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REVIEW

The Dual Diagnosis of Alcohol Use Disorder and Obsessive – Compulsive Disorder—How Do They Interact With Each Other?

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Main Points

- Obsessive – compulsive disorder and AUD are commonly comorbid with each other.
- Obsessive – compulsive disorder usually starts before the onset of alcohol use; however, it can also start after or at the same time as alcohol use.
- Compulsions and impulsivity are common to both OCD and AUD.
- Patients with comorbid OCD and AUD have a higher risk of self-harm compared to those with either condition alone.
- Treatment should focus on the concurrent management of both conditions for a better prognosis.

Abstract

People with psychiatric conditions often have comorbid substance use disorders. Obsessive – compulsive disorder is frequently comorbid with alcohol use disorder. Both obsessive – compulsive disorder and alcohol use disorder share common characteristics like high levels of compulsions and impulsivity. These stem from common neurobiological mechanisms. In most patients, obsessive – compulsive disorder begins first, followed by alcohol use; however, the order of onset can vary. Various factors like genetics, gender, severity of the conditions, and comorbid depression have been known to contribute to the relationship between obsessive – compulsive disorder and alcohol use disorder. The prevalence rates in clinical studies are low as compared to epidemiological studies as the comorbidity is often missed during clinical evaluation due to a variety of reasons. Patients with this dual diagnosis have a higher risk of self-harm compared to those with either diagnosis alone. Hence, it becomes vital to routinely screen patients with obsessive – compulsive disorder or alcohol use disorder for the presence of the other disorder. Management strategies should focus on the concurrent management of both conditions with pharmacological and non-pharmacological methods to ensure improved prognosis. Since research in this area is still scarce, more studies are needed to better understand the mechanisms of this comorbidity.

Keywords: Alcoholism, craving, dual diagnosis, obsessive compulsive disorder

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Introduction

Substance use disorders (SUDs) are very common among individuals with mental illnesses (Grant et al., 2004; Hunt et al., 2018). Patients with dual diagnosis (co-occurring diagnosis) face more severe consequences like worsening of psychiatric symptoms, poor treatment compliance, a greater number of hospitalizations, aggressive behavior, and poor self-care (Buckley, 2006). Consequently, these patients need highly intensive and specialized care. Alcohol use disorders (AUD) and anxiety disorders, in particular have been noted to be a common dual diagnosis. The estimated prevalence of AUD among anxious patients ranges from 20% to 40% (Castillo Carniglia et al., 2019).

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Patients with obsessive – compulsive symptoms (OCS) have a higher rate of comorbid use of substances as compared to the general population (Blom et al., 2011), alcohol being the most common substance of abuse (Cuzen et al., 2014). The lifetime comorbidity of AUD in those with obsessive – compulsive disorder (OCD) is 24%, about five times the rate in the general population (Ruscio et al., 2010) and nearly two times that in patients diagnosed with other anxiety/mood disorders. This seems to be largely gender-dependent (Torres et al., 2006; Wu et al., 2010). A meta-analysis with 2406 participants (RR (Relative Risk) = 10.07 (5.44; 18.33)) indicates that SUDs appear to be a correlate of OCD (Rowe et al., 2022). Instruments that assess both disorders have been developed, such as the Obsessive – Compulsive Drinking Scale (Anton et al., 1996), clearly indicating the presence of similar features between OCD and AUD.

However, there is a discrepancy in the findings between epidemiological and clinical studies, thereby raising a query regarding this association. While epidemiological surveys have noted a frequent co-occurrence of OCD with the use of alcohol, tobacco, and other substances, clinical studies have not substantiated this increased risk. Epidemiological studies have found that 20 – 40% of patients with OCD have AUD (Adam et al., 2012; de Bruijn et al., 2010; Ruscio et al., 2010; Torres et al., 2006), while clinical samples show a prevalence of less than 10% (Gentil et al., 2009; Rasmussen and Eisen, 1994). This difference may be partly due to the fact that some patients with OCD may self-medicate with alcohol rather than seek medical help and consequently develop dependence (Karno et al., 1988; Kolada et al., 1994; Torres et al., 2006). Even experienced clinicians may miss an OCD diagnosis, especially in individuals with taboo sexual obsessions. Hence, the actual prevalence rates of the dual diagnosis of OCD and SUD may be higher than reported clinically.

In patients with SUD, a comorbid OCD diagnosis is often overlooked as most patients report symptoms only if specifically enquired about (Fals-Stewart & Schafer, 1992). A study of individuals with AUD found that 13.5% of the sample also had OCD (Stevens et al., 2021).

