UNIVERSITY OF PADOVA

Department of General Psychology

Bachelor's Degree Course in Techniques and Methods in Psychological Science

Final dissertation

Alcohol Use Disorder: Comprehensive Analysis of Clinical Aspects, Cultural Perspectives and Stigmatization

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Academic Year 2023-2024

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INTRODUCTION

My initial interest in substance use disorders (SUDs) and behavioral addiction arose from studying the complex neurobiological and psychosocial interactions that characterize this set of psychopathologies. Later on, my internship experience at Centro Gulliver Varese deepened my concern with the topic: it elucidated the broad but subtle societal and environmental factors underlying addiction issues, thereby disclosing their importance as a highly political matter. On the societal level, it is indisputable that there exists much disorientation around SUDs and other types of addiction; moreover, healthcare professionals and policymakers are not immune to cognitive bias and stigma, which heavily affect their decisions and, in turn, the sufferers' lives. A prevalent misconception regarding individuals who engage in substance use or gambling is the notion that, ultimately, these behaviors are volitional, bad habits, or even sins that people decide to commit.
Among all substances of abuse, the detrimental effects of legal drugs – specifically nicotine and alcohol, sold in outlets and subject to governments' taxations – are the most underestimated. In Italy, especially, frequent alcohol consumption, in moderate doses, is normalized and usually promoted as something that has at least some health benefits.

The purpose of this work is to provide a comprehensive account of Alcohol Use Disorder (AUD). It begins by presenting current statistics on worldwide and regional alcohol consumption trends and AUD epidemiology; it then offers a diagnostic description of the disorder, including its risk factors and most common comorbidities. A significant portion of the work is devoted to the neurobiological bases of addiction and the most widely accepted models, followed by a review of evidence-based treatments with an emphasis on psychological interventions.
In the second part of this work, a more critical framework of addiction will be proposed by describing the socioenvironmental factors influencing alcohol use and abuse. A brief report of Lee Hogarth's critical addiction model is included. Finally, I will briefly discuss my internship experience at Centro Gulliver Varese in the dual diagnosis unit, focusing on how stigma impacts the development of SUDs and their treatment.

In conclusion, I will summarize and discuss the critical points examined in previous chapters concerning Alcohol Use Disorder, elaborating on the importance of providing a broader conception of AUD and acknowledging the social and political responsibilities we share in creating socioeconomic conditions that, indeed, contribute to the development of SUDs and other mental illnesses.

CHAPTER ONE

CLINICAL OVERVIEW OF ALCOHOL USE DISORDER (AUD)

1.1 Epidemiology: Global and Regional Trends, the Case of Italy

Alcohol is currently among the most widely consumed psychoactive substances in the world, second only to coffee. It is strongly correlated with more than 200 diseases and conditions, 40 of which are entirely ascribable to alcohol consumption; ethanol alone causes 3 million annual deaths and 5.1% of the global burden of diseases. The latest in-depth analysis of global alcohol use prevalence is the subject of the Global Status Report on Alcohol and Health released by the World Health Organization (World Health Organization (WHO), 2018): the data exposed throughout this document unveils the amplitude of alcohol consumption and abuse, their multifactorial nature, as well as their health and social cost.

The report stands on three indicators of the level of alcohol consumption, namely: (1) the prevalence of current drinkers and/or abstainers; (2) the total alcohol per capita consumption (APC); (3) the total grams of pure ethanol ingested per day (APC x 1000 x 0.793/365 days). The indicators all pertain to the behaviors of the global population aged 15 and older in the previous 12 months. As expected, alcohol consumption varies significantly across world regions: on one hand, the lowest rate of drinkers is found among Muslim-majority countries and in poorer regions (EMR, AFR, SEAR); on the other hand, more than half of the population in all three wealthiest regions of the world has consumed alcohol in the preceding year (see *Figure 1*).

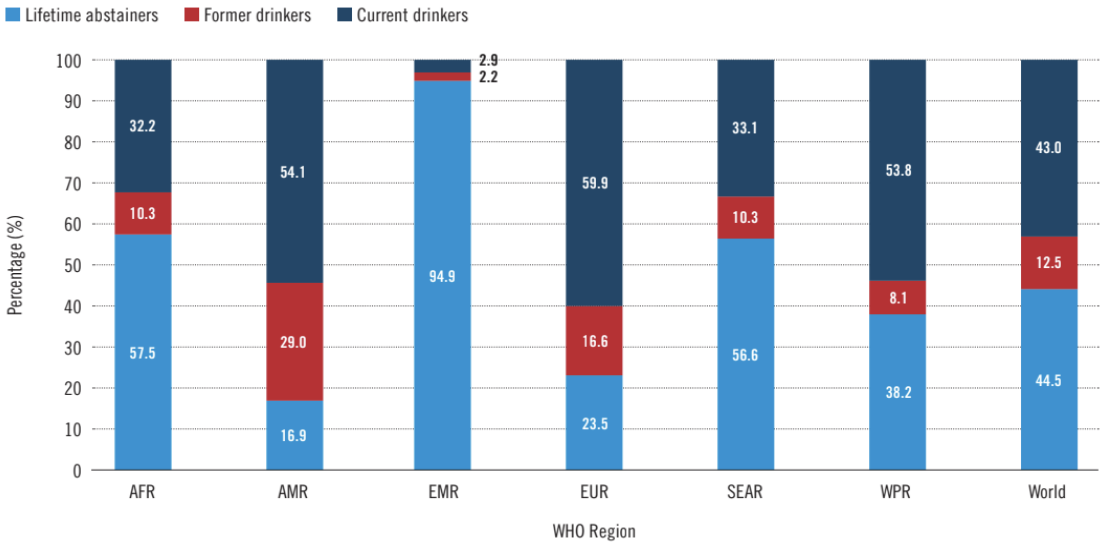

Figure 1: Percentage of current drinkers, former drinkers, and lifetime abstainers (in %) among the total population aged 15 years and older by WHO regions (2016).

Conscious of these differences, it is important to note that, according to the APC index, the world's population aged 15 years and older ingests, *on average,* 6.4 liters of pure ethanol annually, which amounts to 13.9 grams per day. This figure encompasses the amount of recorded and unrecorded alcohol: the latter refers to a product produced and marketed outside of governmental control, as homemade or informally produced alcohol, but also includes smuggled alcoholic beverages, products purchased in other countries, et cetera.

According to the American Department of Health and Human Services (*Dietary Guidelines for Americans 2015-2020*, 2015), the acceptable amount of alcohol to be ingested per day should not be more than one drink for women (~14 grams of ethanol) and two drinks for men (~28 grams); furthermore, it is strongly recommended to consume alcohol without exceeding daily calorie intake and in the context of a well-rounded, healthy diet and lifestyle.

These parameters notably allow to differentiate moderate, non-problematic, and high-risk drinking: the latter is observed when the threshold of 4-5 or more drinks on any day (respectively for women and men) or 8-15 or more drinks per week is exceeded. Indeed, the Global Status Report on Alcohol and Health defines *Heavy Episodic Drinking* (HED) as the consumption of more than 60 grams of pure alcohol on a single occasion, which corresponds, again, to 4-5 standard drinks, at least once per month. HED prevalence is exceptionally high in the Russian Federation, involving more than 60% of current drinkers, in some East European countries (precisely, Poland, Bulgaria, and Romania), and in some Sub-Saharan countries, as well as Australia and some countries in South America (such as Bolivia, Brazil, and Paraguay).

Alcohol use prevalence in young people (15-19 years old) represents a dire issue: the latest data recorded a total of 155 million adolescents who are drinkers, in addition to 64 million who ceased alcohol consumption in the last 12 months. Drinking patterns of this generation mirror the global ones; HED frequency is lower with respect to the general population, but it increases from age 15-19 to 20-24, the life span in which HED peaks.

In 2016, around 1 billion people (18.2% of the total population) were heavy episodic drinkers.

The projections of alcohol use - contained in the report - show a slight increase in the global prevalence of the substance consumption, especially in the Americas, the Western Pacific Region, and the Southeast Asia Region, and an overall APC increase from 6.4 to 7 liters of ethanol per year. However, since 2016, the world's population has suffered a pandemic, exposing significant economic, political, social, and psychological vulnerabilities; therefore, it is reasonable to speculate that these consumption trends might have escalated even more than expected in the last four years (2020-2024).

Diagnosed Alcohol Use Disorders mimic global trends of alcohol use, peaking across high- and upper-middle-income countries; it affects 8.6% of men and 1.7% of women worldwide. Prevalence rates

reflect a substantial difference in the expression of AUDs between sexes; however, data suggest that the gender gap might be narrowing over time.

Undoubtedly, the variance of data should not go unnoticed, as it might represent differences in the neurobiological underpinnings between sexes.

The Case of Italy

In Italy, the competent authority for monitoring alcohol consumption and alcohol-related problems is a branch of the National Health Institute, the National Alcohol Observatory ("Osservatorio Nazionale Alcol," Ona) founded in 1998; since 2001, it has been collaborating with the World Health Organization to study further, prevent, and treat alcohol-related health issues (Istituto Superiore di Sanità [ISS], n.d.). In 2022, the National Health Institute (ISS) released an epidemiologic report as a result of the monitoring activities conducted in the previous years on alcohol consumption and its adverse consequences on health ("Epidemiologia e monitoraggio alcol-correlato in Italia e nelle regioni"). It has been long established that there is no safe amount of alcohol; however, it is necessary to differentiate types of consumers to identify people who are carrying out noxious behaviors and require treatment. Overall, this work shows alarming rates of alcohol consumption and high-risk drinking patterns, such as habitual over-drinkers, out-of-meal consumers, heavy episodic drinkers, consumers at risk[1], and hazardous drinkers and sufferers of AUD. Individuals who did not consume alcohol in the last 12 months, both abstainers and former drinkers, amount only to 22.1% of the male population and 43% of the female population aged 11 years and older. The prevalence of drinkers (who consumed at least one alcoholic beverage in the last year) is 66.4% of the Italian population, which corresponds to 36 million people; the disproportion between sexes is evident, considering the prevalence of 77.2% for men and 56.2% for women. In 2019, the APC of the Italian population was 7.65 liters per year. Conversely to the American Dietary Guidelines described above, the standard alcohol unit taken as reference is equivalent to 12 grams of pure alcohol; it follows that heavy episodic drinking (or binge drinking) is evaluated as such when the subject ingests 4 (for women) or 5 (for men) standard alcoholic units, corresponding to 48-60 grams of ethanol on one occasion. People who engage in hazardous drinking, i.e., people who consume 4 to 5 standard alcoholic units daily, represent 2.29% of adult men and 1.09% of adult women (overall, around 830.000): they must be considered in need of treatment, as people affected by AUD.

[1] Defined according to a specific indicator developed by the National Alcohol Observatory in collaboration with the National Health Institute that combines the two main high-risk behaviors, namely habitual over-consumption of alcohol and binge drinking. It is now employed in the formal monitoring of the Italian population (Istituto Superiore di Sanità [ISS], 2022).

