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A Review on Addiction Types, Involvement of Women, and Role of Covid-19 Lockdown in Addiction Behavior

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Abstract

Addiction is defined as the psychological compulsion towards a substance or behavior. Addiction can be categorized into substance- and behavior-based depending on the type of content involved. The DSM-V, ICD-10, and APA have standardized the diagnostic criteria to diagnose addiction behavior. This review focuses on the addiction types and their sub-categorization. The article also discusses about the addiction behavior observed based on gender differences (Men vs Women). During the COVID-19 lockdown, the severity of addiction has increased many-fold around the globe. This review also focuses on the addiction behavioral pattern during and after the COVID-19 era.

Keywords

Addiction criteria, Behavior addiction, DSM-V, ICD-10, Substance addiction

Introduction

The "Addiction" term is significant to several groups of people, but not limited to policy makers, researchers, clinicians, and patients. "Addiction" term origin is found to be since Roman times and at first it was not associated with substance abuse. However, as time progressed, the "Addiction" term became associated with substance use and abuse such that, the working committee (Diagnostic and Statistical Manual of Mental Disorders (DSM)-III-R (American Psychiatric Association (APA), 1987)) associated with substance-related disorders acknowledged that "Addiction" can be defined by compulsive substance use [1]. However, the category of "Substance-related Disorders" present in DSM-IV-TR was replaced with "Substance-related and Addictive Disorders" found in DSM-V (American Psychiatric Association, 2013) [1].

The primary goal of the DSM during its initial stages was to gather statistical information related to mental disorders in the Unites States of America [2]. Mental disorders were defined by the DSM-V as syndromes affecting the individual's behavior, emotional regulation, and cognition [3]. It also implies that the significant distress normally is associated with an already existing, but undiagnosed condition [3]. Standard criteria for diagnosing substance addiction were included in the DSM-V, or during the Tenth revision of International Classification of Diseases and Related Health Problems (ICD-10). Since then, they have been regularly used and widely applied in diagnosing addiction disorders and also to evaluate their associate treatment [4]. The DSM is considered as a manual for diagnosing criteria associated with mental health disorders and related substance use disorders (SUDs) [5]. The revision in DSM-V made adequate adjustments

associated with the criteria, content, and structure of "Substance-related and Addictive Disorders", which were based on the research developments of the past 20 years, which also include removal and addition of various disorders along with the criteria for specific disorders categorization [5].

Currently, addiction is defined as the behavioral pattern on which an individual has no control over, with adverse or negative or harmful consequences. Therefore, the individuals who realize that their behavior is negatively affecting others or those around (or whom they care about) find themselves not able to stop engaging in the behavior whenever they try to do so. The degree of social, psychological, and medical harm which is associated with the addiction along with the fact that it can violate an individual's freedom of choice, means that it is not inappropriate to acknowledge "Addiction behavior" to be a form of "Psychiatric disorder: a disorder of pleasure and motivation" [6]. Initially, addiction normally involves exposure to stimuli which is followed by the harmful behavior of repetitively seeking the experience. After a certain number of repetitiveness, the "addiction behavior-stimuli sequence" will become new normal and thus established (Figure 1). The degree of severity and behavioral characteristics will change over time, and it might be disrupted by the attempts of the individual to stop, abstain, or to regain control [6].

Types of Addiction

Substance related addictions are categorized as neuropsychiatric disorders which are characterized by persistent desire to take the substance continuously regardless of the negative or adverse consequences [4]. On the contrary, addiction based on non-substance i.e., behavioral addiction includes smartphone addiction, internet addiction, food addiction, pathological gambling, etc. (Figure 1) [4]. Their definition or diagnosis criteria is same as substance addiction; however, they are different from each other as they are domain specific

Substance based Addictions

Addiction based on substances or SUDs classified in DSM-V combines the DSM-IV (APA, 1994) categorization of substance dependence and substance abuse into one category, whose degree of severity will be measured from mild to severe. Furthermore, each substance (excluding caffeine, which will not be categorized under SUDs) is sub-categorized into separate (substance) use disorders (for example, opioid, alcohol, and stimulant use disorders). However, diagnostic criteria for all SUDs or non-SUDs are based on similar principles. The Mental Health Surveillance Study (MHSS) and the National Survey on Drug Use and Health (NSDUH) classifies and assesses mental health disorders and SUDs based on DSM-IV criteria [5]. The diagnostic criteria for addiction were significantly changed from DSM-I to DSM-V [4]

Several researchers and scientists still consider drug addiction as a type of drain disorder (Figure 2) [4]. Initial consumption of substance might be indeed by individual's choice; however, the repetitive use will cause specific neurobiological changes, primarily to the prefrontal cortex among other areas which is associated with executive functions which in turn compromises inhibitory control which when associated with psychological and physiological cravings for the drugs or substances will lead to uncontrollable use or dependence [4]. Hence, it is the mechanisms which happen due to the consumption of the drugs which indeed make the uncontrolla-

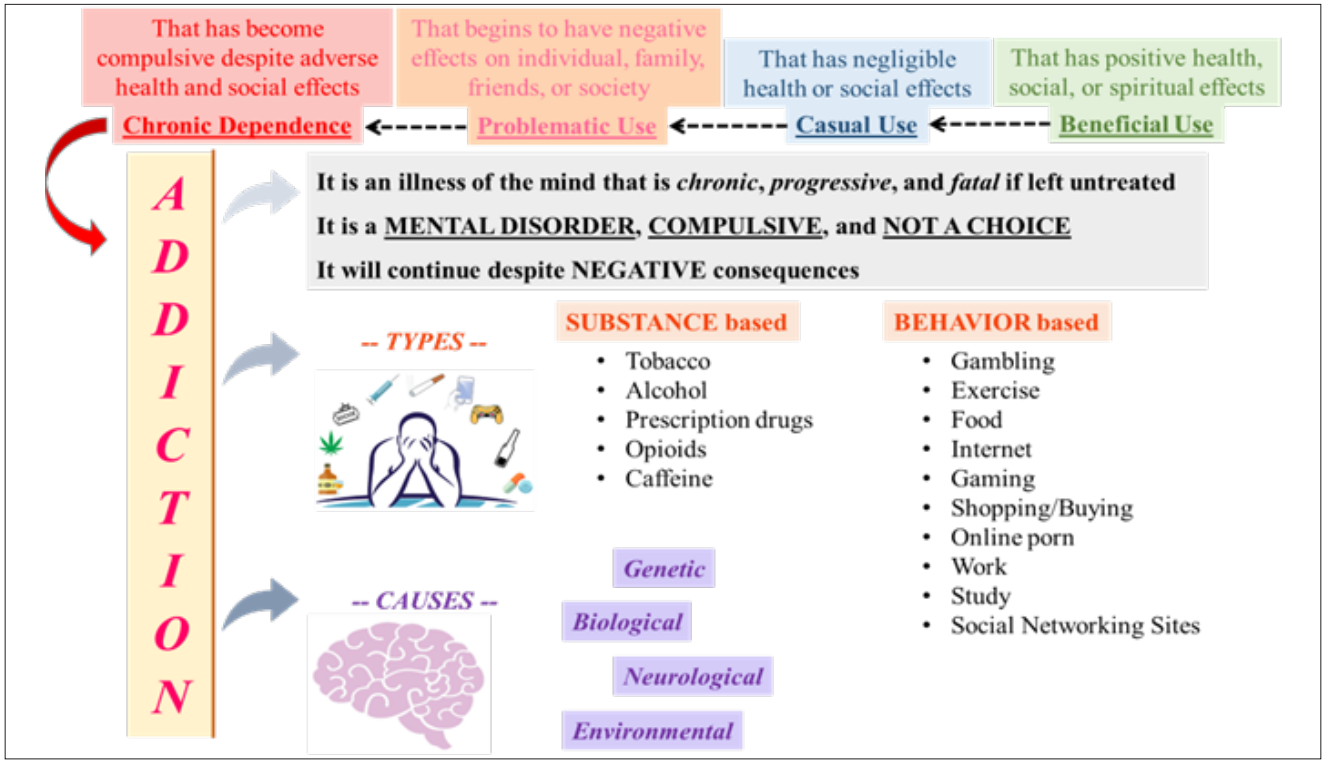

Figure 1: Addiction: Progress, types, and causes.