Patients with a dual diagnosis of OCD and SUD have greater functional impairment than those with OCD alone (Mancebo et al. 2009), and an increased risk of self-harm (Gentil et al., 2009; Torres et al., 2011). Substance use disorder may have started as a coping mechanism to the OCD in certain patients (Cuzen et al., 2014; Sbrana, 2005). When both SUD and OCD co-occur, the management plan must target both conditions as the recovery and prognosis can differ from each disorder alone.

While OCD and AUD are phenomenologically similar and the comorbidity is clinically relevant, the research in this area has several fallacies. Several clinical studies did not have a control group, and epidemiological surveys often had only a limited number of cases with OCD, resulting in incorrect values (Virtanen et al., 2022).

Reviews (Cuzen et al., 2014) on this subject have noted the need for future research on the prevalence of OCS in SUD patients to further understand the mechanisms of comorbidity. The objective of this review was to provide an overview of this dual diagnosis using the existing literature, discuss the implications of the comorbidity, and consider directions for future research.

Material and Methods

The research question aimed at evaluating the prevalence of the OCD – AUD comorbidity, determining if patients with the dual diagnosis differ from those with either disorder alone, identifying the associated risk factors for developing the comorbidity, and the implications for treatment. With a goal to discuss the OCD – AUD comorbidity in terms of prevalence rates, onset, phenomenological similarities, and management challenges, as well as the implications of the diagnoses that may benefit clinical practice, the investigators searched PubMed and Google Scholar databases from their conception to date for articles related to OCD and AUD. English was chosen as the preferred language. The keywords used were Alcoholism, OCD, dual diagnosis and craving.

Hundred articles were generated, of which 54 published systematic and narrative reviews, meta-analyses as well as original research articles dealing with OCD/OCS and SUD/AUD were included. Unpublished work, conference presentations, and articles where the full text was not accessible were excluded. The references and sources were cross-checked.

Results and Discussion

Order of Onset

Studies focused on OCD and SUD in the last four decades have found evidence of the existence of this dual diagnosis; however, the "which came first: The chicken or the egg?" debate continues.

Obsessive – compulsive disorder was found to be six times more common in patients with a primary SUD diagnosis compared to the general population (Hasin & Grant, 1987), with similar findings reported by several authors (Eisen & Rasmussen, 1989; Riemann et al., 1992). Data from the Epidemiological Catchment Area Program (Karno et al., 1988) found a 24.1% comorbidity with AUD in patients with a primary OCD diagnosis.

The general view is that of OCD preceding the subsequent onset of substance use in general, and alcohol use in particular (Blom et al., 2011; Gentil et al., 2009; Mancebo et al., 2009; de Mathis et al., 2013), this being partially explained by the use of alcohol as a medication by OCD patients in an attempt to achieve symptom relief. However, research on the order of onset of OCD and alcohol-related disorders has presented mixed findings.

One study found that in half of the patients (52.7%) with both OCD and AUD, OCD began first (Karno, 1988). In another that had a small sample of 19 patients with alcohol dependence and varying anxiety disorder diagnoses, the anxiety symptoms were found to start first in 63% of the sample (Weiss & Rosenberg, 1985). Other authors have reported that in the majority of patients, OCD and alcohol problems started simultaneously (Powell et al., 1982). Ross and Anderson (1988) found that OCD tended to begin either before or along with alcoholism. A review of various studies concluded that OCD may begin before, after, or simultaneously with alcohol use (Kushner et al., 1990). To summarize, studies have shown significant variation in terms

of onset; however, clinical evidence points to the view that alcoholism is secondary to OCD (Zohar & Insel, 1986). This debate about which disorder starts first is not merely of academic interest. Studies have shown that a large percentage of participants with SUD have reported that their OC symptoms improved with the use of the substance, leading to the hypothesis that the temporary anxiolytic relief experienced may contribute to maintaining the use of the substance (Gentil et al., 2009). Also, some researchers (Fals-Stewart & Schafer, 1992) feel that treatment of the underlying OCD could lead to a better outcome for alcohol dependence in those with primary OCD. Persistent alcohol consumption will in most cases affect the behavioral and psychopharmacological treatment of OCD.

In view of this continuing controversy on the order of onset, several researchers have opined that the relationship between OCD and SUD is closely interlinked, with each disorder influencing the other, finally leading to an increase in OCS (Back & Brady, 2008).

Similarities in Phenomenology and Neurobiological Underpinnings

Although OCD and SUDs are construed as clinically distinct diagnoses, both are associated with high levels of impulsivity and compulsive behavior (Blom et al., 2011; Figee et al., 2011).