In 2020, 64.000 AUD sufferers were under the care of the National Health Care System: this value corresponds to less than 10% of people expected to need specialized treatment.
Global prevalence rates of alcohol consumption were forecasted to be an upward trend until 2025 (World Health Organization (WHO), 2018); indeed, the report by the National Alcohol Observatory confirms the direction anticipated and analyzes the first data set gathered during the COVID-19 pandemic in Italy. As expected, this complex period fueled the already growing trends of alcohol consumption: the most concerning information was the drastic increase of heavy episodic drinking in male adults, which saw a 27.6% spike.

1.2 Diagnostic Criteria and Assessment

Alcohol use disorders are among the most common mental disorders globally. Like other substance use disorders (SUDs), it presents as an egosyntonic behavioral pathology, characterized by the overpowering motivational strength of the substance and the decreased ability to manage its impulsive and compulsive intake; extreme and persistent vulnerability to relapse is idiosyncratic to this type of disorder.

The Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) describes alcohol use disorder as «a problematic pattern of alcohol use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:

1. Alcohol is often taken in larger amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful efforts to cut down or control alcohol use.
3. A great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects.
4. Craving, or a strong desire or urge to use alcohol.
5. Recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home.
6. Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol.
7. Important social, occupational, or recreational activities are given up or reduced because of alcohol use.
8. Recurrent alcohol use in situations in which it is physically hazardous.
9. Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol.

10. Tolerance, as defined by either of the following:
    a. A need for markedly increased amounts of alcohol to achieve intoxication or desired effect.
    b. A markedly diminished effect with continued use of the same amount of alcohol.
11. Withdrawal, as manifested by either of the following:
    a. The characteristic withdrawal syndrome for alcohol (refer to Criteria A and B of the criteria set for alcohol withdrawal, pp. 499-500).
    b. Alcohol (or a closely related substance, such as a benzodiazepine) is taken to relieve or avoid withdrawal symptoms.»

Additionally, the manual offers a set of "specifiers" to better differentiate and determine the severity of each case: the presence of 2-3 symptoms indicates a *mild* form of AUD; 4-5 symptoms are considered the expression of *moderate* severity of the disorder; and finally if the patient displays six or more symptoms the case must be considered *severe*. These parameters are instrumental to assessing changes in frequency and doses of substance use on an individual level over time.

Countries in the European region tend to follow the descriptions and diagnostic criteria provided in the International Classification of Diseases (ICD, now at its 11th revision) by the World Health Organization. Overall, the ICD-11 and DSM-V share a very similar description of alcohol use disorder (*alcohol dependence* in the ICD-11); however, the DSM-V allows for a broader perspective on the problematic use of the substance compared to its counterpart (Knox et al., 2019).
The diagnostic requirements for alcohol dependence (World Health Organization [WHO], 2022) – described as «a pattern of recurrent episodic or continuous use of alcohol with evidence of impaired regulation of alcohol use» – are the following:

1. Impaired control over alcohol use (i.e., onset, frequency, intensity, duration, termination, context).
2. Increasing precedence of alcohol use over other aspects of life, including maintenance of health, and daily activities and responsibilities, such that alcohol use continues or escalates despite the occurrence of harm or negative consequences (e.g., repeated relationship disruption, occupational or scholastic consequences, negative impact on health).
3. Physiological features indicative of neuroadaptation to the substance, including:
    a. Tolerance to the effects of alcohol or a need to use increasing amounts of alcohol to achieve the same effect.

b. Withdrawal symptoms following cessation or reduction in use of alcohol (see Alcohol Withdrawal).
c. Repeated use of alcohol or pharmacologically similar substances to prevent or alleviate withdrawal symptoms.

4. The features of dependence are usually evident over a period of at least 12 months, but the diagnosis may be made if use is continuous (daily or almost daily) for at least 3 months.

The two main assessment methods for alcohol consumption are self-report questionnaires and, in clinical contexts, the analysis of biomarkers related to alcohol use and abuse.
Among the most popular self-report questionnaires employed, both for alcohol use disorder prevention and recognition, is the Alcohol Use Disorders Identification Test (AUDIT), developed by the World Health Organization: it is a 10-item self-report scale that helps clinicians to differentiate between patients affected by AUDs and those carrying out potentially harmful behaviors, such as hazardous drinking (Kranzler, 2023; Higgins-Biddle & Babor, 2018). It can be observed that the test items have two distinct areas of focus: the first three questions inquire into alcohol consumption, whereas the following seven items examine problematic behaviors around drinking, as well as typical symptoms of alcohol dependence.

1.3 Risk Factors

Alcohol use disorders, as much as any other psychopathological condition, have a multifactorial nature and, therefore, it is not possible to reduce it to a single cause.

Genetics is a key determinant of psychiatric disorders and, accordingly, AUDs. Twin and adoption studies provide an invaluable way of discerning the relative influence of genetic versus environmental factors on a phenomenon: studies from the past 35 years include heritability figures from 40% to 70%; for instance, an Australian twin study on the heritability of AUD estimated it at 64%. A meta-analysis conducted in 2014 presented evidence supporting a heritability estimate of 0.49 (95% confidence interval) and a proportion of shared environmental variance of 0.10 (95% confidence interval), indicating that 50% of alcohol use disorders may be attributed to genetic factors (Verhulst et al., 2015). However, these figures might be subject to methodological errors and biases, thus underrepresenting actual genetic contributions.
Nevertheless, the concordance rates are not estimated above 50%, which signifies that gene-environment interactions and environmental risk factors also play a crucial role in the development of alcohol use disorder (Carvalho et al., 2019).

From a purely biological perspective, studies identified 2 main individual alleles that mediate the risk of developing AUD, namely, alcohol dehydrogenase (ADH) and the mitochondrial form of aldehyde dehydrogenase (ALDH2); these are both liver enzymes involved in alcohol metabolism. The mitochondrial form of aldehyde dehydrogenase has two primary alleles, ALDH2*1 and ALDH2*2; carriers of the latter, homozygotes in particular, have impaired alcohol metabolism, which translates into greater acetaldehyde build-up in the liver, causing unpleasant side effects aiming to prevent the development of AUDs in the first place. Another genetic factor contributing to the development of alcohol use disorder is the polymorphism in the ADH group of genes (ADH1B*2).

By means of genome-wide association studies (GWASs), researchers have identified 100 loci associated with problematic alcohol use; additionally, 10 risk loci have been proven to be connected to the AUDIT total score.

Gene-environment interactions are crucial determinants of the vulnerability to alcohol dependence: rs1729578 polymorphism in the PRKG1 gene (which encodes cGMP-dependent protein kinase 1) has been found to moderate the influences of traumatic life experiences and alcohol misuse; furthermore, the involvement of histone modification and DNA methylation in the pathophysiology of AUD is becoming more prevalent, as they may serve as mediators of the impact of other environmental risk factors.

Personal traits are, at least partially, sensitive to genetics and genetic changes, and some of them represent additional risk factors for alcohol use disorder, namely impulsivity and sensation seeking. The latter mediated problematic alcohol use during adolescence as predicted by polygenic risk scores in the genome-wide association of DSM-IV alcohol dependence scores.

The environmental factors that can predispose individuals to the development of alcohol use disorder and, in general, to substance use disorders are many.

Cultural norms and attitudes towards drinking and related problematic behaviors play a major role in trends of consumption. Society's view on the substance has the potential to shape people's perception of the substance itself, often demonizing some and undermining the potential and concrete harm others generate; in cultural groups that tend to have permissive attitudes towards alcohol, the substance is usually strategically advertised, readily available and accessible also to people in of lower-middle income class and young people.

A significant influence on alcohol consumption is the expectation and anticipation of its effects: many individuals make use of alcohol to self-medicate personal difficulties, for instance, in social contexts, with the intent to alleviate anxiety. Interestingly, a recent study aiming to uncover the neural

underpinnings of expecting alcohol registered increased functional connectivity in the reward network (specifically, the circuit of nucleus accumbens, ventromedial prefrontal cortex, and subcallosal cingulate cortex). Hence, research suggests that alcohol beliefs about whether or not individuals have ingested alcohol influence the level of actual alcohol consumption and impact social behavior. Furthermore, such expectancies may contribute to the subjective experience of intoxication (Kirsch et al., 2023).

The domestic context plays a major role in the healthy development of individuals and thus can profoundly mark its components. Poor family support and parental monitoring are strictly related to AUDs development, along with parental drinking, favorable parental attitudes towards alcohol, and parental alcohol supply. In this environment, children and adolescents can be exposed to considerable stressors, for instance, household instability and verbal, physical, and sexual abuse that drastically increase the probability of developing an SUD to compensate for the consequences of such traumas.

Other environmental risk factors are conduct or mood disorder, which often coexist with AUD, low self-control, perceived pattern of drinking among peers, financial resources to buy alcoholic beverages, level of education, and religious beliefs and/or practices.

1.4 Comorbidities

Alcohol is one of the substances with the highest morbidity and mortality rate among drugs of abuse, which makes it a public health matter. AUDs often coexist and contribute to numerous physical and psychiatric comorbidities; the latter can even be a crucial antecedent to the onset of AUD. Psychiatric comorbidities heavily influence alcohol use disorder's evolution, recognition, and the following prognosis. For this reason, it is of vital importance to promptly recognize and address psychiatric comorbidities and investigate their relationships to substance abuse. However, research in this field has not yet come to definite conclusions. There is consensus on the three potential mechanisms that may underlie the presence of psychiatric comorbidities in alcohol use disorders, namely the direct and indirect causal links of the two coexisting psychiatric disorders, common genetic and environmental causes (and their interactions), and shared psychopathological characteristics, which make AUDs and other psychiatric disorders (e.g., SUDs) fall under the same diagnostic entity. Alcohol use disorder often occurs in conjunction with a range of psychopathologies, including externalizing and internalizing disorders as well as thought disorders. Specifically, individuals with AUD are commonly diagnosed with:

- Personality disorders, with an AUD lifetime prevalence of 39%-77%.
- Mood disorders, including major depressive disorder (AUD lifetime prevalence 27%-44%) and

bipolar disorder types I and II (AUD prevalence generally varies between 24% and 44%).

- Attention-deficit/hyperactivity disorder (ADHD), manifesting with a prevalence of 19%-26% in young adults, increasing up to 33% in adults.
- Anxiety disorders, most commonly being Generalized Anxiety Disorder (GAD), social anxiety, and panic disorder, with an estimated prevalence of 20%-40%.
- Post-traumatic stress disorder, ranging from 34% to 55% (the prevalence changes drastically across countries).
- Schizophrenia (AUD lifetime prevalence equal to 21%) and psychotic disorders (17.1%), including alcohol-induced psychotic disorders, which account for one-third of the population already experiencing psychotic episodes.

A late review analyzed 36 previous studies exploring the relationship between alcohol consumption and eating disorders, in particular the association with binge eating disorder (BED). The review highlighted a co-occurrence of alcohol consumption and eating disorders, which increased in the presence of episodes of binge eating, as in bulimia nervosa, BED, and compulsive-purgative type of anorexia nervosa. Overall, the research concluded that there exists, in fact, a relationship between binge eating disorder and alcohol use, which is influenced by numerous variables and needs further investigation (Azevedo et al., 2020).