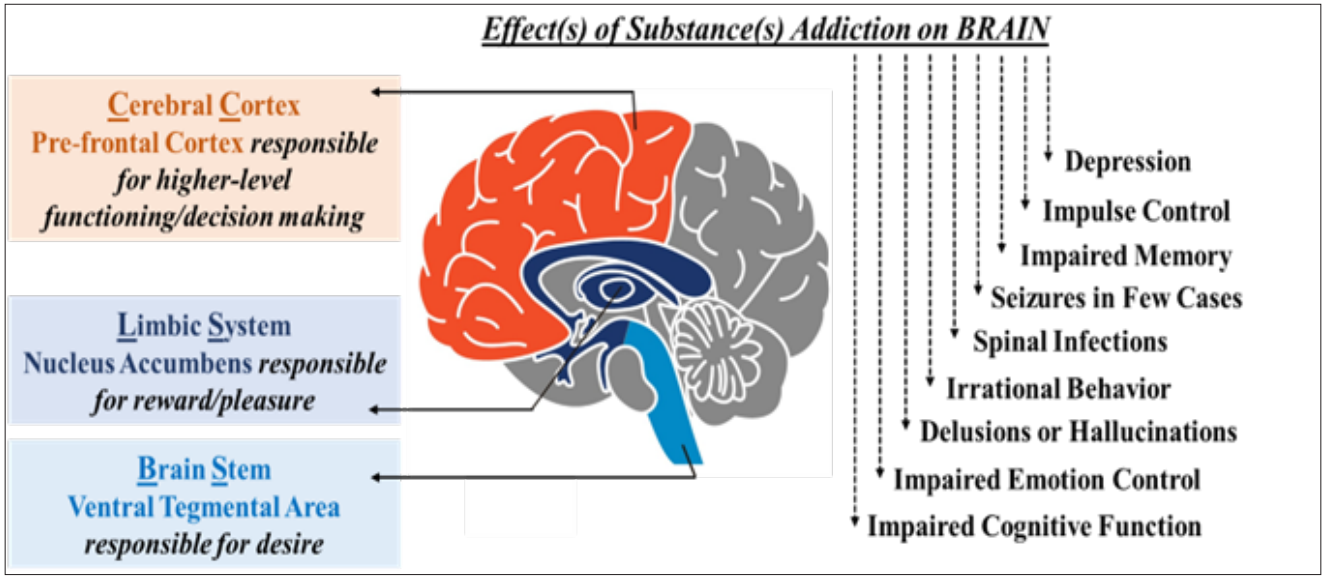

Figure 2: Effect of substances during addiction on brain.

ble substance use a disorder. As per the ICD-10 and DSM-V, tobacco, cocaine, anxiolytics and hypnotics, sedatives, opioids, inhalants, hallucinogens, cannabis, alcohol, and lastly caffeine are the among the most common addictive substances [4]. Based on the global report, tobacco, alcohol, opioids, and drugs are among the most consumed substances [7]. Apart from the above-mentioned substances, DSM-V also includes inhalants, amphetamine-type substances, and anxiolytics, whereas ICD-10 also includes volatile solvents [4]

Either directly or indirectly, SUDs are responsible for ~11.8 million deaths per year (Figure 3a) [8]. Among which, ~350,000 deaths are associated with illicit drug use (overdose) and alcohol use disorders per year (Figure 3b) [8]. More than 2% of the global population has either illicit drug or alcohol addiction [8]. In the USA and various countries of Eastern Europe has at least 1 in 20 (i.e., 5%) with substance dependence. In the USA, the most common substance dependence is in the form of illicit drugs, whereas alcohol is the most common in Eastern Europe and Russia [8]. In the USA, above 43.4 million individuals who use drugs either suffer from depression, anxiety, or other forms of mental disorders or untimely death. In India, around 14% population are alcohol dependent, around 3% are cannabis users, and around 1% are opioids (such as opium, chemical opioids, heroin) users [7]

Alcohol

Among SUDs, alcohol disorders have the highest death count [8]. Around 1.4 percent of people worldwide are thought to suffer from an alcohol use disorder [9]. Consumers who consume more than the recommended limits of 20 to 40 g of pure alcohol per day for women and 30 to 60 g per day for men are deemed hazardous drinkers and have a higher risk of infections. [10]. Worldwide, alcohol misuse results in 3 million fatalities per year. This amounts to 5.3% of all fatalities [11]. Drinking is a factor in about 13.5% of all adult fatalities between the ages of 20 and 39 [11]. Globally, alcohol usage resulted in 2.07 million male fatalities and 374,000 female deaths in 2019 [12]. With about 21 alcohol-related deaths per 100,000 persons in 2019, Belarus had the highest death rate. For the majority of nations, this rate is between 1 and 5 deaths per 100,000 people [9]. However, there is no conclusive proof that excessive overall consumption (especially in moderate amounts) leads to the development of alcohol dependence (Figure 4) [9]

Nicotine/Tobacco

Smoking has a considerable negative impact on the immune system and causes direct lung damage, which contribute to high death rates for infections or respiratory disorders [10]. More than 8 million individuals die prematurely each year owing to tobacco use, of whereby more than 1.2 million non-smokers who are exposed to secondhand smoke and more than 7 million of which are caused by tobacco use. [13]. Smoking is responsible for 15% of all fatalities worldwide (Figure 5a) [14]. Eastern Europe and Asia have the highest smoking-related mortality rates (Figure 5b) [14]. Smoking-related mortality are decreasing in wealthy nations but increasing in low- to middle-income nations [14]. Combustible tobacco items that supply nicotine without combustion, such as snuff, dipping or chewing tobacco, are classified as conventional tobacco products. These include bidis (domestically prepared small cigarettes available in South Asia), cigars, and cigarettes [15]. Heat-not-burn tobacco products and e-cigarettes containing nicotine are two more recent alternatives that do not use combustion [15, 16]. No tobacco product is completely danger-free, even if non-combustion and alternative products may pose a smaller risk than the burned ones [15, 16]

Opioids, cocaine, cannabis, and illicit drugs

Every year, more than 100,000 people worldwide pass away from drug overdoses [17]. Pharmaceutical medications like heroin, other opioids, and benzodiazepines are examples of illicit drugs. Plant-based drugs like cocaine and cannabis are other examples of illicit drugs, as are synthetic drugs like amphetamines [17]. The majority of drug overdoses were caused by opioids (Figure 6a). Opioids are employed in heroin as well

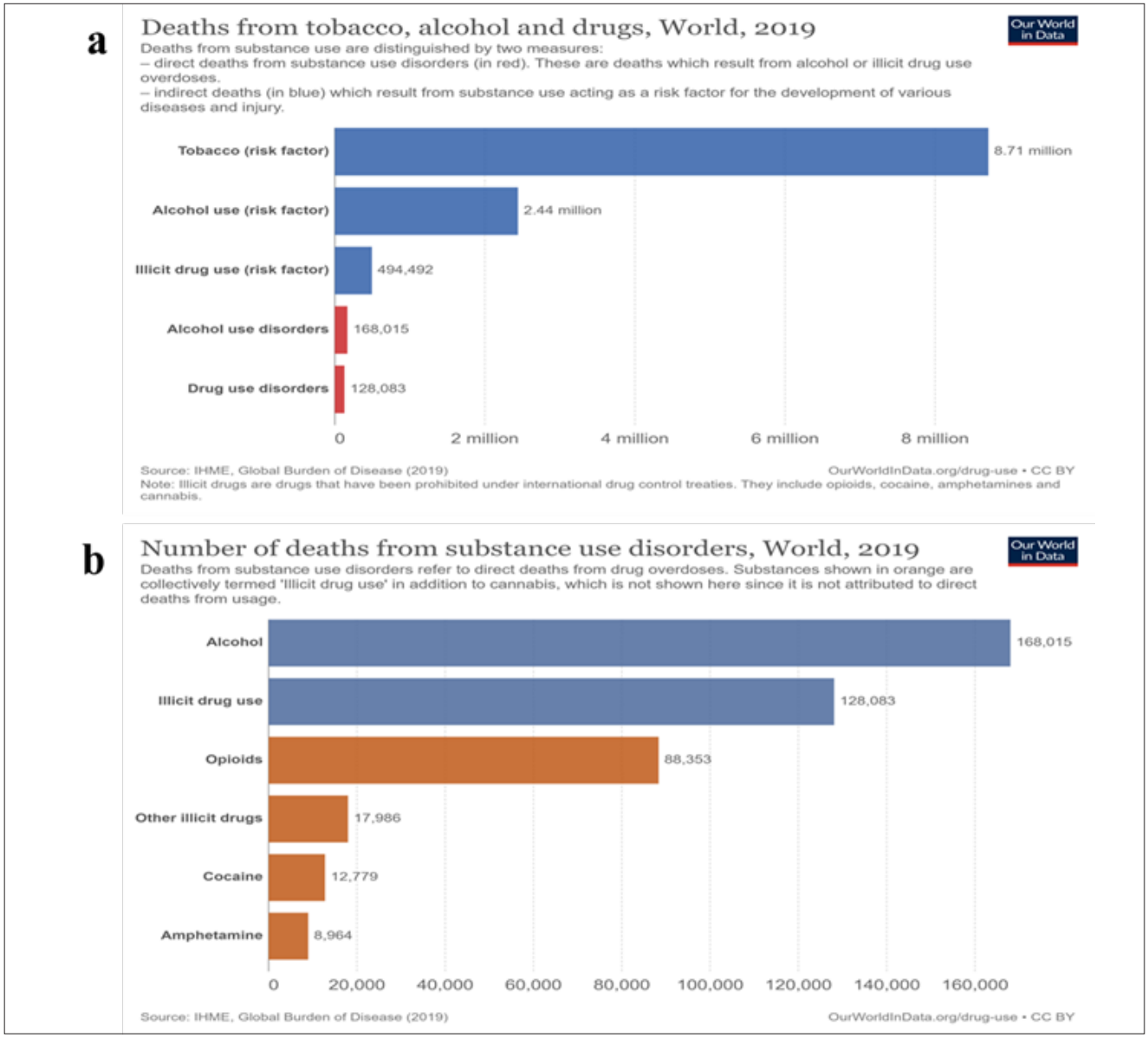

Figure 3: (a) Deaths from tobacco, alcohol and drugs and **(b)** Number of deaths from substance use disorders [8].

as prescription painkillers like OxyContin and Vicodin as well as synthetic opioids like fentanyl, morphine, and codeine [17, 18]. A little less than 1% of the world's population, excluding those who use alcohol and tobacco is thought to be dependent on drugs [17]. The highest incidence of deaths from opioids and illegal drugs occur in the USA [17]. Overdose deaths involving opioids increased in the USA from 21,089 in 2010 to 47,600 in 2017 and remained stable through 2019 (Figure 6b). This was followed by a sharp rise in overdose deaths in 2020 (68,630 recorded deaths) and again in 2021 (80,411) [19].