Therefore, it is likely that the two constructs overlap with each other (Robbins et al., 2012). The nature of the compulsive behaviors is, however, different in the two disorders. While the behaviors in OCD and SUD may be a result of common neural substrates, the pattern in which they are expressed changes through the distinct etiologies of each disorder. One model that has been proposed has attempted to explain compulsive behavior in both AUD and OCD as arising from a move from goal-directed to habitual behavior (Burchi et al., 2019).

Patients with both diagnoses commonly show heightened stress levels and shared executive functioning deficits (Everitt & Robbins, 2005; Olley et al., 2007) as well as similar areas of neurofunctional dysregulation (Klugah-Brown et al., 2021)

Obsessive – compulsive disorder has been considered a form of "behavioral addiction" due to the repetitive and compulsive nature of the ritualistic behaviors that can be physically and mentally detrimental to patients, similar to the pattern seen in SUD (Blom et al., 2011; Cuzen et al., 2014). Obsessive – compulsive disorder patients feel the need to perform compulsive rituals to get relief from the discomfort, which is akin to the symptoms of withdrawal and the urge to drink in SUD patients (Cuzen et al., 2014).

In patients with AUD, the craving for alcohol has been found to be similar to an obsession and compulsion, especially in cases of heavy drinking. Studies have shown that the presence of craving is dependent on the presence of obsessive thoughts about drinking (Modell et al., 1992). Patients with OCD struggle to suppress their obsessions, similar to the struggle that heavy drinkers have with their strong urges to drink. The chief difference is that the obsessions in OCD are recognized as senseless while the craving in people with SUD is a need that begs to be satisfied.

Some authors have suggested shared neurobiological mechanisms that involve alterations in the reward system of the brain and two areas in the frontal cortex (orbitofrontal cortex and the anterior cingulate), which exert inhibitory control over maladaptive behaviors (Lubman et al., 2004). Consequently, a common compulsivity phenotype has been postulated to predict an association of OCD with SUD and other behavioral addictions (Figee et al., 2016; Robbins et al., 2012). A "shared etiology," with common risk factors contributing to the presentation, is another hypothesis (Mancebo et al., 2009).

Associated Factors

Various factors have been identified that play a role as risk/associated factors in the relationship between OCD and AUD.

Genetic factors have been known to contribute to the occurrence of this comorbidity. A large Swedish cohort study that used a general population sample as well as twin cohorts found that individuals with an OCD diagnosis had a 3.7-times higher risk of any substance misuse outcome, this association being at least partially attributable to shared genetics (Virtanen et al., 2022). Mancebo et al. (2009) showed that OCD starting at a younger age, as well as comorbid borderline personality disorder, were risk factors in developing SUD.

On comparing patients with OCD with and without alcohol abuse, Dimitriou et al. (1993) found a high comorbidity rate of 26.4%. Illness course and family history of OCD were not related to the development of alcohol abuse. Use of alcohol was associated with a longer illness duration and a greater number of precipitating factors before OCD onset. However, outcomes of treatment, as well as the present symptomatology and level of functioning, were not affected by alcohol abuse. An interesting finding was that more patients with comorbid alcohol use developed new OC symptoms after treatment.

Gender seems to have a mediating effect on this association. Data from the Netherlands Mental Health Survey and Incidence Study was used to conduct a comparative study (Blom et al., 2011) to examine the co-occurrence of SUD with OCD and with other psychiatric disorders in a large community sample. The study found that the odds of achieving a SUD diagnosis were higher in those with OCD compared to individuals with no psychiatric illness, both within a year as well as lifetime. In men, the dual diagnosis was significantly higher in OCD than in those with other psychiatric conditions, while this pattern was not seen in women. In another study (Riemann et al., 1992) that evaluated the presence of OCD in 50 males with AUD, the authors found that 12% met the criteria for OCD. The majority of those with comorbidity were Black. The authors also assessed patients with OCD (25 of each gender) for comorbid AUD and found that 16% of the men and 4% of the women had a lifetime AUD diagnosis. In contrast to these findings, an epidemiological study that was population-based and of a cross-sectional design in Singapore (Goh et al., 2024) with a large sample found that while the lifetime and 1-year prevalence of AUD was higher in males, the women had more comorbid OCD. Studies have also found that the comorbidity in males could lead to a more severe illness course for their OCD (Gentil et al., 2009).