Substance use disorders are, indeed, the psychopathologies most closely linked to alcohol use disorder; this affinity is evident as AUD, by definition, falls under the broader category of substance use disorders. The common liability model to addiction (CLA) posits that, despite the profoundly different action modes of different drugs of abuse, the substantial genetic contribution to phenotypic variance can compensate for their underlying differences. Therefore, it is possible to consider the liability of all drug addictions as non-specific and independent from the order of initiation (Vanyukov et al., 2012). Contrastingly to this theory, the gateway hypothesis introduces another interesting perspective: it focuses on the data suggesting that alcohol consumption precedes the use of marijuana and other drugs (65% of marijuana users and 97% of cocaine users started drinking alcohol before making use of other substances). The key mechanism is exposure opportunity, as individuals who already consume legal substances are more likely to be exposed to illegal ones within their homes or peer environment (Castillo-Carniglia et al., 2019).

1.5 Neurobiology of Addiction

The neurophysiological principles behind pathological behaviors of addiction have been

studied for decades; however, their extreme complexity continuously opens up new scenarios for research. Among the first dynamics to be ascertained concerning the effects of drugs of abuse in the brain, around the 1970s, is the increased release of dopamine towards the basal ganglia. This mechanism supports reinforcing, even maladaptive, behaviors by expediting the encoding of learned associations. Substance use disorders cannot be explained solely by a supraphysiological dopamine release throughout the reward circuit during the phase of intoxication; key features of this set of psychopathologies are the overpowering motivational strength to perform certain behaviors and the inability to manage the desire effectively, in this case, to obtain drugs.

Current neurobiological knowledge of motivated behavior allows researchers to pursue a more precise account of addiction. Neurobiological mechanisms of SUDs that need further investigation are precisely those underlying vulnerability, maintenance of drug-seeking behaviors and subsequent consumption, the progress of addiction – from goal-directed actions to compulsive, habit-based responses – and the persistent vulnerability to relapse and drug taking, even after significant periods of abstinence (Everitt et al., 2001).

1.5.1 Goal-Directed Behavior

The research starts with the investigation of how goal-directed behavior is activated. Two essential components for this dynamic to work are 1) the attachment of importance to stimuli so that the behavior is activated (salience), followed by 2) the directionality of activation towards a specific behavioral response (direction of behavior). The main brain structures involved in this process are part of the mesocorticolimbic dopamine system (see *Figure 2*), its connections in the basal forebrain, and the amygdala. Additionally, the activation of glutamatergic pathways and opioid peptide networks is implicated in the development of substances of abuse dependence.

The amygdala has been traditionally associated with fear-motivated behaviors; its role in goal-directed behaviors is to establish learned associations between motivationally relevant events and neutral stimuli, which later become predictors of events. The basolateral amygdala nucleus (BLA) is of critical importance in this process because of its glutamatergic projections to the prefrontal cortex (PFC) and the nucleus accumbens (NAc), which allow learned associations to determine more complex behaviors.

The nucleus accumbens is involved in reward-motivated behaviors and comprises two distinct components: the shell and the core. The former has strong connections to the hypothalamus and the ventral tegmental area (VTA), with which it shares reciprocal dopamine innervations, helping

modulate motivational salience and establish learned associations. This link is of particular importance as it contributes to determining ingestive behaviors of substances of abuse. The latter (NAc core) is connected to the anterior cingulate cortex (ACC) and the orbitofrontal cortex (OFC); through its glutamatergic afferents to the PFC, it enables the expression of motivated behaviors. Additionally, dopamine may be released into the NAc core after the subject has been in contact with stimuli predicting a reward, although it does not necessarily happen. Finally, the NAc is crossed by essential projections carrying the γ-aminobutyric acid (GABA) and neuropeptides to the ventral pallidum, which is decisive for expressing motivated behaviors.

The prefrontal cortex has a fundamental role in determining the overall motivational salience of a stimulus or event and, in turn, in regulating whether a behavioral response shall be emitted and, if so, at what intensity (direction of behavior). Its activation arises in response to the predictable rewards.

The VTA is a particularly significant component of the mesocorticolimbic dopamine system, as it sends dopamine projections throughout the reward circuit in response to motivationally relevant events. This neurotransmitter has two main functions in this system: 1) signals the necessity to trigger an adaptive behavior in response to a motivationally relevant stimulus and, when the exposure to the event/stimulus is repeated, 2) dopamine is released to predict the appearance of a (now) familiar, reward-associated event. Contextual dopamine release is triggered to promote neuroplasticity and, hence, learning. Notably, even when the brain has to respond to well-consolidated pairings, the amount of dopamine released does not increase, but no further dopamine-induced neuroplastic changes are necessitated. Indeed, in most naturally rewarding, learned associations, dopamine is released as part of the global experience.

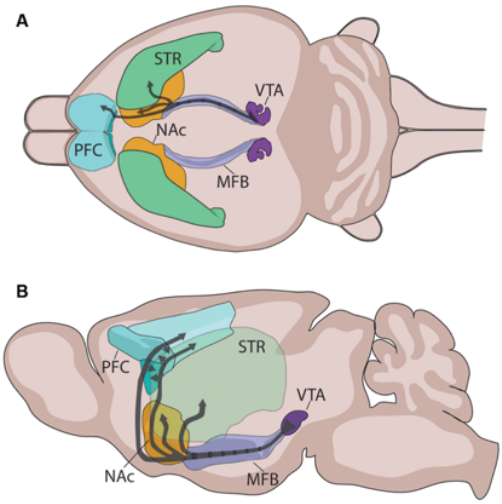

Figure 2: Mesocorticolimbic dopamine system organization – horizontal (A) and sagittal (B) view (Reynolds & Flores, 2021).

1.5.2 The Dopamine Hypothesis

The neurotransmitter dopamine has long been included in addiction etiological models: the dopamine hypothesis was indeed developed in the 1990s and posits that many, if not all, drugs of abuse involve the activation of brain systems regulated by dopamine. It focuses on the fact that substances of abuse all influence distinct chemical neurotransmitters, which cause primary neurophysiological responses; however, the chain of reaction often leads to secondary effects that involve dopamine. Animal experiments highlighted how the behavioral tendency of rats self-administering amphetamine to reach the desired effect could be considered a form of positive reinforcement. Nonetheless, the dopamine hypothesis is not universally accepted as it cannot thoroughly explain such a complex phenomenon as addiction (Robbins & Everitt, 1999).

Repeated substance use and abuse can eventually lead to addiction: at the neurobiological level, addiction corresponds to the dysregulation of the motive circuit just described. Drug consumption can cause long-lasting changes in the brain through pharmacological trauma, genetic predisposition to SUDs, and learning processes. Alterations result from the pathophysiological plasticity of brain systems, primarily in dysregulation of excitatory transmission – usually considered the primary target for pharmaceutical treatments – and changes in the PFC. Specifically, the PFC decreases its ability to initiate behaviors triggered by biological rewards and its capacity to exert executive control over drug-seeking while being hyperresponsive to stimuli that predict drug availability by releasing a disproportionate amount of glutamate to the NAc.

Overall, three general principles concerning the brain's motivational dysregulation have been identified: the final common pathway, modality-dependent subcircuits, and the requirement for dopamine transmission.

Changes in glutamatergic projections following repeated drug use and abuse are part of the so-called *final common pathway* for the initiation of drug-seeking behaviors. Indeed, the augmented release of glutamate in the NAc occurs after drug- and stress-induced reinstatement; more specifically, this mechanism concerns the NAc core, which is responsible for initiating learned behavioral responses. The NAc role in drug-seeking behaviors is supported by the fact that the release of AMPA glutamate receptor antagonists in the structure can reduce and prevent the reinstatement of drug- and cue-generated cravings. Medical treatments aiming at reducing drug-seeking exploit this dynamic by preventing glutamate release. Neuroimaging studies allowed researchers to evaluate a significant change in the orbitofrontal and anterior cingulate cortices metabolism correlated with the intensity of

cue-induce cravings; specifically, the activation of the anterior cingulate cortex has been proved to be inhibited in experimental settings of decision-making and response to biologically relevant rewards. The PFC, but specifically the ACC and OFC, have a prevalent role in predicting drug availability; when dysregulated, they fail to manage drug-related stimuli, triggering a disproportionate motivational response towards finding and ingesting the substance. ACC hyperactivation has been proven to contribute to compulsive behaviors in SUDs as well as in other psychopathologies (e.g., OCD), hence hindering cognitive control over the desire to consume drugs.

Different types of stimuli trigger drug-seeking behavior, which differs in the distinct reward-related subcircuit activated (*modality-dependent subcircuits*). Namely, cue-primed drug seeking involves the basolateral amygdala activation, whereas stress- and drug-primed drug seeking do not necessitate activating such a channel. Stress-caused drug seeking selectively engages different nuclei belonging to the extended amygdala due to its role of learned associations between previously neutral stimuli and reward-associated events. However, studies have provided data suggesting an inconsistent correlation with the intensity of craving experienced.

Finally, the third principle states that all modalities (cue-, stress-, or drug-induced) of drug seeking stimuli *require dopamine transmission*. The mesocorticolimbic dopamine system activation is necessary for the reinstatement of craving, as it involves the delivery of dopamine through projections towards the NAc, PFC, and amygdala; by contrast, it is possible to inhibit this process by deactivating the VTA, regardless of stimulus modality (Kalivas & Volkow, 2005).

1.5.3 The Addiction Cycle

Addiction models are based on a well-established pattern, the *addiction cycle*, which becomes more intense with each repetition and eventually leads to a full-blown pathological state of addiction. It is composed of three main stages: binge/intoxication, withdrawal/negative affect, and preoccupation/anticipation.

The *binge/intoxication* stage is characterized by the acute effects of substances of abuse, resulting from a supraphysiological dopamine release in the reward circuit, especially in the NAc. Initiation of addiction happens when repeated drug ingestion leads to the progressive employment of the PFC and its glutamatergic projections towards the NAc. The hedonic experience of psychoactive substances is supported by short-term neuroplastic changes, which can last hours to days and are

widely distributed throughout the motive system. These cellular events lead to addiction but do not account for the enduring behavioral consequences of addiction.
Ethanol has significant euphoric, anxiolytic, and sedative properties when consumed in low-moderate amounts. However, binge drinking and alcohol intoxication can lead to dire consequences, from motor disorganization, dysarthria, attention and memory deficits, and stupor to hypoventilation or respiratory depression, coma, and death.

During the second stage, i.e., *withdrawal/negative affect*, sufferers experience a significant decrease in the rewarding effect of the substance – and, consequently, an increase in the reward threshold; simultaneously, the subject loses motivation related to natural sources of reward. This is due to the reduction in the dopaminergic and serotonergic neurotransmitter system and a consequent rise of negative affect, enhanced by the hyperactivation of the amygdala and hypothalamus (Yang et al., 2022). The symptoms most commonly experienced during alcohol withdrawal are significant irritability, agitation and anxiety, dysphoria, hyperexcitability, sleep disturbances, nausea, vomiting, generalized weakness, and migraine. Additionally, the abstinence syndrome features a severe central depression followed by hyperactivity of the adrenergic system; overall, critical hydroelectric imbalances are present (Nava, 2004).

