid system to treat haunting traumatic memories.** *Frontiers in Behavioral Neuroscience*. 7, Article 124:1-3. https://www.frontiersin.org/articles/10.3389/fnbeh.2013.00124/full

This commentary on an article appearing in a previous issue of the same journal reviews some of the research literature on the role of the endocannabinoid (eCB) system in regulating emotion and memory. More specifically, "eCB enhancers may be the ideal pharmacological treatment for PTSD by blocking the pathological over consolidation and continuous retrieval of the traumatic event on the one hand, and enhancing its extinction and reducing the anxiety symptoms on the other hand" (1). Previous research indicated the strong role of the eCB system in both maintaining emotional equilibrium and in coordinating the consolidation, retrieval, and extinction of memories. Especially compelling, the author writes, are studies showing that substances activating eCB receptors (in rats) will not only enhance memory consolidation for an inhibitory avoidance task but also prevent PTSD-like symptoms after the animals have been subjected to "a series of intense stressful events." Thus, eCBs may offer an ideal therapy for PTSD since they appear to treat "both the emotional and cognitive aspects of the disorder" (1).

Bellak AS, Bennett ME, Gearon JS, Brown CH, & Yang Y (2006). **A randomized clinical trial of a new behavioral treatment for drug abuse among people with severe mental illness**. *Archives of General Psychiatry*. 63: 426-432. https://jamanetwork.com/journals/jamapsychiatry/fullarticle/209506

Drug use disorders in people with severe and persistent mental illness (SPMI) is a difficult and significant issue confronting mental health treatment providers. The 1990 Epidemiologic Catchment Area (ECA) survey found that lifetime substance abuse prevalence was 48 percent for adults diagnosed with schizophrenia and 56 percent among adults diagnosed with bipolar disorder. This study compared treatment outcomes for two groups of adults with both SPMI and a substance abuse disorder. One group was randomly assigned to six months of treatment in a new experimental program, Behavioral Treatment for Substance Abuse in Severe and Persistent Mental Illness (BTSAS), while the other was randomly assigned to six months of treatment in the normal treatment program, Supportive Treatment for Addiction Recovery (STAR). BTSAS offers a more complete array of flexible treatment approaches, including harm reduction (versus abstinence); short term goal-setting; coping skills training to prevent minor lapses from becoming full-blown relapse (but relapses are not punished); regular urinalyses with monetary rewards for clean results; and social-skills training for equipping participants to resist social pressures more successfully. Data analysis after six months showed that BTSAS participants had much higher clean test results than STAR participants (59 percent versus 25 percent), more clients with at least one 8-week stretch of clean test results (33 percent versus 8 percent), and other desirable outcomes (e.g., fewer in-patient admissions for either psychiatric or substance-abuse issues).

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Faller S, Webster JM, Leukefeld CG, Bumaguin DB, Duarte PCAV, De Boni R, & Pechansky F (2012). **Psychiatric disorders among individuals who drive after the recent use of alcohol and drugs.** *Revista Brasileira Psiquiatria* [Brazilian Journal of Psychiatry]. 34:314-320. http://www.scielo.br/pdf/rbp/v34n3/v34n3a11.pdf

This carefully designed cross-sectional study analyzed data gathered during a Brazilian national roadside survey conducted in 25 state capitals of that country. Follow-up interviews by trained examiners using the Mini International Neuropsychiatric Interview (MINI) resulted in 1,134 respondents who completed the entire survey. Results of a Poisson regression analysis showed that 40.5 percent of drivers testing positive for alcohol or drugs also had a co-occurring psychiatric disorder, compared to 12.9 percent of drivers who tested negative for alcohol and drugs. Adjusted rates revealed that substance-positive drivers were 2.5 times more likely to be diagnosed with any psychiatric disorder, 4.5 times more likely to be diagnosed with post-traumatic stress disorder (PTSD), 3.1 times more likely to be diagnosed with antisocial personality disorder (ASPD), and 2.5 times more likely to be diagnosed with a mood disorder (depression, mania, or hypomania). Of the 40.5 percent of drivers who tested positive for drugs or alcohol, nearly half (48.1 percent) were diagnosed with substance abuse or dependence. The authors conclude, "If drivers could be properly assessed and receive treatment for potential psychiatric problems, the prevalence of driving under the influence of alcohol and drugs could eventually decrease." (318)