The relationship between OCD and SUD has also been found to vary depending on OCD severity. The risk of SUD has been found to increase with an increase in OCD severity until a certain level,

followed by a dip in the curve, prompting some authors to suggest that severe OCD, in fact, becomes a protective armor against developing SUD (Cuzen et al., 2014). In an epidemiological study with a prospective design (Fineberg et al., 2013), the prevalence of alcohol misuse was found to be lower among individuals with OCD as compared to those with subclinical OCS (6.7% vs. 14.9%), suggesting that the progression to the disorder may indeed provide some protection from developing SUD. Several authors have found a strong relation between the severity of alcohol use and the OCS severity (Campos et al., 2015; Mancebo et al., 2009), chiefly in the symptom dimension of religious, aggressive, and sexual obsessions (Brakoulias et al., 2013; Torres et al., 2006). A narrative review (Tan, 2021) on this dual diagnosis found that mild OCD is associated with a high prevalence of AUD/SUD and that comorbidity rates reduce as OCD grows more distressing up to a certain degree of illness severity, above which there is a rise again, forming a U-shaped curve. The authors postulated that this pattern may be explained by the interplay between impulsiveness and compulsiveness, the different obsession patterns in OCD that have different predispositions to AUD, as well as the different rates of treatment-seeking behavior.

Other psychiatric symptomatology, like anxiety and depressive symptoms, has been found to have a role in the OCD – SUD relationship. A study on 178 university students found that physical as well as social concerns, as measured using the Anxiety Sensitivity Index, and depressive symptoms increased the relationship between total OCD symptoms, obsessive dimensions, and risky alcohol consumption, albeit with a small to medium effect size (Randazza et al., 2022). A study conducted in Brazil (Gentil et al., 2009) to compare OCD patients with and without AUD comorbidity found that 7.5% of the sample (n = 630) had a comorbid AUD diagnosis. The dual diagnosis group had more males, a past history of having received psychiatric treatment, higher scores on the hoarding dimension, and higher lifetime suicidal thoughts and attempts. The other comorbidities seen in this group were somatization disorders, compulsive sexual behavior, and generalized anxiety. A study (Campos et al., 2015) that assessed patients with AUD undergoing outpatient treatment found probable OCD in 20.4% of the sample. These patients had more severe dependence, a lower income, comorbid depressive symptoms, and a higher risk of self-harm. The severity of the OC symptoms was directly related to the rates of hospitalization. Hoarding and washing compulsions had a robust relation with suicidal ideation.

Treatment Challenges and Prognosis

Most patients with OCD approach health care services only when there is a symptom exacerbation or when secondary problems like depression or SUD emerge (Garcia-Soriano et al., 2014; Torres et al., 2006).

Even with a SUD comorbidity, only 50% of OCD patients actively seek treatment (Mayerovitch et al., 2003), the compliance with prescribed treatment regimens is poor in this group (Cuzen et al., 2014).

Alcohol use disorder is often missed in OCD patients due to an unhealthy combination of reluctance by the patients to admit the extent of their symptoms and the lack of persistence by the treating specialists in looking for comorbidities (Turner & Cooper, 1996). Also, clinicians who specialize in a particular area of mental health may focus primarily on disorders pertaining to that area only. Deaddiction specialists may underestimate the obsessions, brushing them aside as part of the substance use and mistakenly infer that treating the substance use would automatically lead to relief from OC symptoms as well. Those dealing specifically with OCD may operate under the false notion that remission of OC symptoms will lead to the automatic cessation of alcohol use.

In patients with AUD, OC symptoms often go unnoticed (Eisen & Rasmussen, 1989; Mancebo et al., 2009). This delay in identification and failure to initiate specific therapeutic approaches can lead to a poor prognosis, with higher chances of relapse. Another deterring factor is that patients with SUDs tend to be referred to exclusively substance deaddiction/rehabilitation centers irrespective of comorbid OCD (Cuzen et al., 2014; Fals-Stewart & Schafer, 1992; Mancebo et al., 2009; Sbrana et al., 2005).

It has been shown that when patients with SUD and OCD receive specific treatment for OCD as well, they tend to be more compliant, show a reduction in symptoms, and maintain abstinence for longer periods of time compared to patients who receive only relaxation therapy or treatment for only substance use (Fals-Stewart & Schafer, 1992).

Hence, screening patients with either disorder for the presence of the other disorder becomes an integral part of the management process. For patients with OCD, screening instruments for alcohol use like the Michigan Alcohol Screening Test (MAST) (Selzer, 1971) can be used, while the Yale – Brown Obsessive Compulsive Scale checklist (YBOCS) (Goodman et al., 1989) can be used to screen for OC symptoms in patients with AUD.

In treatment-seeking OCD patients with comorbid AUD, there is an increased risk of poor treatment outcomes, higher distress and impairment (Fineberg et al., 2013), as well as increased suicidality (Gentil et al., 2009). There has been some evidence that, when controlling for depression, there is only a marginal association between OCD and frequent or heavy drinking (Wu et al., 2010); however, more studies are required to confirm this finding.