The third and last stage is *preoccupation/anticipation* or craving, which is what, in many cases, leads to relapse. In this phase, individuals display drug seeking behaviors, struggle with decision-making and have severe executive dysfunction; as a consequence, they are unable to inhibit maladaptive behaviors that bring negative and destructive consequences, despite awareness of this fact. Several factors play a role in determining these conditions: patients face a heightened sensitivity to drug-related cues, in combination with low reward function and increased stress system activity.
The prefrontal cortex has a critical role as the locus of executive functions; specifically, the dorsolateral prefrontal cortex, the anterior cingulate cortex, and the orbitofrontal cortex (the latter two participating in compulsive behaviors), are activated during this phase, along with the hippocampus.

One molecular adaptation determining the transition to full-blown addiction is the D1-receptor-mediated stimulation of proteins with long half-lives, and it is also the most thoroughly studied mutation. It implies alterations in the content and function of various proteins directly involved in dopamine transmission; nonetheless, such changes in dopamine transmission seem to be compensatory and do not directly mediate the transition to addiction.
End-stage addiction is characterized by vulnerability to relapse as a result of long-term cellular and metabolic changes. Some specific alterations in protein content and function often become

progressively more significant with extended periods of withdrawal; such findings raise the hypothesis that this may be one mediating factor establishing vulnerability to relapse as a permanent feature of addiction instead of temporary and reversible.

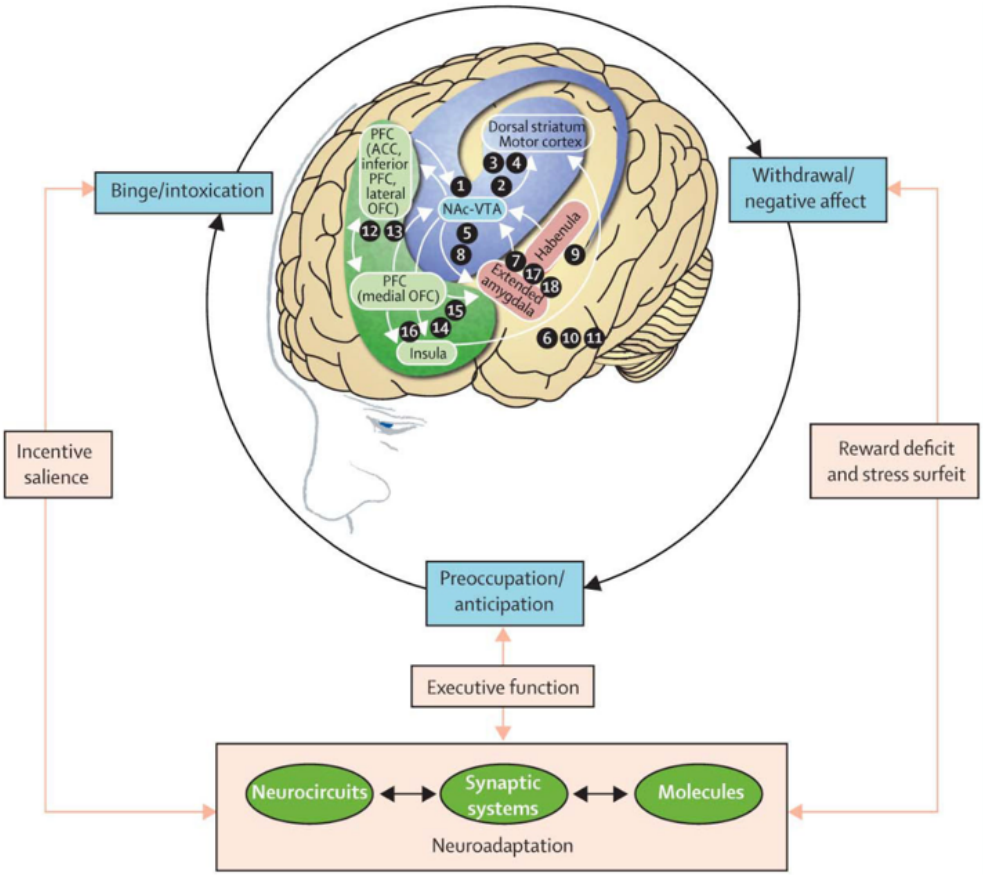

Figure 4: Neurocircuitry contributing to compulsive-like behaviors in SUDs (Koob & Volkow, 2016)

1.5.4 Theories of Addiction

Parallel to neurobiological investigations, three main theories incorporating pathological changes in brain neurophysiology and behavioral features have been developed: they aim at providing a satisfactory account for the transition from substance use and abuse to the state of addiction, working from neurobiological bases and elaborating on different explanations for the addiction cycle. However, it is crucial to highlight that these views are not mutually exclusive.

The first models presented are the *Allostatic Model* (Koob & Le Moal, 1997) and the *Opponent-Process Model of motivation* (Solomon & Corbit, 1974); these models complement each other, as they both speculate that addiction is a process of hedonic homeostatic dysregulation.

The Allostatic Model, specifically, describes addiction as a chronic state of "pathological homeostasis" resulting from the body's attempt to counter-adapt to deviations from regular physical parameters. Homeostasis has indeed been described as a self-regulatory process essential for adjusting the organism's functions around a set point crucial for survival; this process involves multiple bodily systems, as it may face intense challenges, such as drug consumption. Contrastingly, allostasis is a dynamic state in which the organism shifts all its physiological parameters out of a healthy homeostatic range to compensate for stressful, chronic demands through change – leading to "apparent stability." The allostatic model, therefore, involves the entire human organism. Eventually, individuals subject to persistent, stressful demands on the body will reach the allostatic state, i.e., a new and stabilized state of chronic deviation from normal homeostatic levels when new set points are established. In the specific context of addiction, the allostatic state coincides with the experience of withdrawal and the negative symptoms associated, originating from the decrease in reward function and from the chronic activation of the HPA axis (stress-regulating system). Notably, the release of glucocorticoids in the organism elicits the activation of the sympathetic nervous system and the brain's emotional pathways. Being a pathological state, during allostasis, the body and mind are subject to persistent stress and arousal, leading the individual towards generally harmful aftermath and illness. This corresponds to the definition of allostatic loads: in other words, the tangible consequences on the body for being forced to adapt to chronic and deleterious factors. The counteradaptation hypothesis – strictly linked with the concept of hedonic tolerance – refers to neurobiological adaptations at the molecular, cellular, and system levels that are activated in response to substance use. Precisely, in the case of drug use, counteradaptation mechanisms represent the opposition to hedonic senses, which become progressively more extensive over time.

The *Opponent–Process Theory* proposes a shift from traditional views of addiction – which suggest that this latter is driven by the search for the (initial) hedonic effects of drugs – by producing predictions of substances' effects on homeostasis (Koob & Le Moal, 2000). *Figure 4* represents the standard evolution of such adaptations, represented by two different processes, named a-process and b-process, which, together, give rise to the A-state and B-state.

The A-state is triggered by the first drug intake – with no prior drug history – and corresponds to the hedonic phase; the initial part of the a-process, the intensity of which depends on the dosage of the drug ingested, by contrast, activates the opponent b-process, crucial to guarantee homeostasis. With repeated or chronic drug administration, individuals develop a sensitized response (images B and C) and progressively develop changes in the hedonic set point until the hedonic homeostasis is entirely broken. As shown in image D, after a long period of abstinence, individuals who suffered from chronic

and protracted dependence still present a long-lasting change in hedonic set point and residual sensitization. The A-state is protracted as long as the hedonic effects of the drug, hence the a-process, are greater than the counter adaptive b-process; vice versa, the B-state occurs whenever the negative affect characterizing allostasis (b-process) overpowers the a-process (Koob & Moal, 1997).

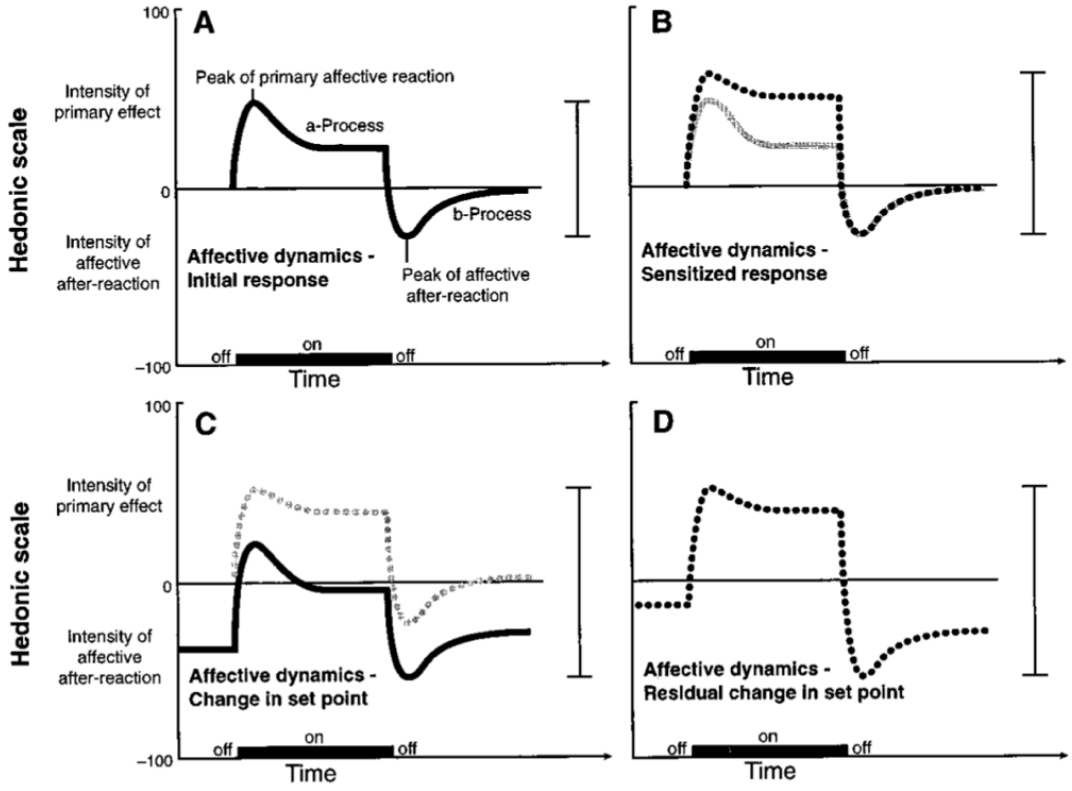

Figure 4: Solomon and Corbit's opponent-process model of motivation (Koob & Moal, 1997).

The second theory of addiction is the *learning theory*: substance use disorders are often characterized as "*aberrant learning,"* reflecting the critical role that learning and reinforcement dynamics play in its development and persistence. Particularly, processes such as Pavlovian and instrumental learning – and their reinforcing influences – can potentially lead to a strong and long-lasting propensity to relapse. A widely accepted fact is that drug seeking behaviors are sensitive to the contingency between instrumental behavior and drug administration but also to the presence of cues associated with substance intake. Animal experimentation led to the identification of three main structures involved in learning processes: the basolateral amygdala is a critical structure for acquiring a second-order schedule, while injury to the anterior cingulate cortex and medial prefrontal cortex cause rats to display consistently high levels of responding to cocaine. Furthermore, neuroimaging studies on cocaine and heroin addicts revealed a persistent activation of the amygdala and the ACC when exposed to drug cues. Pavlovian learning allows humans and other animals to predict and adapt

to environmental stimuli by pairing an unconditioned stimulus (US) with a previously neutral stimulus, which, consequently, becomes a conditioned stimulus (CS), eliciting a conditioned response (CR). This mechanism is susceptible to the contingency of conditioned stimuli and the reinforcers or outcomes. Pavlovian processes can be expressed as autoshaping, Pavlovian-to-instrumental transfer (PIT), and conditioned reinforcement.