Over 16 million people worldwide, including over 2.1 million in the USA, suffer from opioid use disorders, and opioids are responsible for over 120,000 deaths per year globally [18]. In 2020, 284 million individuals between the ages of 15 and 64 used drugs globally [20]. People under 35 make up the bulk of those receiving treatment for drug use disorders in Africa and Latin America [20]. There are ~ 21.46 million cocaine users globally, with the Americas having the highest prevalence [21]. With 27% of the adult population using cannabis, Israel had the highest frequency of cannabis use globally in 2020 [22]. About 17% of Americans use cannabis regularly [22]. In Europe, France (11%) and Czech (11.1%) had the highest rates of adult cannabis use as of 2020 [23]. In 2019, prevalence figures for Italy and the Netherlands were 10.2% and 9.6%, respectively [24].

Caffeine

Numerous beverages, including coffee, tea, cola, and energy drinks, as well as various dietary supplements, prescription drugs, and foods like chocolate, all contain caffeine, a psychoactive substance [25]. For healthy adults, a daily caffeine intake cap of 400 mg is advised [26]. Caffeine is consumed daily by > 80% of adults in western countries, averaging between 122 and 226 mg per day [25]. The US-FDA typically recognizes caffeine as safe at levels not to exceed 200 ppm (0.02%) in beverages of the type found in colas for the express purpose of

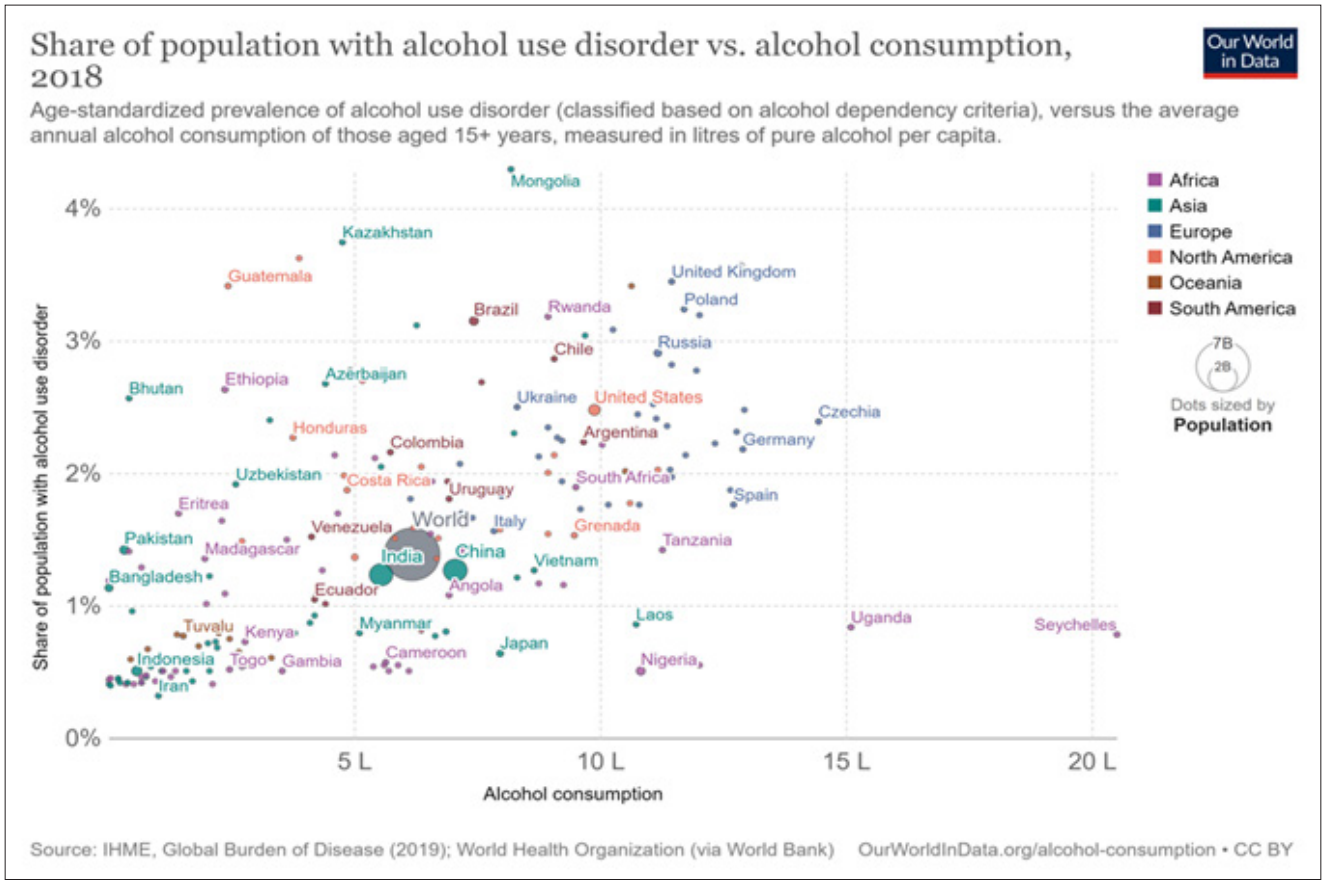

Figure 4: Share of population with alcohol use disorder vs alcohol consumption [9].

flavor [26]. Caffeine is widely available, but research suggests it may cause both physical and psychological harm. Although individual susceptibility to harm is extremely diverse, excessive caffeine consumption has the potential to cause subfertility, delayed fetal development, behavioral effects, calcium and bone effects, cardiovascular toxicity, and acute toxicity [25, 26]. The safety of the caffeine-alcohol combination beverages that have gained attention is a concern due to preliminary evidence revealing the clinical relevance of withdrawal and dependence, concern about a rise in case reports of fatalities from caffeine intoxication from energy drinks and diet pills, and fears about the safety of these beverages have gained US-FDA attention, the DSM-V includes caffeine withdrawal (APA, 2013), and a condition worth additional research is caffeine consumption disorder. [25].

Because there are no established or recommended criteria for caffeine dependency, researchers modified the DSM-IV drug dependence criteria for use in their studies [27]. According to expectations, Striley et al. chose subjects with high rates of drug use and abuse. Three of the seven caffeine dependence criteria were supported by 35% of the 167 patients, according to the authors [28]. According to a study by Juliano et al., 55% of individuals met five of the seven criteria for caffeine dependence, and 93% of the 94 subjects met three of the seven criteria [29]. According to a study by Juliano et al., 93% of 94 participants satisfied three of the seven criteria for caffeine dependence, and 55% of participants met five of the seven criteria [30]. Out of 254 documented cases of caffeine misuse, McCarthy et al.'s assessment of caffeine-related calls found that 106 individuals were treated in an emergency room and 34 were hospitalized and/or admitted to an intensive care unit [31].

Behavioral based Addictions

Significant progress has already been made in the field of non-drug addictions throughout this millennium, but much more work has to be done [1]. Other conditions were taken into consideration, but gambling disorder is now the only condition in the subsection of "non-substance-related disorders" in the category of "Substance-related and Addictive Disorders". Notably, the DSM-V now recognizes Internet gaming disorder as a condition that needs more research [1]. However, Internet gaming may only be one aspect of problematic Internet use, and it is important to take into account the possible effects of other internet-related behaviors (such as gambling, viewing pornography, shopping, and social networking) [1]. However, the correlations between these studies' problematic technology use and poor health and functioning measures, as well as the proportions of people who acknowledged engaging in these behaviors at risky or problematic levels, emphasize the need for more research into these behaviors as well as for greater awareness of, and prevention and treatment for, these behaviors [1]. On the basis of epidemiological, experimental, and neurobiological research, various other non-substance or behavioral addictions linked to shopping, exercise, and sex were described in the literature but were not included in the DSM-