In addition to pharmacological treatment that includes anti-obsessional and anti-craving agents, a comprehensive plan of treatment that incorporates behavioral and social learning techniques for OCD as well as social learning, cognitive, behavioral, and self-help techniques for alcoholism should be employed concurrently. Helping the patients learn techniques to accept the anxiety associated with both OCD and AUD should also be a main component of the treatment. Coping skills training and abstinence-based treatment are recommended for both disorders.

Newer treatment strategies like neuromodulation techniques have also been proposed. In a meta-analysis of case – control studies that investigated Gray Matter (GM) volume in OCD and SUD and then compared the two, the AUD group showed less GM in the limbic, cerebellar, temporal, and frontal regions. The OCD group had decreased GM in the insular and frontal areas; however, it was higher in the brainstem and hypothalamic areas. The overlapping areas in both groups, which showed reduced GM, were the anterior cingulate cortex and insula, suggesting that interventions targeting these areas specifically could prove

beneficial in treating the compulsivity in both disorders, especially when they occur comorbid with each other (Stevens, 2021).

The findings of this study emphasize the need for screening patients with OCD/AUD for the presence of the other disorder, both as part of the clinical interview and using appropriate screening tools. In patients with a dual diagnosis, an individualized management plan that comprises medications, psychological intervention, and possible neuromodulation techniques needs to be formulated that targets both disorders simultaneously.

The strengths of this review are that the authors have tried to include most of the recent research on the topic as well as looked at the different facets of the association between OCD and AUD. The authors have also touched upon the prognosis and implications for the same for better clinical management of these patients. The review has its limitations, chiefly that no new analysis was done as part of this study and the findings reported are purely descriptive.

Conclusion

Patients with AUDs generally like to term themselves as "compulsive drinkers" and as being "obsessed with drinking," while patients with OCD often consume alcohol in large quantities in an attempt to relieve their anxiety. Obsessive – compulsive disorder and AUD share similar cognitive and affective characteristics and have some common neurobiological basis. Regardless of which begins first, there is a definite link between OCD and AUD, making it a common dual diagnosis. A multitude of factors from both the patients' and the treating doctor's viewpoints may have contributed to the low prevalence rates of this dual diagnosis in clinical settings.

Patients with OCD and AUD have been found to have poorer functioning and a higher risk of self-harm than those with either condition alone. These findings make it vital that patients who present with OC symptoms or with SUD must be compulsorily screened for the presence of the other disorder. Treatment strategies must include pharmacological and non-pharmacological methods that target both disorders. Improving awareness of the presence of this comorbidity amongst practitioners would help in early detection and prompt intervention and thus has implications for prevention as well as improved outcomes.

There is a definite need for future research in this area for improved understanding of the mechanisms of comorbidity. Future studies focusing on heterogeneous sub-groups of OCD, gender-related associations, use of neuromodulation techniques in treating this comorbidity, and evaluation of genetic markers may help in better comprehension and management of this co-occurring diagnosis.

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References

Adam, Y., Meinlschmidt, G., Gloster, A. T., & Lieb, R. (2012). Obsessive-compulsive disorder in the community: 12-month prevalence, comorbidity and impairment. *Social Psychiatry and Psychiatric Epidemiology*, *47*(3), 339 – 349. [CrossRef]

Anton, R. F., Moak, D. H., & Latham, P. K. (1996). The obsessive-compulsive drinking scale: A new method of assessing outcome in alcoholism treatment studies. *Archives of General Psychiatry*, *53*(3), 225 – 231. [CrossRef]

Back, S. E., & Brady, K. T. (2008). Anxiety disorders with comorbid substance use disorders: Diagnostic and treatment considerations. *Psychiatric Annals*, *38*(11), 724 – 729. [CrossRef]

Blom, R. M., Koeter, M., van den Brink, W., de Graaf, R., Ten Have, M., & Denys, D. (2011). Co-occurrence of obsessive-compulsive disorder and substance use disorder in the general population. *Addiction*, *106*(12), 2178 – 2185. [CrossRef]

Brakoulias, V., Starcevic, V., Berle, D., Milicevic, D., Moses, K., Hannan, A., Sammut, P., & Martin, A. (2013). The characteristics of unacceptable/taboo thoughts in obsessive – compulsive disorder. *Comprehensive Psychiatry*, *54*(7), 750 – 757. [CrossRef]

Buckley, P. F. (2006). Prevalence and consequences of the dual diagnosis of substance abuse and severe mental illness. *Journal of Clinical Psychiatry*, *67*(Suppl. 7), 5 – 9.