Autoshaping corresponds to the fundamental association dynamic described earlier, after which environmental stimuli paired with rewards gain emotional and motivational salience. Specifically, when drug-related cues are repeatedly paired with the ingestion and hedonic effects of a substance, conditioned responses are elicited in the individual. Pavlovian conditioning has been proven to activate an extensive neural network, including the anterior cingulate cortex, the nucleus accumbens core, and the amygdala central nucleus (CeN), mediated by the mesocorticolimbic dopamine system.

Pavlovian instrumental transfer (PIT) is a psychological phenomenon that explains how separately trained stimuli, established through Pavlovian processes, exert a significant motivational influence on behaviors shaped through instrumental learning, regardless of the specific processes involved (S-R or R-O process). Through animal training, researchers assessed the potential of a CS to reinforce instrumental behaviors: results showed that lesions to the NAc core and the CeN inhibited the reinforcement of such behaviors, testifying their involvement in the process. Additionally, the mesocorticolimbic system influenced the PIT. Notably, pavlovian processes have been described so far as a mechanistic dynamic of stimulus and learned response that does not represent the reality of drug-related stimuli, which indeed carry a solid affective value.

Conditioned reinforcement is the process by which learned stimuli acquire a strong motivational salience and support instrumental, goal-directed actions.

Instrumental learning displays several differences compared to Pavlovian processes: first and foremost, instrumental mechanisms are sensitive to contingencies between actions or responses and outcomes. Studies on animal models revealed that, in one specific case, cocaine-seeking acts are driven by the appraisal of the specific contingency between a behavioral response and its outcome (drug administration), which results from an interplay of reinforcements, regulatory, and activation processes. Therefore, drug-seeking actions are regulated by the knowledge of contingency, which in this case is a drug-taking link. In contrast, the S-R instrumental process refers to the simple habit response to a motivationally salient stimulus. A possible dynamic that has yet to be further investigated explores the transition from drug use and abuse to full-blown addiction, as a switch between the goal-directed R-O process – under which drug-seeking behaviors are initiated – and the S-R process, when the pursuit of substances becomes compulsive and, hence, outside of the individual's control. This

shift may also reflect the role of the prefrontal cortex in now-impaired executive functions (Everitt et al., 2001).

Incentive-Sensitization Theory can be categorized among "neuroadaptationalist models", i.e., it supports the view of addictive behaviors stemming from progressive and long-lasting neurobiological changes in the brain and behavioral learning by the sensitization process. Sensitization carries a progressive increase in substance effect with repeated or chronic use. This framework focuses on craving and relapse as defining characteristics of addiction and caused directly by changes in the neural system that undergoes sensitization-related adaptations. The hypersensitization of this neural network is believed to mediate specific psychological functions involved in incentive motivation, that is, the attribution of incentive salience to an otherwise ordinary stimulus. The enhancement of drug-related stimuli is to be considered pathological; with the simultaneous activation of behavioral learning, the incentive salience on substance-related cues increases even further. "Wanting" is a psychological process correlated with the dopamine activity in the reward system, and when sensitized, it becomes responsible for obsessive drug craving, displayed through drug seeking and taking. The Incentive-Sensitization Theory differentiates itself from more traditional addiction models also because it theorizes that the progressive neural sensitization and increase of drug "wanting" is not accompanied by an increase in "pleasure" obtained by substances of abuse, as the neural substrates involved are different. The neural network believed to mediate incentive-sensitization processes is the mesotelencephalic dopamine system, comprising mesocortical and mesolimbic pathways and the mesostrial or nigrostrial system. At this level, sensitization gives rise to enhanced responsiveness to salient stimuli that, in turn, elicit a greater dopamine release.

Incentive-Sensitization Theory stands on six criteria that must be satisfied for the theory to be valid. 1) The mesotelencephalic system, representing the common neural pathway, needs to be influenced by different substances; however, it would be incorrect to state that it is the only system affected by drug consumption. 2) The repeated consumption of substances of abuse should lead the common neural substrate to become progressively hypersensitive. Processes of counteradaptation and allostasis do explain principles underlying tolerance to the substance and withdrawal; however, they do not thoroughly account for the defining features of addiction, namely craving and persistent vulnerability to relapse. Additionally, for any given substance, some of its effects may decrease with repeated administration as the individual develops tolerance, whereas others may increase (behavioral sensitization). Sensitization effects are particularly evident with psychomotor stimulant drugs, but also other substances, such as ethanol, elicit similar effects (psychomotor activation, enhanced dopamine transmission, behavioral sensitization). Repeated drug consumption may lead to cross-sensitization to

different substances; nonetheless, literature on the topic has not been consistent. This correlation is also found between drugs and stress: more specifically, substances of abuse are hypothesized to induce sensitization through their action as stressors. Despite the availability of little research on the topic, sensitization to the motivational properties of drugs of addiction is thought to exert a significant influence on the pattern of addictive behaviors. Additionally, studies on animal subjects initiated the path to unveil the link between potentially stressful environments (e.g., social isolation, prenatal stress) and a greater predisposition for substance use and abuse through self-administration. In conclusion, enough empirical evidence supports criterion two; however, further research is required to clarify the biophysical basis of sensitization-induced dopamine changes. 3) Neuroadaptations stemming from sensitization processes should be persistent. Studies on animal models highlighted how restricted doses could induce significantly long-lasting sensitization, potentially permanent. It is still unknown whether sensitization to psychomotor stimulants is similar to incentive sensitization, but since these different processes should share a common neural network (see premise 1), sensitization effects should be comparable. 4) The manifestations of sensitization-induced neuroadaptations should be susceptible to conditioned stimuli. As previously mentioned, associative learning co-occurring with sensitization processes might lead the individual to an even more excessive and obsessive focus on drug-related cues. Evidence suggests that neuroadaptation shifts can affect not only the motivational properties of drug-associated stimuli but also the incentive salience of "natural rewards," potentially altering a much wider range of behaviors. 5) Criterion five concerns the role of the mesotelencephalic dopamine system in incentive motivation. The role of dopamine transmission during drug consumption and the development of addiction has been largely studied for decades; such rich scientific literature on the topic allows scholars to determine the role of dopamine in mediating drug-induced incentives and motivational alterations necessary to satisfy this premise. 6) Effects mediated by dopamine exclusively concern incentive salience ("wanting") and not pleasure. Research has yet to establish a definite pleasure system, and with current knowledge, it is impossible to affirm that the neural pathways for "liking" and "wanting" are different. A few potential candidates explaining pleasure processing have been identified, e.g., the endogenous opioid neurotransmitter systems. Finally, it is not possible to explain increased drug craving assuming that sensitization processes support dopamine mediation of subjective pleasure of drugs; nevertheless, an increased differentiation between drug craving and pleasure is what research expects when considering the altered dopamine transmission network as a mediator of incentive salience (Robinson & Berridge, 1993).

1.6 Available Treatments

Upon analysis of diagnostic criteria, it is evident that a prominent characteristic of substance use disorders is the vulnerability to relapse, even after extended periods of moderate drug use or abstinence. Indeed, there exists no singular treatment modality that can guarantee lasting avoidance of high-risk drug consumption, including sustained abstinence. In specialized structures, various treatment approaches are integrated to address the underlying causes of disorders, regardless of their organic, psychosocial, or psychiatric origins; consistently, in most instances, Medication Assisted Treatment for AUD and heavy drinking is complemented by behavioral interventions. Medical prescriptions – among the most widely used are Disulfiram, Naltrexone, Acamprosate, and Nalmefene – are essential to mitigate withdrawal syndrome, which can be intolerable for patients, particularly those lacking substitution therapy (Knox et al., 2019), and to manage symptoms caused by comorbid psychiatric conditions.

Although the importance of such medications cannot be understated, the present work will be directed toward examining evidence-based psychosocial interventions and therapeutic communities.
To maximize positive potential outcomes, psychosocial interventions for alcohol use disorder and harmful drinking should be tailored to patients in need of care and support: a thorough analysis of the amount and frequency of alcohol intake is needed and can be shaped, for instance, employing the Alcohol Needs Assessment Research (based on the ICD-10) or the severity criteria provided in the DSM-V clinical description of the psychopathology. This initial assessment is key to reducing mortality, which is, in turn, caused by lack of adherence to the treatment; undeniably, the first three months of abstinence are the most complex and crucial for the patient, as witnessed by drop-out levels ranging between 50%-80%.

Among psychological evidence-based treatments, two main approaches can be distinguished: the motivational and the cognitive-behavioral approaches.
The **motivational approach** branches out into two distinguished forms of therapy, both "client-centered," aiming to increase the patient's motivation to change by exploring and resolving ambivalence towards unsafe drinking practices. Motivational Interviewing (MI) and Motivational Enhancement Therapy (MET) consider the change in drinking patterns as a result of a decision, which, in order, stems from therapeutic techniques and relational styles – applied by the therapist – that activate cognitive and behavioral resources possessed by the patient. Motivational interventions are usually short (a single session for MI and up to four for MET), making them suitable for subjects with mild dependence and hazardous alcohol intake patterns. Additionally, as AUD presents significant

variability across individuals, the clinical efficacy of motivational approaches is just as variable, and the positive effects tend to abate as time passes.

Cognitive behavioral approaches (CBT) employed in alcohol use disorder treatments are numerous; their action is based on the recognition that AUD is a learned behavior and can thus be changed with adequate interventions. Generally, cognitive behavioral techniques aim to improve emotional regulation and social skills, develop coping strategies, and challenge dysfunctional or biased ideas about the Self and the substance of abuse. As previously stated, relapse is a distinctive characteristic of SUDs, and some CB approaches are designed to specifically prevent it: they target negative emotions, social pressures, and interpersonal conflicts, which aggravate the desire to drink. Additionally, a small portion (3%) of patients relapse because of unpleasant withdrawal symptoms. It is important to note that Relapse Prevention (RP) strategies do not necessarily aim at sustained abstinence but rather prioritize a balanced lifestyle that enables patients to manage relapses, making them "less destructive," given their high likelihood of occurring; indeed, the recovery journey from addiction is inherently complex and nonlinear.

To the same aim, Behavioral Self-Control Training (BSCT) was developed: this intervention method is based on behavioral techniques directed at reducing the amount of alcohol consumed, namely, to practice controlled drinking and to improve the patient's attitudes towards the substance. Controlled drinking presents several advantages even when compared to sustained abstinence, for instance, many people may reject the goal of abstinence without having tried controlled drinking first, and many of those who successfully manage a safe alcohol intake for a significant period frequently naturally choose to quit alcoholic beverages utterly. BCST has been proven to be an effective approach in decreasing the amount of alcohol ingested compared to other controlled drinking treatments; nevertheless, the intervention is particularly well-suited for individuals who have a brief AUD history behind and who do not experience severe problems with alcohol (Coriale et al., 2018).