Freeman JE, Maxwell JC, & Davey JD (2011). **Unraveling the complexity of driving while intoxicated: a study into the prevalence of psychiatric and substance abuse comorbidity**. *Accident Analysis and Prevention*. 43:34-39. https://eprints.qut.edu.au/38031/1/38031.pdf

This study investigated the extent of co-occurring psychiatric illness and substance abuse disorder in 36,373 Texas drivers with a DUI offense in the previous 12 months, who also volunteered for admission to one of the state's 79 community-based, non-profit substance abuse treatment programs between 2005 and 2008. Intake interviews for these programs included client-assessment data from a "shortened version" of the Addiction Severity Index, and fuller mental health assessments were conducted by counselors trained to evaluate clients according to DSM-IV-TR diagnostic criteria. Since many of the treatment programs did not have DSM-trained counselors, full diagnostic interviews following DSM guidelines were completed for only about two-thirds of the DUI offenders, and just under 85 percent of these interviews did not show positive signs of psychiatric illness. Out of the remaining DUI offenders in treatment, 8.6 percent were diagnosed with depression, 4.2 percent with bipolar disorder, 1.7 percent with an anxiety disorder, and one percent with schizophrenia. Overall, about 15.5 percent of clients arrested for DUI in the previous 12 months were assessed with a DSM-IV-TR psychiatric illness. Out of the fuller sample, two-thirds (65.9 percent) were shown to have alcohol as their primary substance-use problem and for 12.5 percent of clients cannabis was the primary substance-use problem. Additionally, 8.6 percent had a primary problem with cocaine, and 4.7 percent had a primary problem with methamphetamine. Just over eight percent were assessed as having no primary substance-use problem.

Fuehrlein BS, Mota N, Arias AJ, Trevisan LA, Kachadourian LK, Krystal JH, Southwick SM, and Pietrzak RH (2016). **The burden of alcohol use disorders in US military veterans: results from the National Health and Resilience in Veterans study**. *Addiction*. 111: 1786-1794. https://onlinelibrary.wiley.com/doi/full/10.1111/add.13423

This study analyzed data from a nationally-representative sample of 3,157 U.S. military veterans in order to estimate the lifetime prevalence of alcohol use disorder (AUD); the level of common psychiatric conditions associated with AUD; and cofactors of lifetime and past-year likely AUD. Survey results showed lifetime and past-year prevalence of AUD among U.S. veterans to be 42.2 percent and 14.8 percent, respectively. Veterans with lifetime AUDs were at heightened risk for drug-use disorders (OR=10.7), major depressive disorder (OR=2.6), PTSD (OR=4.1), and attempted suicide (OR=4.1).

Grant BF, Goldstein RB, Saha TD, Chou SP, Jung J, Zhang H, Pickering R, Ruan WJ, Smith SM, Huang B, & Hasin DS (2016). **Epidemiology of DSM-5 alcohol use disorder: results from the NESARC-III.** *JAMA Psychiatry*. 72: 757-766. https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2300494?version=meter%20at%20null&module=meter-Links&pgtype=article&contentId=&mediaId=&referrer=&priority=true&action=click&contentCollection=meter-links-click

This article briefly reviewed the history, development, and methodology of the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC). In addition, the survey data was analyzed to estimate the prevalence of alcohol-use disorder (AUD) both overall and in connection with numerous cofactors. e.g., age, gender, income, region, race, and psychiatric disorders. The total sample size for NESARC-III was 36,309 with data collected between April 2012 and June 2013. Results showed 12-month and lifetime AUD prevalence among U.S. residents at 13.9 percent and 29.1 percent, respectively. Subjects diagnosed with AUD were also found to be over three times more likely to suffer from an additional drug use disorder than those without an AUD, and between 10 and 90 percent more likely to suffer from an additional psychiatric illness.