Burchi, E., Makris, N., Lee, M. R., Pallanti, S., & Hollander, E. (2019). Compulsivity in alcohol use disorder and obsessive-compulsive disorder: Implications for neuromodulation. *Frontiers in Behavioural Neurosciences*, *11*(13), 70. [CrossRef]

Campos, L. M., Yoshimi, N. T., Simão, M. O., Torresan, R. C., & Torres, A. R. (2015). Obsessive-compulsive symptoms among alcoholics in outpatient treatment: Prevalence, severity and correlates. *Psychiatry Research*, *229*(1 – 2), 401 – 409. [CrossRef]

Castillo-Carniglia, A., Keyes, K. M., Hasin, D. S., & Cerdá, M. (2019). Psychiatric comorbidities in alcohol use disorder. *Lancet Psychiatry*, *6*(12), 1068 – 1080. [CrossRef]

Cuzen, N. L., Stein, D. J., Lochner, C., & Fineberg, N. A. (2014). Comorbidity of obsessive-compulsive disorder and substance use disorder: A new heuristic. *Human Psychopharmacology*, *29*(1), 89 – 93. [CrossRef]

de Bruijn, C., Beun, S., de Graaf, R., ten Have, M., & Denys, D. (2010). Subthreshold symptoms and obsessive-compulsive disorder: Evaluating the diagnostic threshold. *Psychological Medicine*, *40*(6), 989 – 997. [CrossRef]

de Mathis, M. A., Diniz, J. B., Hounie, A. G., Shavitt, R. G., Fossaluza, V., Ferrão, Y., Leckman, J. F., de Bragança Pereira, C., do Rosario, M. C., & Miguel, E. C. (2013). Trajectory in obsessive-compulsive disorder comorbidities. *European Neuropsychopharmacology*, *23*(7), 594 – 601. [CrossRef]

Dimitriou, E. C., Lavrentiadis, G., & Dimitriou, C. E. (1993). Obsessive-compulsive disorder and alcohol abuse. *European Journal of Psychiatry*, *7*(4), 244 – 248.

Eisen, J. L., & Rasmussen, S. A. (1989). Coexisting obsessive compulsive disorder and alcoholism. *Journal of Clinical Psychiatry*, *50*(3), 96 – 98

Everitt, B. J., & Robbins, T. W. (2005). Neural systems of reinforcement for drug addiction: From actions to habits to compulsion. *Nature Neuroscience*, *8*(11), 1481 – 1489. [CrossRef]

Fals-Stewart, W., & Schafer, J. (1992). The treatment of substance abusers diagnosed with obsessive-compulsive disorder: An outcome

study. *Journal of Substance Abuse Treatment*, *9*(4), 365 – 370. [CrossRef]

Figee, M., Pattij, T., Willuhn, I., Luigjes, J., van den Brink, W., Goudriaan, A., Potenza, M. N., Robbins, T. W., & Denys, D. (2016). Compulsivity in obsessive-compulsive disorder and addictions. *European Neuropsychopharmacology*, *26*(5), 856 – 868. [CrossRef]

Figee, M., Vink, M., de Geus, F., Vulink, N., Veltman, D. J., Westenberg, H., & Denys, D. (2011). Dysfunctional reward circuitry in obsessive-compulsive disorder. *Biological Psychiatry*, *69*(9), 867 – 874. [CrossRef]

Fineberg, N. A., Hengartner, M. P., Bergbaum, C. E., Gale, T. M., Gamma, A., Ajdacic-Gross, V., Rössler, W., & Angst, J. (2013). A prospective population-based cohort study of the prevalence, incidence and impact of obsessive-compulsive symptomatology. *International Journal of Psychiatry in Clinical Practice*, *17*(3), 170 – 178. [CrossRef]

García-Soriano, G., Rufer, M., Delsignore, A., & Weidt, S. (2014). Factors associated with non-treatment or delayed treatment seeking in OCD sufferers: A review of the literature. *Psychiatry Research*, *220*(1 – 2), 1 – 10. [CrossRef]

Gentil, A. F., de Mathis, M. A., Torresan, R. C., Diniz, J. B., Alvarenga, P., do Rosário, M. C., Cordioli, A. V., Torres, A. R., & Miguel, E. C. (2009). Alcohol use disorders in patients with obsessive-compulsive disorder: The importance of appropriate dual-diagnosis. *Drug and Alcohol Dependence*, *100*(1 – 2), 173 – 177. [CrossRef]

Goh, C. M. J., Asharani, P. V., Abdin, E., Shahwan, S., Zhang, Y., Sambasivam, R., Vaingankar, J. A., Ma, S., Chong, S. A., & Subramaniam, M. (2024). Gender differences in alcohol use: A nationwide study in a multi-ethnic population. *International Journal of Mental Health and Addiction*, *22*(3), 1161 – 1175. [CrossRef]

Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., Heninger, G. R., & Charney, D. S. (1989). The Yale-Brown obsessive - compulsive scale. I. Development, use, and reliability. *Archives of General Psychiatry*, *46*(11), 1006 – 1011. [CrossRef]

Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, S. P., Dufour, M. C., Compton, W., Pickering, R. P., & Kaplan, K. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the National Epidemiologic Survey on alcohol and Related Conditions. *Archives of General Psychiatry*, *61*(8), 807 – 816. [CrossRef]

Hasin, D. S., & Grant, B. F. (1987). Psychiatric diagnosis of patients with substance abuse problems: A comparison of two procedures, the DIS and the SADS-L. Alcoholism, drug abuse/dependence, anxiety disorders and antisocial personality disorder. *Journal of Psychiatric Research*, *21*(1), 7 – 22. [CrossRef]

Hunt, G. E., Large, M. M., Cleary, M., Lai, H. M. X., & Saunders, J. B. (2018). Prevalence of comorbid substance use in schizophrenia spectrum disorders in community and clinical settings, 1990 – 2017: Systematic review and meta-analysis. *Drug and Alcohol Dependence*, *191*, 234 – 258. [CrossRef]

Karno, M., Golding, J. M., Sorenson, S. B., & Burnam, M. A. (1988). The epidemiology of obsessive-compulsive disorder in five US communities. *Archives of General Psychiatry*, *45*(12), 1094 – 1099. [CrossRef]

Klugah-Brown, B., Zhou, X., Pradhan, B. K., Zweerings, J., Mathiak, K., Biswal, B., & Becker, B. (2021). Common neurofunctional dysregulations characterize obsessive-compulsive, substance use, and gaming disorders-An activation likelihood meta-analysis of functional imaging studies. *Addiction Biology*, *26*(4), e12997. [CrossRef]

Kolada, J. L., Bland, R. C., & Newman, S. C. (1994). Obsessive- compulsive disorder. *Acta Psychiatrica Scandinavica*, *89*(s376), 24 – 35. [CrossRef]

Kushner, M. G., Sher, K. J., & Beitman, B. D. (1990). The relation between alcohol problems and the anxiety disorders. *American Journal of Psychiatry*, *147*(6), 685 – 695. [CrossRef]

Lubman, D. I., Yücel, M., & Pantelis, C. (2004). Addiction, a condition of compulsive behaviour? Neuroimaging and neuropsychological evidence of inhibitory dysregulation. *Addiction*, *99*(12), 1491 – 1502. [CrossRef]

Mancebo, M. C., Grant, J. E., Pinto, A., Eisen, J. L., & Rasmussen, S. A. (2009). Substance use disorders in an obsessive - compulsive disorder clinical sample. *Journal of Anxiety Disorders*, *23*(4), 429 – 435. [CrossRef]

Mayerovitch, J. I., duFort, G. G., Kakuma, R., Bland, R. C., Newman, S. C., & Pinard, G. (2003). Treatment seeking for obsessive-compulsive disorder: Role of obsessive-compulsive symptoms and comorbid psychiatric diagnoses. *Comprehensive Psychiatry*, *44*(2), 164 – 168.

Modell, J. G., Glaser, F. B., Mountz, J. M., Schmaltz, S., & Cyr, L. (1992). Obsessive and compulsive characteristics of alcohol abuse and dependence: Quantification by a newly developed questionnaire. *Alcoholism, Clinical and Experimental Research*, *16*(2), 266 – 271. [CrossRef]

Olley, A., Malhi, G., & Sachdev, P. (2007). Memory and executive functioning in obsessive- compulsive disorder: A selective review. *Journal of Affective Disorders*, *104*(1 – 3), 15 – 23. [CrossRef]

Powell, B. J., Penick, E. C., Othmer, E., Bingham, S. F., & Rice, A. S. (1982). Prevalence of additional psychiatric syndromes among male alcoholics. *Journal of Clinical Psychiatry*, *43*(10), 404 – 407.

Randazza, M. P., McKay, D., Bakhshaie, J., Storch, E. A., & Zvolensky, M. J. (2022). Unhealthy alcohol use associated with obsessive-compulsive symptoms: The moderating effects of anxiety and depression. *Journal of Obsessive-Compulsive and Related Disorders*, *32*, 100713. [CrossRef]

Rasmussen, S. A., & Eisen, J. L. (1994). The epidemiology and differential diagnosis of obsessive -compulsive disorder. *Journal of Clinical Psychiatry*, *55*(5 – 10), 11 – 14.