Further behavioral interventions that have been demonstrated to be effective in reducing alcohol consumption include 12-step facilitation, mindfulness-based treatment, couple-based therapy (e.g., Cognitive Behavioral Marital Therapy, CBMT) based on behavioral contract and training, Coping Skills Training (CST), and continuing care, along with contingency management (CM) (Knox et al., 2019).

As it was previously observed, epidemiologic rates of alcohol use disorders and the persistence of relapse risk represent a costly burden to healthcare facilities; because of this issue, it is necessary to restate the importance of accurately selecting treatments based on individual characteristics and creating cost-effective, and, therefore, accessible interventions. One instance is group therapy: studies

have shown that there are no significant differences between individual and group treatments in terms of alcohol consumption, patient satisfaction, and abstinence rates.

There is a marked difference between group therapy and self-help groups: the latter refers to regular group sessions with people who share the same issue and aim to support each other. The most well-known self-help format is that of Alcoholics Anonymous (AA), which was born in the United States in 1935 and then spread cross-nationally. The program promotes sustained abstinence through the 12-step method: the individual needs to gain awareness of their addiction and the motives behind it and solve their problems with the group's support, with no other restrictions (Nava, 2004).

Group therapy is often implemented in therapeutic communities, i.e., residential and semi-residential facilities providing care, rehabilitation programs, and territorial reintegration. Therapeutic communities first began to appear in the 1950s and, later, in Italy (1962) and have significantly evolved since then; however, two almost immutable funding principles can be recognized: the employment of the structure to produce a shift in the user and the efficacy of self-help.

Therapeutic communities can develop different approaches to the rehabilitation of patients; nonetheless, they all heavily rely on peer influence on the individual, by means of which he/she can develop adequate social skills toward reintegration into society. The stay in the therapeutic community is usually planned to last between 12 and 24 months; undoubtedly, the length of stay predicts success, but research highlighted the great benefits of a 90+ days stay compared to shorter ones. The gains of a brief period in a therapeutic community are even more outstanding for people who make use of different drugs, present psychiatric comorbidities, have legal issues, and are unemployed (Nava, 2004).

In the context of AUD specialized treatment, many therapeutic communities accept alcoholics, yet there are few dedicated structures with functional modules and specialized training for professionals in the field. As suggested by Coriale et al. (2018), therapeutic communities seem not to be an adequate response for individuals with AUD. Indeed, there is consensus among specialists on a different and more effective outline to provide valuable care to people affected by AUDs: programs for alcoholics should be shorter in time, with specific programs for alcohol use disorder, and must allow patients to develop a strong connection with territorial structures and outpatient alcohol units.

CHAPTER TWO

SOCIO-ENVIRONMENTAL DETERMINANTS OF ALCOHOL CONSUMPTION AND STIGMATIZATION

Alcohol has been produced and used by human beings since, at least, the Neolithic times – i.e., between 10,000 to 5,000 B.C. – across almost every region of the world (Kuntsche et al., 2021); throughout history, alcohol has fulfilled multiple purposes, as medium in religious rites and, later on, as a rudimentary sanitizer and analgesic in medicine and surgery practice. It was only during the 19th century that the harmful effects of alcohol abuse became a subject of research, yet addiction to the substance was not considered a (chronic) disorder until the end of the 20th century (Nava, 2004).

Given its longstanding interrelation with humankind, it is impossible to think of alcohol use, abuse, and dependency as caused solely by its biological effects on the organism, specifically on the brain; the mutation in alcohol function and consumption throughout history testify that alcohol is indeed a cultural artifact, i.e., its forms and meanings are culturally defined (Tudor, 2021).

Recently, the approach to substance use disorder treatment, and, hence, to alcohol use disorder, has been undertaken as a public health matter; a growing body of research is investigating social determinants of health, namely, non-medical variables that concretely influence people's health, beliefs and related attitudes (Braveman et al., 2011). Socioecological factors exert a significant influence on patterns of alcohol consumption and need to be analyzed across various levels of specificity.

2.1 Tracing Environmental Factors from Macro to Micro Levels

The **socio-environmental framework** covers four distinct levels of influences of society on its members: (1) macro/policy level, (2) community level, (3) microsystems, and (4) individual level (Sudhinaraset et al., 2016).

Macro-level factors include a range of societal influences, among which availability and accessibility of alcoholic products, advertising and marketing, and social media are studied.

Research on interactions between such stratified factors presents multiple methodological challenges; indeed, available reviewed literature on the topic needs to be expanded.

The correlation between alcohol spatial and temporal availability, rate of consumption, and related harm is likely explained by three main pathways. The first one suggests that increased alcohol availability is linked to advanced and targeted alcohol-related marketing and advertising, which, in turn, increase individuals' exposure to the substance. The second pathway focuses on retailer density

and competition, which leads to private companies lowering the prices of their products to improve sales; this mechanism removes a significant barrier to alcohol consumption, namely price, making alcoholic beverages more accessible.

The third and final pathway proposes that the perception of drinking as standard practice and socially endorsed contributes to the more permissive norms around alcohol consumption and drunkenness; as discussed later on, cultural and social norms exert a powerful influence on people's perception of a substance and, consequently, their behavior towards it. Tolerant social norms may significantly increase alcohol use and abuse and related health consequences (Dimova et al., 2023).

Empirical findings generally endorse the correlations among variables described in the three pathways; nevertheless, current quantitative research designs have proven insufficient to determine these relationships' causality and directionality.

To better understand the complex interplay between socio-environmental influences, Dimova et al. (2023) further classified them into three dimensions: physical-geographical, temporal, and personal-historical.

Unequivocally, alcohol advertisement and promotion are grounded in the physical-geographical dimension and, together with other parameters such as outlet density, visibility, and proximity, it is believed to uphold alcohol use and heavy drinking, especially at the expense of marginalized groups and adolescents. Overall, research demonstrates that targeted alcohol marketing contributes to the development of more favorable attitudes towards alcohol consumption, thereby reinforcing its social acceptability; however, the amplitude of its effects varies significantly across age and ethnic groups. Research conducted in the U.S.A. revealed that ethnic minorities in the country are exposed to heavily targeted alcohol advertisement and placement, which, in combination with other socioeconomic factors, contributes to heavier alcohol consumption and consequent harm. For instance, studies indicated that malt liquor, a beverage with higher ethanol content and sold in large quantities for a low price, has historically had a significant market presence in African American communities; indeed, data suggest that, generally, this community is exposed to more malt liquor commercials than any other ethnic group.

As previously mentioned, alcohol-related marketing also aims at the underage population through, e.g., flavored beverage production and advertisement, which is considered more desirable, especially for young women. Effects of alcohol publicity on adolescents have been proven to be more influential on their behavior than it would be on adult individuals, increasing the number of drinks consumed by 1% with each commercial seen. Moreover, youth displaying alcohol brand preferences were found to consume, on average, more drinks on a monthly basis compared to peers who declared no preferred

brand choice. A significant influence on youth is exerted through social media, on which alcohol marketing has been progressively relying for the past decades: social media offer vast platforms with few age-related ties, making commercials available to people below the legal drinking age. Indeed, studies on the issue observed an increase in alcohol use proportional to the number of online peer contacts (Sudhinaraset et al., 2016).

Further facilitators of alcohol consumption identified in the local environment are the lack of recreational activities or the lack of alcohol-free recreational activities, and the use of public spaces for drinking. The latter has been assessed across countries and linked to the need to connect with others and create a community, which are particularly significant among ethnic and other minorities. A noteworthy factor related to the physical surroundings in which members of a community find themselves is gentrification, i.e., a sociocultural shift of an urban area from mainly proletarian to bourgeoise; as far as drinking-related activities are concerned, it would imply a decline in traditional pubs and an increase of "hybrid" establishments, encouraging the dismissal of alcohol-centered daytime drinking spaces and sociocultural disapproval of such activities. This transformation can lead to both beneficial and harmful consequences. In gentrified areas, the costs of licensed venues may increase, and fewer people can afford to consume alcohol there: higher prices could potentially decrease alcohol purchases in those areas and, consequently, increase the sense of safety among residents, but they could also draw people to other private, less safe, and crowded spaces to pursue such activity (Dimova et al., 2023). Partition of drinking venues caused by socioeconomic and cultural differences might exacerbate health inequalities outcomes and alcohol-related harm due to marked differences in the quality of beverages consumed, number of injuries and assaults caused by intoxication, and monetary resources available to manage consequent health adversities.

Determinants belonging to the temporal dimension can enable or restrict alcohol consumption. The primary facilitator identified through research is longer opening hours of facilities selling alcoholic beverages during the day and night. Protracted access to the substance is markedly more dangerous for people suffering from AUD or problematic drinking patterns. Still, time-limited, special events usually give great access to alcohol and heavy drinking is socially endorsed.

Finally, studies addressed the personal-historical dimension, which encompasses the interaction between personal characteristics and circumstances, i.e., the social dimension of alcohol consumption (inextricable from social norms). Alcohol environments can ease social relationships, especially among people with similar biographical characteristics. This specific social function of alcohol may lead to further normalization of its consumption, which, in turn, increases its use; for instance, city centers are

perceived to be conducive to drunkenness for young people due to the standardization of drinking in such contexts (Dimova et al., 2023).

Legislation around the alcohol trade is crucial in establishing its availability and requirements for selling and buying. Lawmaking and resulting policies inevitably intersect with environmental and cultural aspects of a particular society – e.g., religion – and its economic structure. Alcohol is indeed related to social status and wealth: the substance can be considered a proper *status symbol,* and its consumption grows parallel to prestige. Monetary resources are essential not only for purchasing but, especially, to manage its adverse effects through high-quality health care services; data indicate that in any given society, for the same amount of alcohol consumed, people of lower socio-economic status and their loved ones suffer more detrimental repercussions compared to higher SES people. This lack of balance is further aggravated in countries lacking universal health care. Notably, alcoholic products are also a source of taxes; hence, alcohol policy and politics are necessarily intertwined. This link is reflected by rates of alcohol consumption analyzed in Chapter 1: regions that consume the highest amounts of alcohol are the wealthiest. Additionally, data imply that economic progress might indeed lead to an increase in alcohol consumption and alcohol-related harm.

Most United Nations members (90%) adopted policies to regulate the minimum legal age to purchase alcohol, but the threshold varies significantly across countries. The limit is defined according to the environmental and cultural features of the region, which, in order, define the age or the events that introduce individuals into adulthood. Alcohol is functional to rites of passage between phases of life cross-nationally, and this is testified by data from the WHO (2016), highlighting how globally, 26.5% of youth between 15 and 19 years old can be categorized as current drinkers. Data on legal permission to purchase and consume alcohol is crucial to psychological research on addiction: scholars unanimously agree that early onset of alcohol consumption is among the best predictors of experience with problematic alcohol use later in life. Moreover, this association is found regardless of preexisting psychological and health issues. These findings should guide future policies aimed at delaying the onset of alcohol to effectively prevent AUD, reduce the risk of alcohol serving as a gateway to other substance use, and improve overall public health.