Hasin DS & Grant BF (2015). **The national epidemiologic survey on alcohol and related conditions (NESARC) waves 1 and 2: review and summary of findings**. *Social Psychiatry and Psychiatric Epidemiology.* 50: 1609-1640. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4618096/pdf/nihms-711105.pdf

This paper reviews the history of U.S. national epidemiologic surveys designed to estimate the prevalence and comorbidity of a range of substance use and psychiatric disorders in the U.S. Beginning in the 1960s and 1970s, the ancestors of NESARC were nationwide surveys attempting to gauge the extent of nationwide alcohol and drug use. Sampling methods have become far more sophisticated, enabling researchers to drill down into specific problem areas without sacrificing either precision or generalizability in their findings. This article reports on the results of 2004-2005

Wave 2 follow-up interviews with 34,653 (of the original 43,093 in Wave 1) participants, to identify the extent of substance abuse and psychiatric illness throughout the country. The study's findings were significant: 9.4 percent and 32.3 percent of the U.S. population suffers from either a previous-year or a lifetime substance-use disorder. Alcohol-use disorders (AUD) were the major contributor to this problem, with 8.5 percent and 30.3 percent of respondents suffering from a previous-year or lifetime AUD, and another 2.0 percent and 10.3 percent suffering from a drug-use disorder. In addition, the survey identified prevalences for major depressive disorder (MDD), bipolar disorder (BP), post-traumatic stress disorder (PTSD), other anxiety disorders (OAD), obsessive-compulsive disorder (OCD), and other psychiatric disorders. Prevalences for the major disorders were as follows (previous-year and lifetime, respectively: MDD, 5.3 percent and 13.2% percent; BP, 2.8 percent and 4.4 percent; PTSD, 4.5 percent and 6.4 percent; OAD, 11.1 percent and 17.2 percent; OCD, 7.9 percent (lifetime only).

Hasin D, Samet S, Nunes E, Meydan J, Matseoane K, & Waxman R (2006). **Diagnosis of comorbid psychiatric disorders in substance users assessed with the psychiatric research interview for substance and mental disorders for DSM-IV.** *American Journal of Psychiatry*. 163:689-696 https://ajp.psychiatryonline.org/doi/pdf/10.1176/ajp.2006.163.4.689

This study used the Psychiatric Research Interview for Substance and Mental Disorders (PRISM) to test the reliability of the psychiatric and substance abuse disorder criteria outlined in the *Diagnostic and Statistical Manual of Mental Disorders* DSM-IV. More specifically, the authors sought to determine whether and to what extent the PRISM-IV's semi-structured interview approach could differentiate reliably between primary (innate) and substance-induced (SI) mental illness. One of the most persistent issues in treating dual diagnosis patients is this differentiation: "The diagnosis of psychiatric disorders among substance abusers is complicated by the resemblance of intoxication and withdrawal effects to the symptoms of psychiatric disorders" (689). As a result, DSM-IV offered the first documented guidelines for distinguishing between primary and SI disorders.

Hasin DS, Kerridge BT, Saha TD, Huang B, Pickering R, Smith SM, Jung J, Zhang H, & Grant BF (2016). **Prevalence and correlates of DSM-5 cannabis use disorder, 2012-2013: findings from the NESARC-III.** *American Journal of Psychiatry*. 173: 588-599. https://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2015.15070907

This article briefly reviewed the history, development, and methodology of the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC), and then analyzed survey data to estimate the prevalence of cannabis-use disorder (CUD) both overall and in connection with numerous cofactors. e.g., age, gender, income, region, race, and psychiatric disorders. The total sample size for NESARC-III was 36,309, and sample data was collected between April 2012 and June 2013. Results showed 12-month and lifetime CUD prevalence among U.S. residents at 2.54 percent and 6.27 percent, respectively. Participants identified with CUD were nearly eight times more likely to have an alcohol use disorder and ten times more likely to have an additional drug-use disorder. In addition, CUD patients were almost eight times more likely to be diagnosed with bipolar

disorder; over four times more likely to have post-traumatic stress disorder or a personality disorder; and nearly four times more likely to have a major depressive disorder.