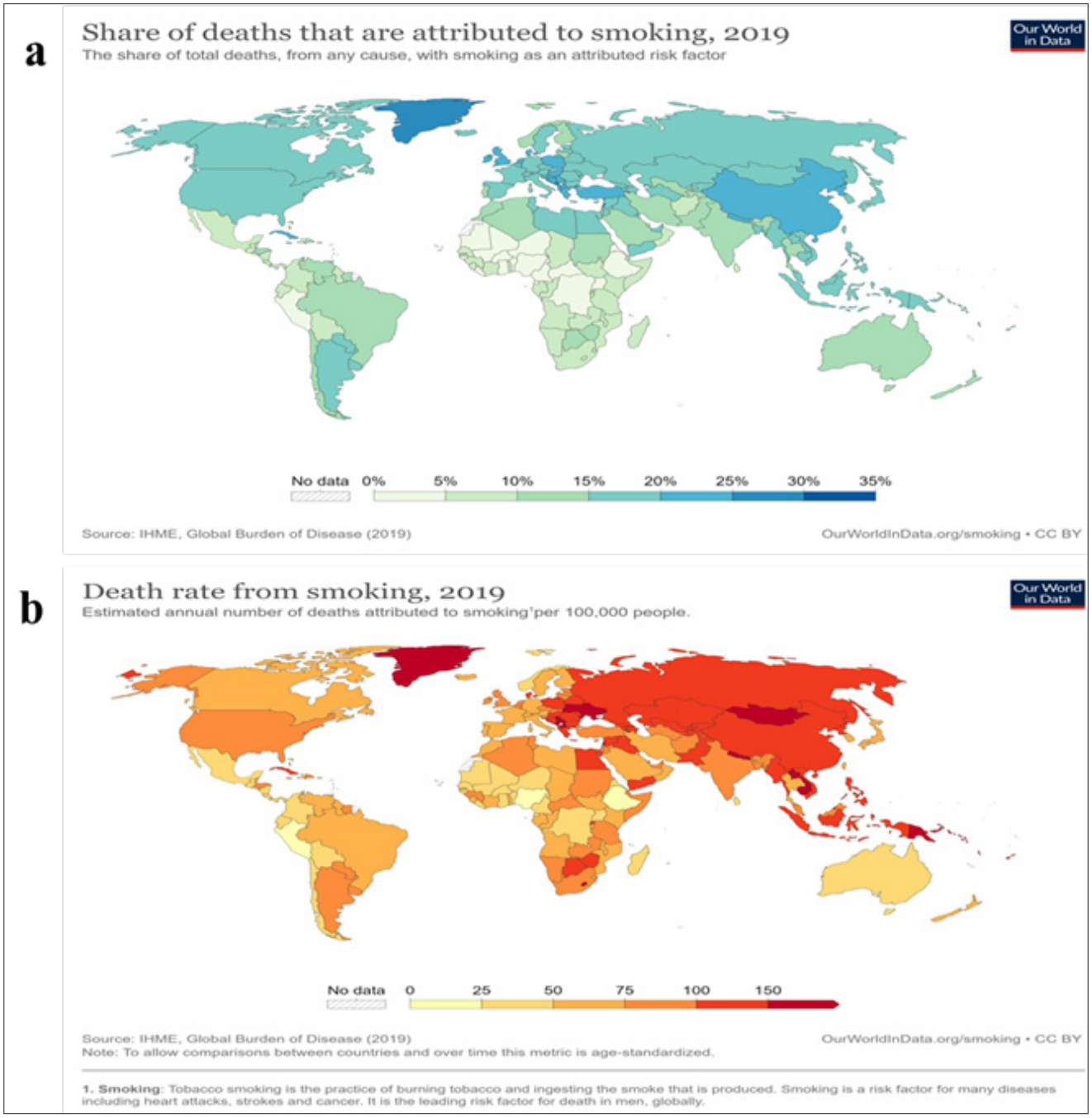

Figure 5: (a) Share of deaths that are attributed to smoking and **(b)** Death rate from smoking [14].

5. These addictions are awaiting formal acknowledgment [1, 3, 32]. The ideal definition of which conditions qualify as addictions is still up for debate [1, 3]. The extent to which food may be addictive and if food addiction may be a significant entity are both hotly contested topics [1]. However, excessive behavior resembles addictions to substances in certain ways: In particular, anxiety disorders, mood disorders, impulse-control disorders, and other addictive (substance related) illnesses are frequently diagnosed in people with gambling disorders [3].

Gambling

The only addiction illness recognized as a diagnosable diagnosis in DSM-V is gambling disorder [33]. A gambling disorder is described by the APA as "persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress" and satisfying at least four of nine criteria [33]. Identification of gambling trends and routine updating of global gambling prevalence statistics are necessary since problem gambling has been identified as an emerging public health concern (Figure 7) [34, 35]. In Asia, 0.5% to 5.8%, Oceania, 0.4% to 0.7%, and Europe, 0.1% to 3.4%, gambling prevalence rates varied from 2% to 5% [34]. 2 million adults in the USA satisfy the criteria for serious gambling addiction in a given year, according to the National Council on Problem Gaming [36]. An estimated 246,000 people in England suffer from gambling addiction [37]. According to estimates, 3.8%

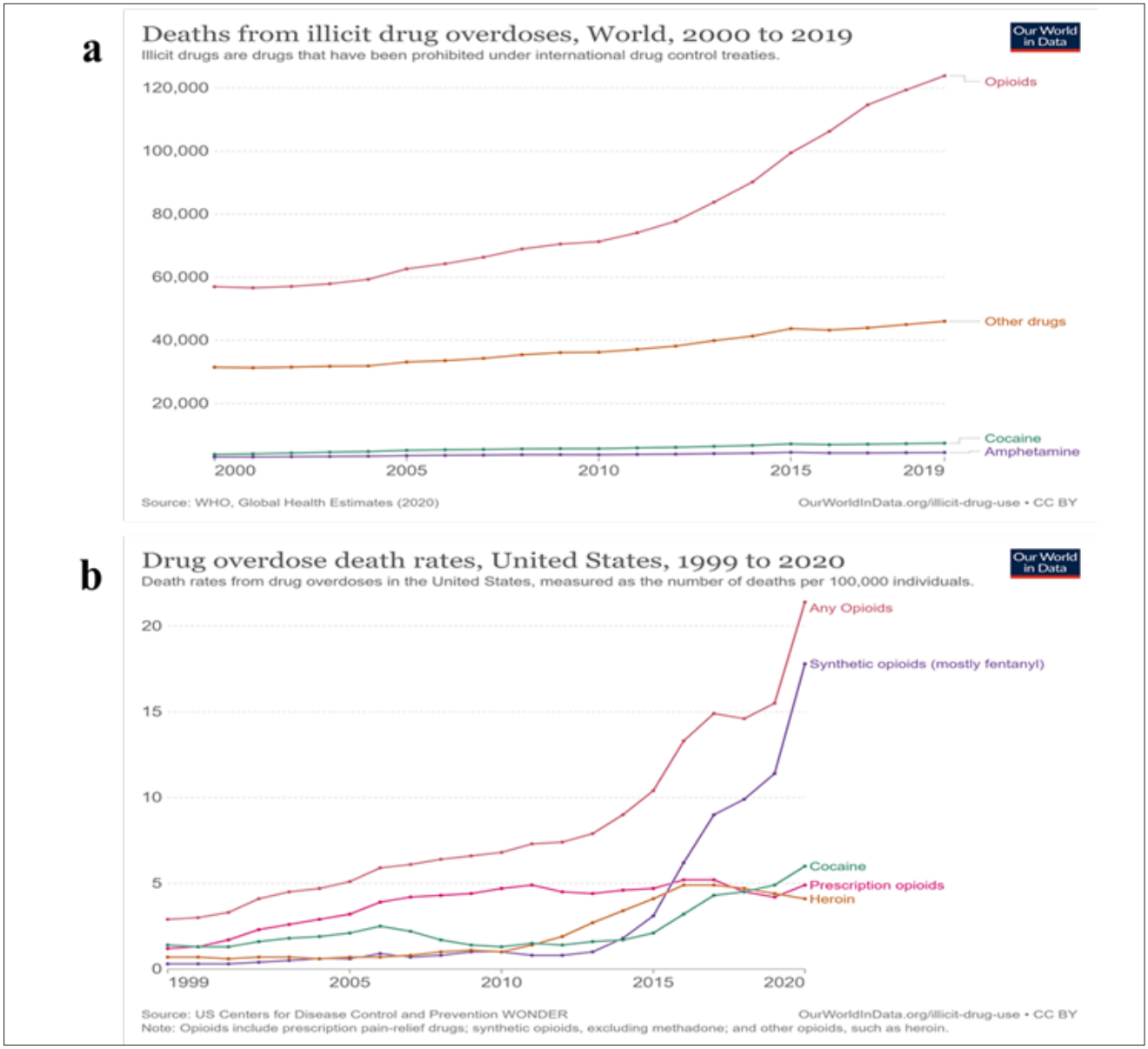

Figure 6: (a) Deaths from illicit drug overdoses and **(b)** Drug overdose death rates [17].

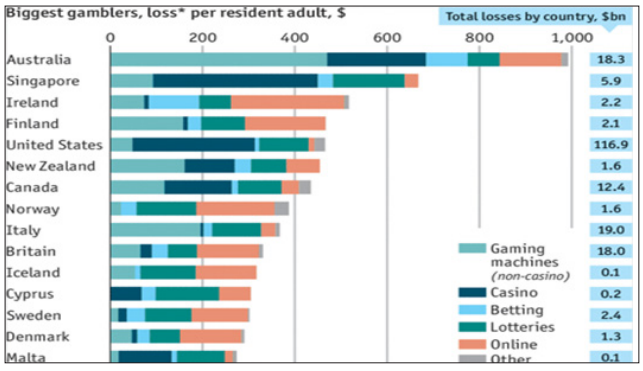

Figure 7: Gambling addiction in numbers around the globe [35].

of English people gambling, putting them at a "elevated risk" of addiction [37]. Scandinavian nations with prevalence rates of over 3% include Estonia, Finland, and Switzerland. [38]. In Australia, a prevalence of between 0.5 and 1% was noted, and in New Zealand, it doesn't rise above 0.2% [38].

Food

It has also been proposed that in human research, the pattern of food consumption in "food addiction" may resemble that of substance dependence, and that this phenomenon may be comprehended using the same psychopathological, behavioral, neurobiological, and clinical framework as traditional drug dependence [39, 40]. The relationship between "food addiction" and the rising incidence of human obesity, which has reached epidemic proportions worldwide, is gaining attention [40]. There are currently very few human studies available, and those that exist were done on particular cohorts like eating disorder patients, small-stratified populations like obese people trying to lose weight, or junior college students [40]. Age >35, female gender, and higher BMI values were all associated with an increased chance of developing a food addiction [39]. It has been debated for decades that certain foods may have an addictive potential and that obesity or binge-related eating disorders may involve an addictive form of behavior [41].

Certain foods showed the highest propensity for addiction, especially processed foods with additional sugars and fats [39].

Given the present obesity epidemic, better policy initiatives, treatment, and prevention may result from a better understanding of how a food-addiction model could connect to obesity or other eating-related problems [1]. According to the YFAS, food addiction affects between 5 and 10% of the general population and between 15 and 25% of obese adults [42]. In college-going young adults between the ages of 18 and 29 (USA), Wattick et al. found that the incidence of food addiction was overall 21.9% (n = 1645) (n = 1645). Food addiction has been linked significantly to ACEs, sex, depression, anxiety, and stress [43]. 13.3% of Indian youth (median age 19 years; n = 376; 42.8% males) reported having a food addiction, according to Ghosh et al. [44]. In a sizable population sample of Canadian adults (n = 1432), Minhas et al. looked at the prevalence of food addiction (median age = 38.93 13.7; 42% male) [45]. The prevalence of food addiction was 9.3%, which was significantly lower than the prevalence of obesity (32.7%), despite the fact that obesity was associated with a higher prevalence of food addiction (18.5%) [45]. In all sectors, food addiction was linked to noticeably worse quality of life [45].