Riemann, B. C., McNally, R. J., & Cox, W. M. (1992). The comorbidity of obsessive- compulsive disorder and alcoholism. *Journal of Anxiety Disorders*, *6*(2), 105 – 110. [CrossRef]

Robbins, T. W., Gillan, C. M., Smith, D. G., de Wit, S., & Ersche, K. D. (2012). Neurocognitive endophenotypes of impulsivity and compulsivity: Towards dimensional psychiatry. *Trends in Cognitive Sciences*, *16*(1), 81 – 91. [CrossRef]

Ross, C. A., & Anderson, G. (1988). Phenomenological overlap of multiple personality disorder and obsessive-compulsive disorder. *Journal of Nervous and Mental Disease*, *176*(5), 295 – 299. [CrossRef]

Rowe, C., Deledalle, A., & Boudoukha, A. H. (2022). Psychiatric comorbidities of obsessive- compulsive disorder: A series of systematic reviews and meta-analyses. *Journal of Clinical Psychology*, *78*(4), 469 – 484. [CrossRef]

Ruscio, A. M., Stein, D. J., Chiu, W. T., & Kessler, R. C. (2010). The epidemiology of obsessive-compulsive disorder in the National comorbidity Survey Replication. *Molecular Psychiatry*, *15*(1), 53 – 63. [CrossRef]

Sbrana, A., Bizzarri, J. V., Rucci, P., Gonnelli, C., Doria, M. R., Spagnolli, S., Ravani, L., Raimondi, F., Dell'Osso, L., & Cassano, G. B. (2005). The spectrum of substance use in mood and anxiety disorders. *Comprehensive Psychiatry*, *46*(1), 6 – 13. [CrossRef]

Selzer, M. L. (1971). The Michigan Alcoholism Screening Test: The quest for a new diagnostic instrument. *American Journal of Psychiatry*, *127*(12), 1653 – 1658. [CrossRef]

Stevens, B. W., Morris, J. K., Diazgranados, N., & Ramchandani, V. A. (2021). Common gray matter reductions in alcohol use and obsessive-compulsive disorders: A meta-analysis. *Biological Psychiatry Global Open Science*, *2*(4), 421 – 431. [CrossRef]

Tan, O. (2021). Is obsessive – compulsive disorder preventive against addiction? *Journal of Neurobehavioral Sciences*, *8*(3), 251 – 261. [CrossRef]

Torres, A. R., Prince, M. J., Bebbington, P. E., Bhugra, D., Brugha, T. S., Farrell, M., Jenkins, R., Lewis, G., Meltzer, H., & Singleton, N.

(2006). Obsessive-compulsive disorder: Prevalence, comorbidity, impact, and help-seeking in the British National Psychiatric Morbidity Survey of 2000. *American Journal of Psychiatry*, *163*(11), 1978 – 1985. [CrossRef]

Torres, A. R., Ramos-Cerqueira, A. T. A., Ferrão, Y. A., Fontenelle, L. F., do Rosário, M. C., & Miguel, E. C. (2011). Suicidality in obsessive-compulsive disorder: Prevalence and relation to symptom dimensions and comorbid conditions. *Journal of Clinical Psychiatry*, *72*(1), 17 – 26; quiz 119. [CrossRef]

Turner, S., & Cooper, M. (1996). The dual diagnosis of obsessive-compulsive disorder and alcoholism. *Alcoholism Treatment Quarterly*, *14*(3), 77 – 93. [CrossRef]

Virtanen, S., Kuja-Halkola, R., Sidorchuk, A., Fernández de la Cruz, L., Rück, C., Lundström, S., Suvisaari, J., Larsson, H., Lichtenstein, P., Mataix-Cols, D., & Latvala, A. (2022). Association of obsessive-compulsive disorder and obsessive-compulsive symptoms with substance misuse in 2 longitudinal cohorts in Sweden. *JAMA Network Open*, *5*(6), e2214779. [CrossRef]

Weiss, K. J., & Rosenberg, D. J. (1985). Prevalence of anxiety disorder among alcoholics. *Journal of Clinical Psychiatry*, *46*(1), 3 – 5.

Wu, P., Goodwin, R. D., Fuller, C., Liu, X., Comer, J. S., Cohen, P., & Hoven, C. W. (2010). The relationship between anxiety disorders and substance use among adolescents in the community: Specificity and gender differences. *Journal of Youth and Adolescence*, *39*(2), 177 – 188. [CrossRef]

Zohar, J., & Insel, T. R. (1986). Obsessive-compulsive disorder and alcoholism. *Journal of Clinical Psychiatry*, *47*(3), 153.