Exploration of community-level factors primarily examines neighborhood characteristics and direct opportunities for alcohol consumption. As with macro and policy-level influences, current research presents significant methodological challenges in explaining the effects of complex community factors on individual behaviors. Key issues concern social stratification (society's categorization of people based on socioeconomic factors, which can influence where people live) and

social selection (people associating with others due to shared interests, beliefs, and behaviors, potentially leading to the concentration of problematic alcohol use in specific neighborhoods), as well as temporality. Studies on the connection between neighborhood alcohol consumption in adolescents and neighborhood socioeconomic disadvantage show significant associations, yet directionality remains unclear due to potential confounding variables. Aggregated information is consistent with an increase in alcohol use in communities with frequent social disorders and, hence, might lead to increased stress in adolescents. A significant protective factor was identified: social capital, which includes the strength and quality of social networks within a community, as social support and attachment, was linked to lower alcohol use levels (Bryden et al., 2013).
Nonetheless, data collection in the U.S.A. produced inconclusive results on the association across community-level socio-economic factors.

Microsystems of influence refer to smaller contexts, such as family environment and peer networks, which have some of the most decisive impacts on patterns of alcohol use among individuals, especially during adolescence. A marked association was identified between increased alcohol use among parents and peers and heightened consumption among adolescents and young adults. Accordingly, parental support and bonding and parental monitoring (specifically until 15 years of age) served as protective factors, lowering alcohol consumption in teenagers. Data collection on variable associations reveal that, overall, strong social networks and support can hinder problematic alcohol use; nevertheless, permissive peer norms towards alcohol and peer pressure gradually increase in relevance towards late adolescence, becoming stronger predictors of alcohol abuse and binge drinking patterns. Notably, during adolescence and early adulthood, alcoholic beverages become a prominent means of socialization and status definition. In order to limit problematic alcohol use in young people, the familial environment and peer groups must work in synergy, as better parental support has been shown to promote more positive peer associations that have less permissive alcohol-related norms. Indeed, how parents position themselves concerning alcohol has a massive impact on the offspring's peer connections, self-efficacy, and negotiation skills around the substance (Sudhinaraset et al., 2016).

As described in this section, individuals are constantly subject to a multitude of societal influences, which shape their beliefs and norms regulating behaviors. Consequently, individual patterns of alcohol use and abuse can be regarded as the synthesis of these socio-environmental factors, together with genetic and psychological predisposition, and upstream factors, e.g., different forms of discrimination, stress, and acculturation processes related to migration.
Interventions and new policies aimed at reducing at-risk alcohol consumption need to consider all these

influences in order to make a substantial difference in public health.

2.2 Defining Social Norms and "Drinking Culture"

Social norms, or expectations, can be defined as «socially negotiated and contextually dependent modes of conduct» (Rimal & Lapinski, 2015). Their primary function is to guide behavior by establishing expected conduct, according to which people can navigate social interactions and manage unfamiliar situations more confidently. Social norms emerge from shared interactions within social groups, which is part of the reason they significantly differ across regions and cultures. Psychological literature distinguishes between two types of social norms, namely injunctive or perceived norms and descriptive norms. The former refers to implicit rules resulting from what individuals perceive to be socially approved or disapproved by others; in contrast, the latter indicates perceptions of which behaviors are typically performed by other members of society or of specific contexts. From a psychological perspective, understanding how others behave can determine the individual's attitudes in similar situations, regardless of whether those perceptions accurately reflect reality. Alcohol consumption is a social act, and, as such, it is regulated by collective drinking norms, i.e., relatively permanent cultural rules altering the behavior of a class of individuals who share them; furthermore, norms are almost always specified for particular social situations. Hence, alcohol-related norms define whether it is appropriate to consume alcoholic beverages at all and, if so, what is the appropriate amount to ingest on definite occasions. In turn, rules regulating alcohol consumption result from situational, individual, and societal factors; indeed, different norms apply to people in distinct socio-cultural groups. Nevertheless, the literature highlighted some similarities in situational drinking norms across different social groups, for instance, in defining the relative ranking of situations in which the norm is not to drink at all, as well as the relative ranking of situations where it is considered acceptable to drink enough to "feel the effects" (Kuntsche et al., 2021).

Social norms endorsed by different cultural groups give rise to different cultural entities regarding alcohol use, namely "*drinking cultures.*" Literature provides different categorization methods for drinking cultures, the broadest one being the distinction between dry and wet cultures: the former (temperance culture) presents stricter regulations on alcoholic products, promoting less favorable norms around alcohol use. At the same time, the latter imposes fewer restrictions on alcohol consumption and trade.

Pittman provided another differentiation of cultural patterns of drinking in his work "Society, culture, and drinking patterns" (1964), which describes four different typologies. Abstinence cultures vigorously condemn the consumption of alcoholic products; ambivalent cultures display both

permissive and adverse beliefs regarding alcohol; finally, permissive cultures and overly permissive cultures generally admit respectively moderate to high alcohol use, including intoxication.
Mizruchi and Perrucci (1970) identified only three types of cultures regulating alcohol use around the globe: proscriptive, prescriptive, and permissive cultures. Proscriptive cultures firmly condemn alcohol consumption and, therefore, lack drinking norms; on the contrary, prescriptive cultures are guided by drinking norms, which allow to condemn heavy drinking and intoxication but simultaneously expect alcohol to be consumed. Finally, permissive cultures present no specified social norms and have very favorable attitudes toward the substance; hence, individuals are more likely to engage in problematic drinking patterns. A more detailed model for understanding different cultures of alcohol consumption was proposed by Room and Mäkelä (2000), who identified seven dimensions: regularity with which alcohol is consumed, the extent of drunkenness (which acknowledges regional differences in meaning regarding intoxication), the purpose of drinking, social control around alcohol consumption, the context of drinking, drinking-related problems, and expectations of behaviors when intoxicated (Tedor, 2021).
Notably, some countries might fit into more than one of the typologies described or, very often, distinguished attitudes and beliefs may coexist in the same region.

Social norms are deep-rooted attributes that shape our reality and perceptions about it. Research on the origins of drinking socio-cultural norms revealed that proximal cognitive factors related to alcohol use set during childhood, as young as three years old; children observe adult alcohol consumption from the perspective of total abstinence, as, naturally, alcohol consumption is not the norm for them. Generally, before reaching five years of age, children already have some degree of awareness concerning alcohol-related norms and gender-specific drinking norms; furthermore, they have some perspective on socially acceptable amounts of alcohol to be ingested. Between the ages of six and ten years old, children develop alcohol expectancies that progressively shift from being primarily negative to primarily positive. Socialization is a cardinal process through which children internalize social and cultural practices, norms, and beliefs. Indeed, parental alcohol norms and use profoundly influence the offspring's alcohol-related cognition, i.e., alcohol-related knowledge, norms, and expectancies. Specifically, the latter may transition later in life to the individual's drinking motives; according to the Motivational Model of alcohol use, this type of motivation is what ultimately leads to alcohol initiation and contributes to shaping drinking patterns of the young adult. Parents are primary socialization agents, especially during childhood; nonetheless, while parental drinking directly impacts the offspring, it is the general exposure of children to alcohol that mediates and contributes to shaping alcohol-related expectancies and the consequent development of drinking patterns. This association is

better explained by the Cognitive Model of Intergeneration Transference, which states that the observation of parental drinking habits and parents' affirmation of the perceived benefits of alcohol consumption contribute to the development of alcohol-related cognitions in the next generation. In turn, research has shown that these cognitions mediate behavioral outcomes. Children's observation and modeling by adults support the development of internal working models, which gradually translate into alcohol-related behaviors (Kuntsche et al., 2021).

Recent studies explored the association between location-specific social norms, specifically descriptive norms, and personal approval and drinking patterns in college students; furthermore, all the locations examined meet the criteria to be considered high-risk drinking locations. Results showed no associations between location-specific injunctive norms and alcohol consumption, while perceived descriptive norms and personal approval had a more consistent relation to alcohol consumption. This data set conveys that what students perceive others to do has a more significant impact on one's behavior than what is perceived to be acceptable in specific situations. Overall, the investigation supports the initial specificity hypothesis: location-specific descriptive norms and personal approval can predict alcohol consumption patterns in the same location for any location.
Further research on determinants of location-based differences is essential to refine focused interventions (Boyle et al., 2020).

Expectancies of alcohol effects and perceived social norms around consumption do not fully explain complex drinking patterns; social norms around the negative consequences of alcohol consumption are valuable elements to understand this dimension further. Results highlight a bidirectional relationship between social norms and negative consequences of alcohol consumption over time. As described by Lee et al. (2010), college students often overestimate the frequency with which their peers experience negative effects related to alcohol consumption and perceive them to evaluate these consequences as less harmful. This process might lead to the normalization of the overtly harmful aftermath of alcohol use and abuse, which naturally decreases its motivational power to change maladaptive behaviors. More research is needed to establish whether these influences reinforce each other in a feed-forward loop, maintaining drinking habits and their adverse effects. Nonetheless, the current literature can help design up-to-date intervention protocols to decrease at-risk, alcohol-related behaviors.

For decades, specialists have already been working on developing interventions tackling harmful social norms and their misperceptions. It is imperative to address these issues, especially for at-risk drinking groups, e.g., adolescents and college students. The Social Norms Approach for

interventions stems from two basic assumptions: first, the misperception of drinking norms may lead to risky drinking behavior because of the will of individuals to conform; consequently, effectively challenging core beliefs about alcohol consumption can lead to a change in behaviors around the substance. Data on interventions showed how ineffective education about the harmful effects of alcohol is since the complex psychosocial drives guiding behavior overpower cognition. Indeed, the Social Norms Approach includes more sophisticated techniques, e.g., social marketing techniques, personalized normative feedback (aiming at giving a realistic picture of how an individual fits in with respect to their peers' behaviors), and focus group discussions on misperceptions of social norms and alcohol-related consequences.

Finally, the Collective Social Norms approach is a type of targeted intervention, directing efforts at modifying a high-risk group's drinking norms and easing the adaptation to more restrictive ones (Kuntsche et al., 2021). Further investigation into how different sets of social and cultural norms intersect is needed to effectively contrast problematic drinking patterns in a globalizing world.