Exercise

A dysfunctional behavior known as exercise addiction or compulsive exercise is characterized by excessive training, a loss of control over one's exercise behavior, and unfavorable effects on one's life that may be physical, psychological, social, or a mix of all three [46]. Exercise addiction is still not recognized as a separate category of psychiatric illness in the clinical reference manual (DSM-V), despite its acknowledged dysfunctional characteristics [46]. For dysfunctional kinds of exercise, a variety of psychological and physiological theoretical theories are available. Exercise addiction appears to be linked to health issues, eating disorders, depression, and anxiety [47]. A high risk of addiction among elite athletes could have a negative effect on performance [47]. There are no clinical diagnostic standards; hence exercise addiction as a whole cannot be diagnosed [47]. As a result, questionnaires are used in studies on exercise addiction to determine the likelihood of malfunction (Table 1). According to research, the prevalence in the general exercising population is around 3% but depending on the exercise and the measurement method utilized, it can range from 3 to 42% [47]. The prevalence of exercise addiction varies between 3% and 9% among different adult sport samples, with the majority being athletes and fitness enthusiasts (Table 2) [48]. A prevalence rate of up to >40%, which is ten times higher than that found in a population-wide survey, and a risk of exercise addiction that is stronger in athletes than non-athletes are both present [49].

Gaming

ICD-11 included a diagnosis for gaming disorder, while the DSM-V made a provisional diagnosis for Internet Gaming Disorder [50]. The definitions and criteria of "gaming addiction" are still up for debate in the scientific community. One concern is whether playing video games nonstop for hours on end can be viewed as a healthy passion or as a sign of an addictive mental condition [51]. According to research, teenage guys play video games for longer and longer periods of time-up to 13 hours per week and over 1 hour per day on average [51]. While excessive game playing may not be a problem for all gamers, addiction is always bad for the user [52]. According to a longitudinal study, some gamers may experience short-term negative behavior as a result of their excessive gaming exposure. But they also discovered that the majority of problematic gamers continued to play at unhealthy levels for years [53]. Studies have found that compared to non-pathological gamers, pathological gamers exhibit worse levels of daily life pleasure, self-esteem, social competence, and loneliness [54].

Pathological gaming is characterized as an uncontrollable, prolonged, and excessive interest in computer or video games, notwithstanding any corresponding emotional or social issues [54]. Studies have repeatedly demonstrated that a tiny subset of gamers engage in excessive gaming while exhibiting intrapersonal or interpersonal conflicts, loss of control, obsession, withdrawal, and a wide range of pathological behavior symptoms [54]. According to a 2021 assessment, 3.05% of people worldwide have gaming disorders [55]. Approximately 60 million people today suffer from gaming disorder [55]. The prevalence of video game addiction is highest in Iran. In this nation, 22.8% of people are categorized as video game addicts [55]. Rates varied from 5.4 to 17.7% throughout Southeast Asia, with a combined prevalence rate of 10.1% [56]. The incidence rate in the UAE was 6.1% (n = 1332) [57].

Shopping/buying

There are currently a number of alternative terminologies that can be found in the literature, such as pathological shopping, compulsive buying-shopping disorder, and compulsive buying disorder (CBD) [58]. Many experts discussed how to categorize impulse control disorders (ICDs) prior to the DSM-V's publication in May 2013 [59]. One of these ICDs, CBD, does have presenting symptoms and is also a condition that clearly overlaps with behavioral addictions [59]. ICDs are often characterized by strong impulses to engage in a certain behavior that varies depending on the individual ICD; in the case of CBD, the behavior is to actively seek out occasions to make purchases of goods or services. Due to the urges to engage in the behaviors continuing even after they have been carried out, they become repetitive, which is why they are considered compulsive behaviors [59]. This behavioral pattern is also comparable to addictive disorders, both chemical and behavioral, where people describe having a strong want to use drugs or engage in a particular behavior and being powerless to control that urge [59].

People who develop aberrant shopping habits become fascinated with shopping and spend a lot of time planning their next shopping trip, which is similar to drug and behavioral addictions, especially pathological gambling [59]. The Compulsive Buying Measurement Scale, which is mostly used in the United Kingdom, Europe, and Canada, examines both the financial and psychological effects of CBD [59]. The one that is most frequently used in the United States and focuses

Table 1: Tests/tools used in the assessment of addictions.

Addiction	Assessment Tool(s)	
Alcohol [124]	AUDIT	10-item Alcohol Use Disorders Identification Test
Nicotine/Tobacco [125, 126]	FTND	Fagerstrom Test for Nicotine Dependence
	FTQ_	Fagerström tolerance questionnaire
	HSI	Heavy Smoking Index
Opioids, cocaine, cannabis, and illicit drugs [127]	-	17-item Current Opioid Misuse Measure
	ORT	5-item Opioid Risk Tool
	PMQ_	26-item Patient Medication Questionnaire
	DAST	Drug Abuse Screening Test
	SDS	5-item Severity of Dependence Scale
Caffeine [25]	-	9-item Caffeine Use Disorder Questionnaire
	CHS	14-item Caffeine-related Harm Screen
Gambling [34]	DIGS	Diagnostic Interview for Gambling Severity
	DSM-IV	Diagnostic Criteria for Pathological Gambling
	PGSI	Problem Gambling Severity Index
	-	South Oaks Gambling Screen
Food [98, 128]	YFAS	27-item Yale Food Addiction Scale
Exercise [3, 47, 129]	EAI	6-item Exercise Addiction Inventory
	EDS	21-item Exercise Dependence Scale
Gaming [50, 130, 131]	GAS	7-item Game Addiction Scale
	IGDS9-SF	9-item Internet Gaming Disorder Scale-Short-Form
	GAIT	Gaming Addiction Identification Test
Shopping/buying [61]	BSAS	Bergen Shopping Addiction Scale
Work [32]	BWAS	Bergen Work Addiction Scale
Sex [132]	SAST	Sexual Addiction Screening Test
	-	6-item PATHOS test
	BYSAS	Bergen–Yale Sex Addiction Scale
Internet [77, 124]	AICA-S	17-item Assessment of Internet and Computer Game Addiction Scale
	YDQ_	8-item Young Diagnostic Questionnaire
	CIAS	26-item Chen Internet Addiction Scale
	YIAT	20-item Young Internet Addiction Test
Smartphone [80]	SAS	Smartphone Addiction Scale
Social networking sites [133]	BSMAS	Bergen Social Media Addiction Scale
	BFAS	Bergen Facebook Addiction Scale

Table 2: Exercise addiction prevalence in athletes.

Country	Number(s)	Category	Remark(s)
Germany [134]	72	Marathon runners	6.9% are prevalent
Spain [135]	330 (Women: 30)	Amateur Endurance Cyclists	6.1% are prevalent
USA [136]	8251	College students	11% (Men) and 17% (Women) are prevalent
Denmark [47]	417 (Women: 51%)	15 sport disciplines	736% are prevalent
Italy [137]	317	Runners (Road: 31.9%, Mountain: 28.7%, Ultra-trail: 39.4%	15.4% are prevalent
Italy [138]	229	Runners	4.4% are prevalent
Spain [139]	1014	Indoor cyclists	13.3% are prevalent
Denmark [140]	603	Cross fit	5% are prevalent

mostly on money control is the Compulsive Buying Scale [59]. 8–16% of people in the UK are impacted by CBD [60]. Polish undergraduate students indicated a prevalence of 3.5% (n = 1156) according to Uzarska et al. [61].

Work

Over the past 20 years, research on excessive work has attracted more and more attention. The inclination to work

extremely hard and get obsessed with work, which displays as compulsive working, is known as “workaholism” [62]. Workaholism is the practice of putting excessive emphasis on one's job, being driven by an uncontrollable work motivation, and devoting so much time and effort to it that it interferes with one's personal relationships, leisure activities, and/or health [62]. “Workaholism”, “work addiction”, and “excessive work” are all terms that have been used interchangeably [62]. Research focuses mostly on the detrimental effects of workaholism, such as rigidity and compulsiveness [62]. The primary driving force behind workaholics is a compulsive drive that is present in almost all addictions [62]. Unlike most other behavioral addictions (e.g., shopping addiction, video gaming addiction, pathological gambling, etc.), workaholism - has often been regarded as a productive and positive kind of addiction [32]. Recently, the BWAS was created to address the conceptual and theoretical shortcomings of earlier instruments for evaluating work addiction [32].

Overworking could be the cause of more than 745 thousand fatalities annually in the world, and that number only includes cardiovascular issues [63]. Between 27% and 30% of the overall population suffers from workaholism [64]. According to Andreassen et al., 8.3% (n = 1124) of Norwegian employees reported workaholism [65]. Fekih-Romdhane et al. found that among Lebanese young (mean age 26.18 years) adult employees, the frequency of workaholism were 13.8% (n = 1268; females: 65.1%) [66].

Study

According to recent studies, some people's academic studying may become excessive and compulsive and result in "study addiction" [32]. Although study addiction has received minimal research and no widely accepted description to present, such behavior (as a method of managing academic stress and pressure) may be comprehended and conceptualized within current workaholism research [32]. In light of this, study addiction may also be defined as "being overly concerned with studying, being driven by an uncontrollable studying motivation, and putting so much energy and effort into studying that it impairs personal relationships, leisure activities, and/or health" [32].