Karjalainen K, Lintonen T, Joukamaa M, & Lillsunde P (2013). **Mental disorder associated with driving under the influence of alcohol and/or drugs: a register-based study.** *European Addiction Research*. 19:113-120.
https://www.karger.com/Article/Pdf/342569

This Finnish study compared psychiatric diagnosis data for a random sample of DUI drivers drawn from a national register, and for a control sample randomly drawn from the general Finnish population (matched with the DUI drivers by age and gender). DUI offenders were grouped into DUIA (alcohol), DUID (illicit drugs), and DUIAP (psychoactive prescription drugs), perhaps the first time that these subgroups have been analyzed separately in a comorbidity study. The authors then used staged logistic regression to estimate the risk of a given DUI driver being diagnosed with psychiatric illnesses or substance use disorders. Results of this analysis showed that DUIA drivers were about six times more likely (OR=6.1) to be identified with an alcohol use disorder (AUD); over twice as likely (OR=2.4) to have an illicit-drug use disorder (DUD); nearly twice as likely to be diagnosed with bipolar disorder (OR=1.9) or serious depression (OR=1.95); and nearly twice as likely to have a personality disorder (OR=1.79). DUID offenders were over four times more likely (OR=4.3) to have an AUD, over sixty times more likely (OR=61.2) to be diagnosed with a DUD, and nearly twice as likely to be diagnosed with depression (OR=1.8) or an anxiety disorder (OR=1.9). Results for DUIAP drivers revealed that they were also very likely to suffer from DUDs (OR=7.5), bipolar (OR=10.1), depression (OR=4.5), or anxiety disorders (OR=2.2).

Lapham SC, Smith E, C'de Baca J, Chang I, Skipper BJ, Baum G, & Hunt WC (2001). **Prevalence of psychiatric disorders among persons convicted of DWI**. *Archives of General Psychiatry*. 58: 943-949.
https://jamanetwork.com/journals/jamapsychiatry/fullarticle/481831

In this study of 612 female and 493 male offenders convicted of DWI and referred to a screening program in Bernalillo County, NM, follow-up diagnostic interviews were conducted with each subject by trained interviewers. Data from the National Comorbidity Sample (NCS), Western Region, were weighted to match the New Mexico DWI sample by age, ethnicity, and education level, and results for men and women were analyzed separately. Results for these DWI offenders showed that they were about ten times more likely than their general-population counterparts to suffer from lifetime alcohol-use or drug-use disorders, and significantly more likely to suffer from lifetime PTSD, major depression, and anxiety disorders.

McGovern MP, Lambert-Harris C, Gotham HJ, Claus RE, Xie H (2014). **Dual diagnosis capability in mental health and addiction treatment services: an assessment of programs across multiple state systems**. *Administration and Policy in Mental Health and Mental Health Services Research*. 41: 205-214.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3594447/pdf/nihms424476.pdf

Note: These research summaries are not implied to be the full extent of review that could be conducted on these topics. Research and review was focused on the most recent literature available, with attempts to identify appropriate meta-studies (a comprehensive review of many studies) that have already been conducted.

This study defines and evaluates mental health services able to treat both psychiatric and substance use disorders. The authors argue that integrated approaches to patients diagnosed with comorbidity have been shown to be more effective than the "bifurcated" approach commonly adopted in treatment programs, i.e., treating the psychiatric disorder separately from the substance use disorder. The authors collected data from a nationwide sample of 256 treatment programs, and evaluated them according to the recommended program guidelines published in the Dual Diagnosis Capability in Addiction Treatment (DDCAT) and Dual Diagnosis Capability in Mental Health Treatment (DDCMHT) indexes. Results of their analyses showed that only 18 percent of addiction treatment programs and nine percent of mental health programs in the U.S. meet the treatment standards for dual diagnosis services.

McMillan GP, Timken DS, Lapidus J, C'de Baca J, & McNeal M (2008). **Under-diagnosis of comorbid mental illness in repeated DUI offenders mandated to treatment**. *Journal of Substance Abuse Treatment*. 34: 320-325.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2359227/pdf/nihms-43373.pdf

This article reported the results of an intensive case review of 233-convicted DUI drivers mandated to attend one of seven alcohol treatment centers in Multnomah County, OR, and compared their review outcomes to the evaluations conducted in the treatment centers. Results revealed that the assessments conducted at the alcohol treatment centers under-diagnosed the extent of numerous comorbidities. Specifically, the treatment centers failed to diagnose 97.2 percent of patients with clear symptoms of bipolar disorder, 67.5 percent of those showing symptoms of depression, 100 percent of those with symptoms of obsessive-compulsive disorder, and, surprisingly, 37.3 percent of those diagnosed with drug-use disorders. The under-diagnosis of psychiatric disorders (which the authors called "missed opportunities") leads to increased relapse rates and poor compliance with treatment protocols because the psychiatric disorders often reduce patient motivation to comply. In addition, patients experience diminished absorption of psycho-social skills training due to symptom-generated cognitive disruption and increased use of drugs or alcohol in order to "medicate" the painful symptoms of psychiatric disorders. For all of these reasons, under-diagnosis leads to increased rates of DUI recidivism.