2.3 Hogarth's Paradigm Shift: Rethinking the Roots of Addiction

In the book "*Evaluating the Brain Disease Model of Addiction*" (2022), critical addiction psychologist Lee Hogarth exposes three prominent critics of different neurobiological theories currently guiding addiction research and formulates a new model that includes socioeconomic deprivation-related factors as powerful motivators for goal-directed drug choice and mediating spiraling into chronic addiction. Hogarth states that drug use, abuse, and addiction do not stem from habitual, automatic, or even compulsive processes; on the contrary, he argues that (persistent) drug choice is goal-oriented in nature and does depend on the expected value assigned to the drug and complexly intertwined psychosocial and environmental factors. The first critique addresses *cue reactivity theory*, which states that addicted individuals automatically respond to drug-related eliciting stimuli, and this process can also occur outside of awareness. Hogarth disputes this account of maladaptive consumption patterns as the appraisal of drug cue reactivity is not purely mechanic; importantly, associating the quality of automaticity to any behavioral process is essentially a "statement of belief" of pre-existing theoretical evidence, implicitly giving theoretical models more relevance compared to other, equally important, aspect of scientific inquiry. The author identified the Pavlovian Instrumental Transfer (PIT) as the best design to isolate mechanisms alleged underlying automatism: the procedure outcome, specifically its bidirectional version, disconfirms the cue-induced reactivity account. The updated experimental layout includes training animals to receive both rewards (food and drug – R1, R2) with each related stimulus (S1, S2), differentiating conditions by a discriminative

stimulus (SD). In this condition, automaticity alone cannot justify the preference for one or the other outcome, as they were equally reinforced during previous training; consequently, goal-directed knowledge must be integrated into the process about which SD erns the drug. Additional studies confirm Hogarth's speculation that sensitivity to drug-related cues do not explain addiction, drug-induced craving is not correlated with the pathology's severity, and it does not predict relapse. Instead, drug choice is goal-directed, and it is strongly motivated by the expectation of reward; finally, addiction severity is better explained by frequency of exposure to drug-related cues and substance availability.
The second theory discredited in this chapter is the *habit theory*, which states that addiction occurs as a result of the shift from goal-directed actions aimed at obtaining the substance (knowledge-driven) to reinforced associations between drug-related stimuli and behavioral response (S-R process, see paragraph 1.5.4 – "*Learning Theory*"). The theory explains variations in addiction severity as the individual predilection of habitual processes over goal-directed ones; outcome-devaluation protocols applied to human models have disproved this account. The experimental design includes reward devaluation: a decrease in responding to the devaluated incentive testifies to the goal-directed nature of drug choice, as guided by its current lower value. According to habit theory, the subject's response to the reward should remain unchanged for salience variations.
Finally, Hogarth elaborates his critique of the *compulsion theory*, especially the interpretation elaborated from the habit theory. Compulsion concerning substances of abuse refers to their compulsive ingestion despite severely harmful consequences. The original study on this behavioral pattern was conducted on animals less sensitive to suppression of behavior by shock punishment, leading to two main hypothetical underlying mechanisms: 1) the presence of a unique compulsive trait (stemming from the S-R habit process) or 2) vulnerable animals attribute such a high value to the drug that it outweighs its harmful aftermath. Human studies found comparable sensitivity to negative consequences between SUDs sufferers, non-users, and less dependent users, hence supporting the second hypothesis of excessive value placed on the substance, which represents further evidence in favor of the goal-directed account of addiction. Again, the severity of drug dependence is more likely to be influenced by drug choice instead of reduced sensitivity to suppressive consequences.

2.3.1 Goal-directed Negative Reinforcement Theory

The new theory of addiction developed by Lee Hogarth takes as reference the already-existing negative reinforcement theory, which posits that adverse emotional states *automatically* elicit drug-seeking, which, in turn, worsen with chronic drug use, eventually creating a spiraling, vicious circle. Working on the evidence in favor of a goal-directed account of addiction previously presented, the

author states that negative affect increases the expected value of the drug (e.g., "soothing" effects on mood), which has a significant influence on the direction of behavior, especially in individuals who report using drugs to cope.

Overall, two processes supported by empirical evidence underlie addiction processes: dependence severity is determined by the drug's inherent value linked to its effects driving goal-directed drug choice; substances use to cope is "uniquely associated with greater sensitivity to negative mood induced motivation of goal-directed drug choice."

Additionally, L. Hogarth identified three main socioeconomic deprivation-related risk pathways potentially mediating goal-directed drug choice and, eventually, the shift to full-blown addiction. First, outlet density has been proven to be a predictor of legal drug consumption and gambling; also, the density index is higher in lower SES neighborhoods. Combined epidemiological and experimental data support the hypothesis that the frequency of exposure to drug-related stimuli and drug availability in deprived environments is associated with goal-directed drug choice. The second pathway links socioeconomic deprivation to exposure to frequent, severe, and stressful life events and the severity of mental illness. In such environments, substance use to cope finds fertile land and becomes a powerful determinant of addiction, disproportionately motivating drug choice. Finally, the third pathway hypothesizes that the lack of numerous resources, including medical and psychological support, typical of deprived environments, impacts substance use by increasing salience attributed to drugs. Indeed, deprivation of alternative rewards contributes to an increase in drug consumption and mediates the association between low SES, psychiatric symptoms and SUDs (Hogarth, 2022).

2.4 A Real-Life Perspective on Stigma: Insights from my Internship

SUDs-related stigma – as, more generally, mental illness stigma – is an understudied topic in psychosocial research, yet it still has a significant impact on the treatment and recovery journey of sufferers. The criminalization of substance users and a longstanding debate over the psychological definition of addiction, which has persisted since the 1980s, contribute to the maintenance of stigma. Its importance has become increasingly apparent in the last decades, culminating in the unanimous approval, by all 193 State members, of the Outcome Document of the 2016 United Nations General Assembly Special Session on drugs. This document represents the recognition of addiction as a "complex multifactorial health disorder, characterized by chronic and relapsing nature." Among the eight recommendations endorsed by all Member States for improving addiction prevention and management of clinical practice and public policies, one explicitly addresses stigma and discrimination. This assembly resulted in a critical shift in mentality, allowing professionals to better

help SUDs sufferers by overcoming a significant obstacle to treatment (Volkow et al., 2017). Research has come to define stigma as a core antecedent of health inequalities: it facilitates the initiation of substance use and affects SUDs patients once the disorder is developed, hindering treatment interventions. Stigma is a profoundly discrediting attribute, rooted in prejudices and stereotypes held toward a specific group of people sharing some characteristics. It is a social process occurring within a system of power, enabling discrimination practices; indeed, stigmatization has a critical social function that is encouraging – mainly through shame, the emotional core of stigma – conformity to present social norms, which, in turn, reflect principles of the capitalistic, patriarchal, and racist bases of modern society. People living in stigmatized statuses (also called *targets*) can experience stratified forms of discrimination, e.g., when ethnicity and sexual orientation intersect. Stigma can be directly experienced, but it can also take other equally harmful forms, such as *anticipated stigma* (expecting prejudice, stereotypes, and discrimination from others) and *internalized stigma* or *self-stigma*, i.e., the extent to which people apply stigmatized features onto the self (Earnshaw, 2020).
The danger of stigmatization lies in failing to recognize those suffering from substance use disorders or struggling with drug abuse as worthy human beings, thereby objectifying them.

A review by Van Boekel et al. (2013) highlighted how widespread stigmatization is in healthcare contexts: this fact is particularly significant since healthcare professionals have a crucial role in determining access to high-quality emergency and primary health services and SUDs treatments. Treatment avoidance or interruption during relapse and inefficient communication can stem from stigmatizing attitudes of key figures in therapeutic settings; the resulting hindered therapeutic alliance can lead to diagnostic overshadowing, that is, the misattribution of physical illness symptoms to SUDs. In this frame of reference, psychologists must advocate for better public policies for drug management, including alcohol and nicotine, and the dismantling of structural stigma; addiction professionals need to protest with every means the exploitation of SUDs stigma for political propaganda and prevention campaigns, as it has been demonstrated to be highly ineffective and harmful. The education of the public and being mindful when discussing sensitive topics could produce significant benefits to communities: treating people facing different hardships with compassion, rather than fear, anger, or pity, can create a welcoming and healing environment, which would improve not only health outcomes for SUDs sufferers but rather the entire society.

During my internship at Centro Gulliver Varese in the dual diagnosis unit, I had the opportunity to facilitate a group discussion with some of the facility's residents regarding stigma and how it impacted their lives, their approach, and their engagement in treatment; I used items from the

substance-use stigma scale – validated by Chen et al. (2020) for methamphetamine-using adults in China – as prompts for conversation. All participants were familiar with the concept of stigma, as they all experienced it differently, having endured it both as an antecedent and in direct relation to substance use disorders. There was unanimous agreement on the pejorative connotation of the term "drug addict" ("tossicodipendente" in Italian), a label consistently applied to them from the beginning of sporadic substance use throughout full-blown addiction, seemingly subsuming their entire identity. Indeed, many of them stated that the deprecative labeling concerning addiction was never perceived as problematic but rather an identity to embrace; this aligns with the previously described notion of self-stigma. Interestingly, some users declared that enclosing their identity into the label "drug addict" was seen as desirable and associated with transgression, particularly during adolescence. Different interpretations can be drawn from such a statement, including the possibility that stigma was used to externalize suffering without making oneself vulnerable while simultaneously using substances to cope with distress caused by stigma itself and previous traumas. Notably, participants collectively acknowledge that stigma significantly influenced their approach to treatment. Despite recognizing SUDs as psychiatric conditions, they hold the erroneous belief that one could snap out of this kind of problem through utter willpower.

To summarize, the group discussion revealed numerous prejudices about SUDs and mental illness, stemming from both patients and external sources. This experience underscored the importance of addressing internalized stigma and feelings of shame about one's condition as an absolute priority; indeed, these factors hinder treatment effectiveness by preventing patients from fully entrusting their emotions and history to the multidisciplinary team to allow comprehensive recovery.

CHAPTER THREE

DISCUSSION AND CONCLUSION

The present work aims to provide a critical and comprehensive analysis of Alcohol Use Disorder (AUD), drawing from renowned scientific literature, together with an exhaustive account of socioenvironmental influences on alcohol consumption. In the majority of Western cultures, alcohol consumption and heavy episodic drinking (HED) are normalized and endorsed by precise social norms. This pervasive trend is reflected by the alarming "Global Status Report on Alcohol and Health" redacted by the World Health Organization (2018): data presented show that not only does ethanol cause a disproportionate number of deaths (3 million per year), but it also represents around 5% of global burden disease. Such data implicate a severe and widespread issue with the substance that needs to be addressed with immediate and decisive actions, spanning from public health initiatives and policy reforms to accessible, high-quality treatments for AUD sufferers and substance users. Ideally, normative changes should aspire to prevent substance use disorders and behavioral addictions or, at least, minimize barriers to treatment and social support.

The extraordinarily harmful effects of ethanol on the human brain have been described through an accurate characterization of the neurobiological underpinnings of addiction. Current knowledge on the topic has allowed significant progress toward a more exhaustive comprehension of the phenomenon and, consequently, to significantly improve pharmacological and non-pharmacological treatments. These advances include specific medications capable of reducing excruciating craving symptoms and psychotherapy intervention models that can be tailored to the patient's unique needs. Nonetheless, significant evidence discrediting theoretical models of addiction is emerging, highlighting the need to broaden the field of investigation to other influential dimensions, including psychological, social, and environmental elements that contribute to the development and maintenance of AUD.

Recent findings on socioenvironmental factors suggest, and as Hogarth (2022) recalls, a shift in research toward the study of socioecological factors is essential to developing even more solid interventions to prevent SUDs, including AUD. This indispensable change reflects the acknowledgment of the complex interaction of influences at play with addiction and emphasizes the need for a more holistic approach to conducting further research on the matter and developing prevention practices.

The most effective way to reorient interventions includes regulating outlet density and advertisements

of alcoholic products (e.g., producing plain packages), improving housing and working conditions, promoting and making substitute rewarding activities accessible for all, promoting community reinforcement, and endorsing social prescribing. Simultaneously, research needs to be evenly financed, from projects on biomedical processes to analysis concerning features of the socioeconomic goal-directed account.

In conclusion, the interventions proposed are challenging to implement primarily because such a radical policy agenda would need to be endorsed unanimously by the scientific community; furthermore, there is a lack of political will to improve the socioeconomic conditions of the most, as it goes against the established productivity system rooted in the exploitation of land and people. Nonetheless, these interventions currently represent the best strategy for reducing Alcohol Use Disorder prevalence and improving overall public health.

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