Sex

Sex addiction (compulsive sexual behavior disorder/hypersexual disorder) was added to the ICD-11 by the World Health Organization in 2018, which offers precise diagnostic recommendations [67]. According to the ICD-11, sex addiction is defined as "a persistent pattern of inability to control intense, repeated sexual urges or impulses, resulting in repetitive sexual behavior over an extended period of time that causes marked distress or impairment in occupational, educational, social, family, personal, or other important areas of functioning” [67]. The use of sex as a coping method to counteract negative emotional states or stressful life experiences is another characteristic of sex addiction [67]. These inappropriate sexual behaviors cause people to engage in a variety of unpleasant sexual practices, such as excessive pornographic viewing that is frequently followed by obsessive masturbation (also known as "pornographic binges") [68], casual sexual activity with numerous partners, excessive use of sexual services for payment, or compulsive sexual activity within a committed partnership [69, 70].

The frequency and severity of these sexual fantasies, desires, and behavior constitute clinically significant personal suffering or functional impairment in social, occupational, or other key areas [70]. These sexual imaginations, cravings, and actions are not brought on by manic episodes, co-occurring general medical conditions, or the direct physiological consequences of exogenous substances (such as drugs of abuse or pharmaceuticals) [70]. In the general community, hypersexual behaviour affects 2 to 6% of people [71]. In the USA, 7% of women and 10.3% of males reported difficulty and/or impairment owing to difficulties in managing sexual urges, feelings, and behaviors, according to a recent poll of men (n = 1151) and women (n = 1174) [72]. According to a 2017 study by Rissel et al., among 20,094 Australian participants, 4.4% of males and 1.2% of females identified as problematic pornography addicts [73]. A psychiatric condition coexists with sexual addiction in about 88% of cases. These primarily include anxiety disorders (38%), mood disorders (72%), and a history of personality disorders (17%), suicidal ideation (19%), or other addiction disorders (40 to 71%). Obsessive-compulsive disorder (12 to 14%) or impulse control issues (5 to 6%) [71]

Internet

Our lives have been easier as a result of the development of technology-mediated aid in better communication services (Figure 8), however, behavioral addictions like internet addiction have spread as a result (Figure 9) [74]. A troublesome behavior known as impulse control disorder without the use of psychoactive intoxicants is internet addiction. Internet addiction categorized into five types: (a) *Computer addiction* is characterized by binge-playing video games, (b) *Information overload* is addiction to web surfing, (c) *Net compulsions* are addictions like online shopping and online gambling, (d) *Cyber sexual addiction* is a sex addiction or overindulgence in online pornography more prevalent, and (e) *Cyber-relationship addiction* is addiction to establishing internet relationships [75]. There is evidence that people spend a significant amount of time online in other wealthy nations. The following graph depicts the amount of time young people spend online in major

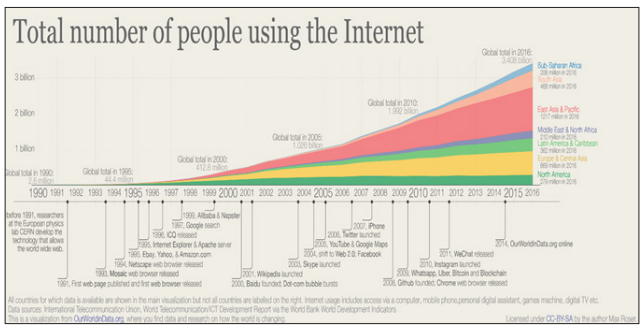

Figure 8: Total number of people using the internet with the timeline of internet evolution [74].

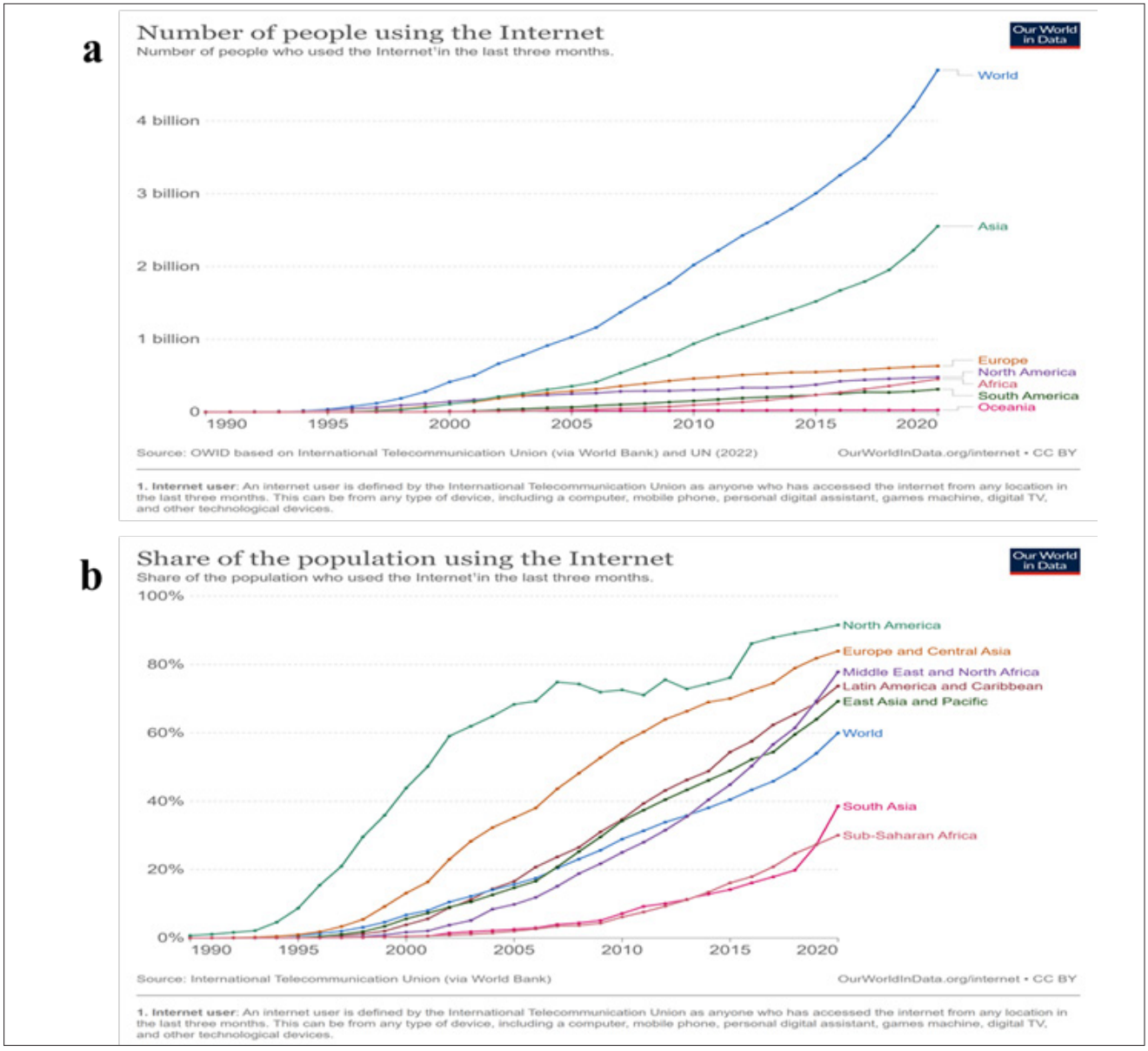

Figure 9: (a) Number of people using the internet and **(b)** Share of the population using the internet [123].

developed nations (Figure 10) [76]. However, there is ongoing debate regarding the psychopathological basis of internet addiction [77].

As with all addictions, Internet addiction has a negative impact on behavior and social interactions as well as health, and it gets worse when coexisting with other mental problems [78]. Depending on the measurement and target group, there was a substantial range in the prevalence rates of internet addiction, from 4.6% to 40.0% (Table 3) [77]. Most of the time, smartphones and the internet work together: 4.66 billion people worldwide (49.5 percent) use the internet [79]. Numerous studies have examined the incidence of addiction by nation or region and have found high rates throughout Asia. These statistics, which always refer to the population of young adults, range from 51% in the Philippines to 48% in Japan. The prevalence of addiction in Europe varies between 2% and 8%, depending on the study and the nation (Spain, Estonia, Romania, Italy, and Germany). There are significant disparities

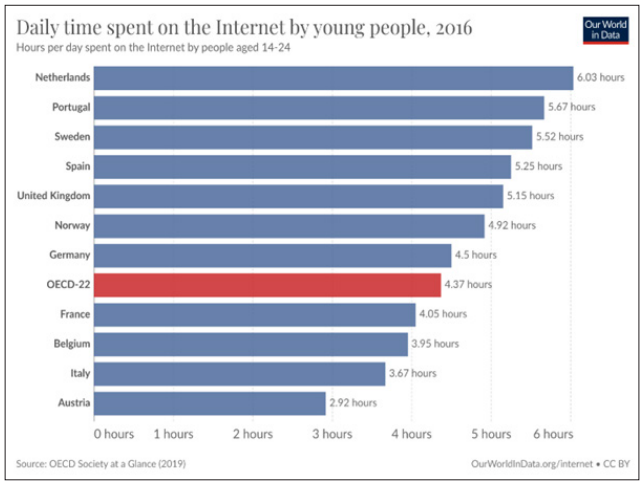

Figure 10: Daily time spent on the internet by young people (14 - 24; 2016) [76].

Table 3: Internet addiction prevalence in various countries [77].