Ray GT, Weisner CM, & Mertens JR (2005). **Relationship between use of psychiatric services and five-year alcohol and drug treatment outcomes**. *Psychiatric Services*. 56: 164-171.
https://ps.psychiatryonline.org/doi/pdfplus/10.1176/appi.ps.56.2.164

This article described a study on the therapeutic effectiveness of psychiatric services in the treatment of 604 patients with co-occurring substance abuse and mental health disorders. The patients were drawn from a cohort of Kaiser Permanente members admitted to a Kaiser Permanente chemical dependency treatment program based in Sacramento, CA. The outcome measure of interest, obtained at a five-year follow-up appointment, was alcohol and drug abstinence for the previous 30 days. The authors included a variety of additional measures from patient files in order to control for multiple hypothesized potential confounding variables, including

hours of psychiatric services received and severity of psychiatric and substance-disorder symptoms. The major finding was that clients who received at least 2.1 hours of psychiatric services per year were much more likely to be drug and alcohol-free at five years post-program entry than those who received fewer hours of psychiatric services.

Shaffer HJ, Nelson SE, LaPlante DA, LaBrie RA, Albanese M, & Caro G (2007). **The epidemiology of psychiatric disorders among repeat DUI offenders accepting a treatment-sentencing option.** *Journal of Consulting and Clinical Psychology*. 75:795-804. https://www.researchgate.net/profile/Howard_Shaffer/publication/5936902_The_Epidemiology_of_Psychiatric_Disorders_Among_Repeat_DUI_Offenders_Accepting_a_Treatment-Sentencing_Option/links/0fcfd50a785c972ed8000000/The-Epidemiology-of-Psychiatric-Disorders-Among-Repeat-DUI-Offenders-Accepting-a-Treatment-Sentencing-Option.pdf

This study analyzed data obtained for a population of repeat DUI offenders—about 53 percent of statewide repeat DUIs choosing treatment as a sentencing alternative to prison during the study period, April 2005 to April 2006. The study included offenders admitted to a two-week residential treatment program, a sentencing option available to repeat DUI offenders in Massachusetts. A structured intake interview process was conducted to assess the prevalence of cofactors believed to hamper substance abuse recovery, including psychiatric disorders. The authors then compared the results of this assessment with known prevalence outcomes in the National Comorbidity Survey (NCS). The results revealed that program participants, compared to the general population, had much higher lifetime rates of alcohol-use disorder (97.6 percent versus 17.3 percent), drug-use disorder (25.9 percent versus 6.4 percent), post-traumatic stress disorder (13.3 percent versus 4.8 percent), and bipolar disorder (7.3 percent versus 4.3 percent).

Swendsen J, Conway KP, Degenhardt L, Glantz M, Jin R, Merikangas KR, Sampson N, & Kessler RC (2010). **Mental disorders as risk factors for substance use, abuse and dependence: results from the 10-year follow-up of the National Comorbidity Survey**. *Addiction*.105: 1117-1128. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2910819/pdf/nihms188508.pdf

The authors analyzed results from a 2001-2003 follow-up to the baseline National Comorbidity Survey (NCS) obtained in 1991-1992. A probability sub-sample of 5,001 respondents (out of the baseline sample of 8,098) were contacted and given a structured interview to assess outcomes ten years post-baseline findings. Results showed that subjects diagnosed with bipolar disorder were 3.6 times and 5.1 times more likely, respectively, to have developed an alcohol use (AUD) or drug use disorder (DUD). Those diagnosed with post-traumatic stress disorder at baseline were 3.2 times more likely and 3.9 times more likely, respectively, to develop an AUD or a DUD, and those diagnosed with any anxiety disorder at baseline were 3.2 and 3.5 times more likely, respectively, to develop an AUD or DUD.