Country	Number(s)	Prevalence (%)	Assessment Tool
Austria	2031	4.6	YDQ
Bangladesh	573	24.0	IAT
Estonia	1572	11.5	YDQ
Germany	2573	5.1	YDQ
Greece	1199	16.1	YDQ
Hong Kong	9666	28.1	CIAS
India	380	25.3	IAT
Iran	4261	24.5	IAT
Japan	1258	38.2	IAT
Jordan	587	40.0	IAT
Lithuania	1806	18.3	YDQ
Nepal	937	35.4	IAT
Romania	1245	8.7	YDQ
Singapore	1119	9.3	IAT
Spain	40955	16.3	Other
Taiwan	2170	17.4	CIAS
Turkey	2350	17.7	IAT
United States	1244	8.0	IAT

among the countries of South America. For instance, Chile has a rate of above 11%, and some studies in Brazil indicate a 30% rate. In addition, it is contradictory that Bangladesh, a developing nation, exhibits a prevalence of 27.1% [78]. 72% of all internet users are predicted to only use smartphones to access the internet by 2025 [79].

Mobile phone/smartphone

Over the past ten years, the percentage of people who own smartphones has climbed, reaching at least 50% of the world's population (Figure 11a) [79, 80]. Over 80% of people in high-income nations in North America and Europe own a smartphone, and the percentages in low- and middle-income nations are steadily increasing [80]. 5.27 billion (67%) of the world's 7.86 billion people are unique mobile phone subscribers [79]. 48.33% of the world's population, or 3.8 billion people, use smartphones [79]. With 82.9% of the population using smartphones, or 55.5 million people, the UK has the highest smartphone penetration rate [79]. Switzerland has the lowermost market permeation, with 6.2 million smartphone users, at 72.9%. [79]. Around 80% of Facebook users were using smartphones to access the social network as of October 2020 [79].

When cellphones interfere with daily living, problematic smartphone use or smartphone addiction results (Figure 11b) [79, 81, 82]. Typically, it refers to an excessive use that is unchecked, characterized by maladaptive reliance and a propensity to utilize the smartphone while still connected to it [82]. Depression, poor sleep, and cognitive deficits have all been linked to smartphone addiction [80]. Additionally, it has been demonstrated to be linked to worsened social abilities, emotional intelligence, and empathy, as well as an increase in interpersonal conflict [83]. The abundance of available metrics makes it difficult to assess smartphone addiction globally. There are ~78 different scales that evaluate related behavioral addiction-related components, several of which have strong correlations with one another [83].

Social networking sites

Internet addiction is different from addiction to social networking sites (social media), as it does not involve using other internet applications [75]. "Being overly concerned about social media, driven by an unquenchable motivation to log in to or use social media, devoting so much time and effort to social media that it impairs other important life areas" are some of the characteristics of social media addiction [75]. The term "social media addiction" refers to the compulsive usage of all social media platforms, including YouTube, WhatsApp, Instagram, Twitter, and Facebook [75]. Social media and communications take up half of the time used on smartphones and other mobile devices [79].

About 7.7 billion people lived on the planet in 2019, with ~3.5 billion of them online [76] (Figure 12a). This indicates that more than two thirds of all internet users and one in three people globally both utilize social media platforms [76]. 89.5% of consumers have installed social networking apps [79]. About 2.4 billion people used Facebook in 2019, making it the most popular social media network in the world (Figure 12b) [76]. From 2008 to 2018, Facebook's market share increased from 1.5% of the global population to almost 30% [76]. Over one billion people used WhatsApp and YouTube, two additional social media services [76]. An increase in the amount of time spent online has coincided with the growth of social media in wealthy nations (Figure 13) [76]. A remarkable illustration of how rapidly and radically social behaviors may change is the emergence of social media. Over 90% of young people in most developed nations use online social networks [84]. The reports are frequently scary, claiming that social media and cellphones are to blame for a wide range of troubling developments, including an increase in suicide rates in the US, widespread memory loss, and shorter sleep and attention spans [84].

Women vs Men in Addictions

Alcohol and narcotics are frequently used differently by men and women, who also react to them differently [85]. According to research, certain aspects of hormones, fertility, pregnancy, lactation, and menopause may affect how quickly women advance from substance use to addiction and how difficult it is for them to recover [85].

Alcohol

According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA), men may be at risk for alcohol-related issues if they consume more than 14 standard drinks per week, or 4 drinks per day, while women may be at risk if they consume more than 7 standard drinks per week, or 3 drinks per day [85]. Most women absorb more alcohol and require longer duration to metabolize it due to biological variances in body chemistry and structure [86]. Women typically have higher blood alcohol levels than men after consuming the same amount of alcohol because they have less total body water, less alcohol dehydrogenase activity in the stomach, and the immediate effects of alcohol typically manifest more quickly and last longer in women than men [85]. Due to these distinctions, women are more vulnerable than males to the long-term

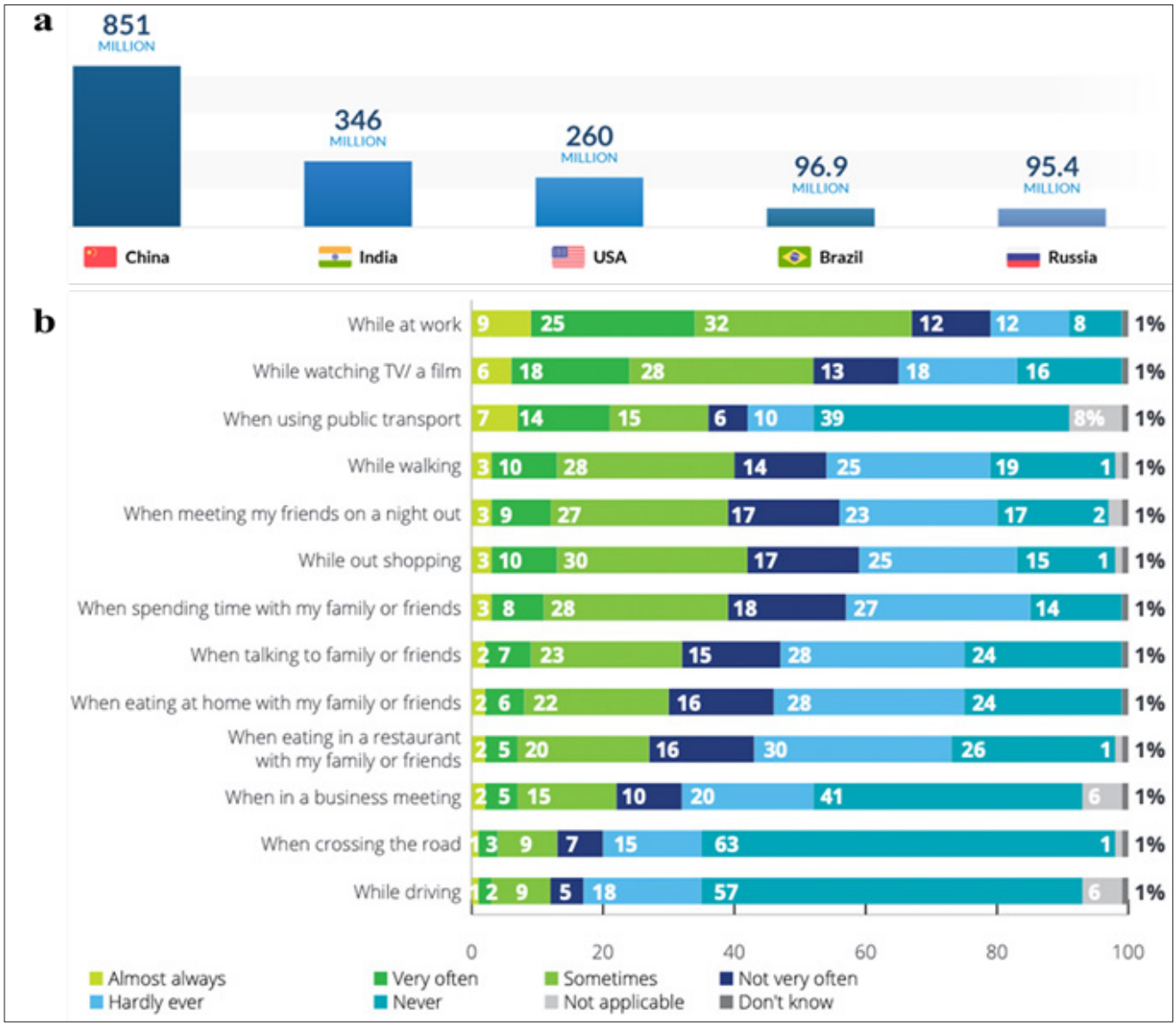

Figure 11: (a) Countries leading in smartphone usage [79] and **(b)** Usage of smartphone in daily life [81].

harmful consequences of alcohol on their health [87].

An estimated 107 million people worldwide suffer from alcohol consumption disorder. You may view the breakdown by gender for any country here; 32 million women made up 32 percent of the world's population, or 75 million men [9]. 2.6% of all deaths worldwide are caused by alcohol-related causes among women [11]. 13% of adult women say they have binged on alcohol. Among them, 25% engage in binge drinking once every two weeks on average and 25% consume at least six drinks [86]. In 2019, 26% of male high school students and 32% of female high school students both drank alcohol. Additionally, among high school students, females (15%) binge drink more frequently than males (13%) do [88]. In 2020, 17% of females between the ages of 18 and 25 and 9% of all females had an alcohol consumption disorder [89]. In a recent survey, 4.5% of pregnant respondents who reported drinking binge-style used alcohol [90]. Excessive alcohol use increases the risk of Sudden Infant Death Syndrome, premature delivery, stillbirth, and miscarriage [87]. Although light-to-moderate drinking has been linked to lower risks of various cardiovascular issues in women, the same levels of drinking have also been linked to higher risks of breast cancer and issues with liver function. Women who drink heavily on a regular basis are more likely to experience cognitive impairment and difficulties from osteoporosis [85].

Tobacco

In 2020, smoking was a habit for 22.3% of the world's population, including 36.7% of males and 7.8% of women [13]. The fact that men smoke substantially more than women in China (288 million men smoked compared to 12 million women in 2018) may be related to this sex propensity [91]. In the world, more than one third of men smoke. Less than 10 percent of women do [14]. Smokeless tobacco use among adults is typically more prevalent among men than women; however, in some nations, including Barbados, Sierra Leone, Mauritania, South Africa, Vietnam, Malaysia, Cambodia, India, Nepal, Thailand, and Bangladesh, female use is either comparable to or higher than male use [92, 93]. The tobacco industries' obscene efforts enhanced the involvement and in-

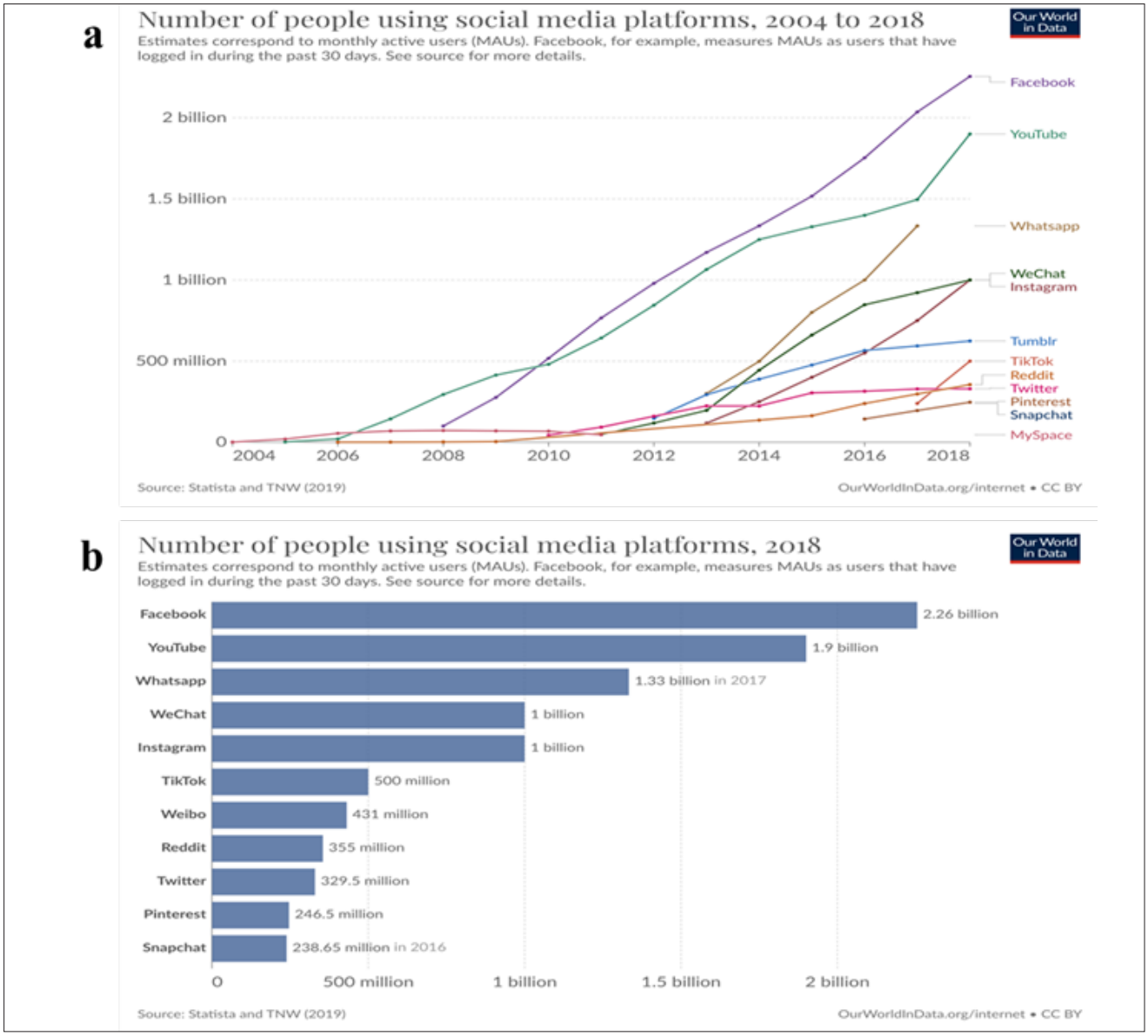

Figure 12: (a) Number of people using social networking sites (2004 to 2018) and **(b)** Number of people using social networking sites [76].

dulgence of both men and women from Low-Middle-Income Countries in cigarette use [94].

Opioids

Compared to men, women are more likely to get addicted to opioids through medical intervention. Opioids are primarily used to alleviate pain, and population-based research indicate that women are more likely than men to experience pain and are more sensitive to the unpleasant elements of most painful stimuli [95]. Additionally, prescription opioids along with other drugs that raise the risk of an overdose are more likely in women than in males [95]. Although prescription opioid overdose deaths are more common among males than women in the USA, women are experiencing a greater rate of growth than men are [95]. Such deaths increased by 404% for males and 583% for women between 1999 and 2016 [95].

Gaming

Despite the fact that men have traditionally preferred gaming, research on female gamers has started to surface [96]. According to the Interactive Software Federation of Europe (ISFE) and Entertainment Software Association (ESA), the number of women who play video games has increased over the past 20 years, and they now account for half of the gaming population. [96]. Almost all study on gaming addiction focuses on male players, despite the growing number of female gamers. Compared to men, women frequently play casual games for shorter amounts of time [97]. According to medical professionals that treat gaming addiction, females may be unaware they have this mental condition and that they experience other psychopathologies differently than male patients do [96]. However, neither theoretical study nor empirical research has often addressed the problematic and maybe pathological gaming among women.

Others

Food addiction affects 3% of males and 7% of women [40]. Women aged 45 to 64 had an 8.4% prevalence rate, com-

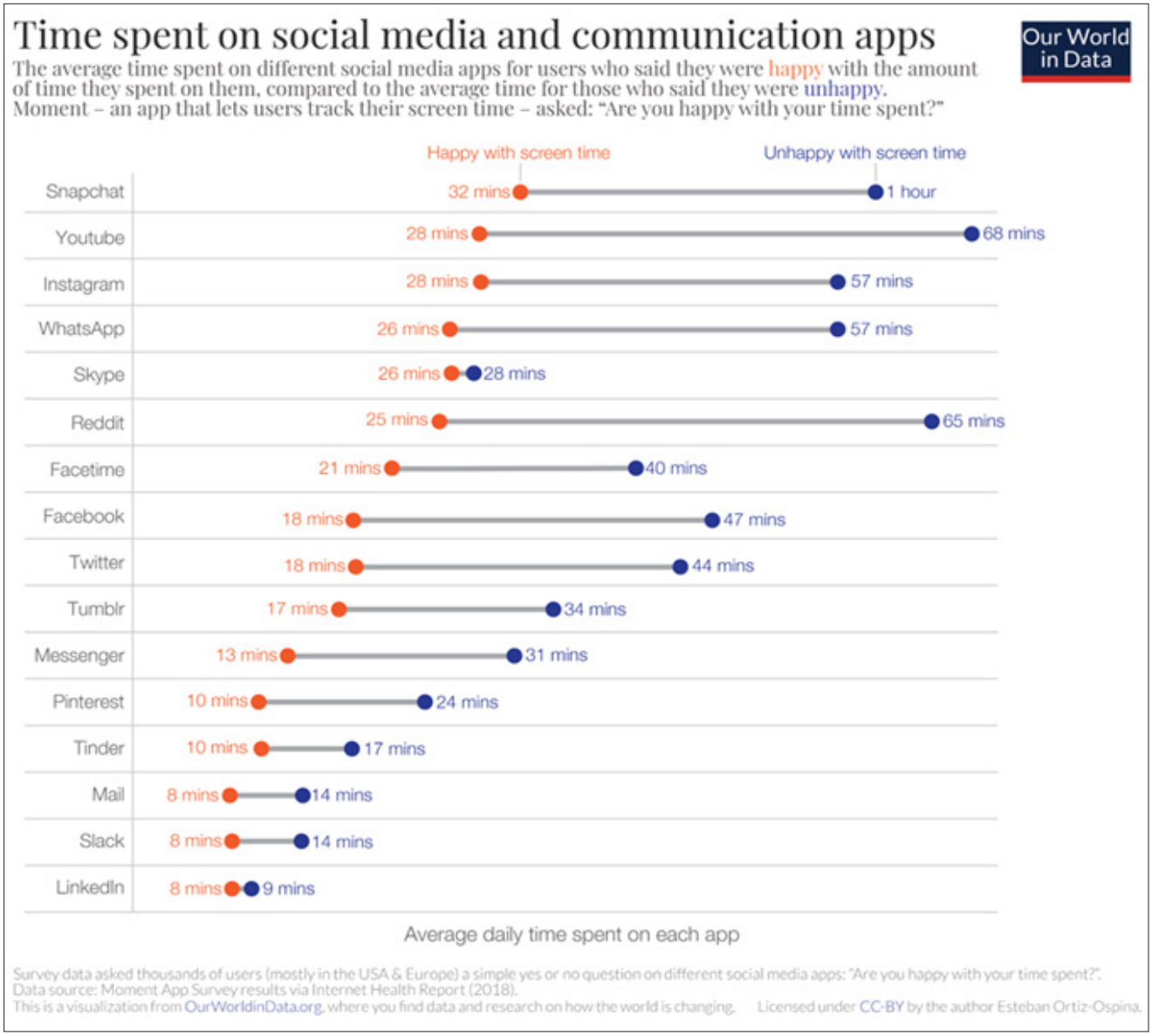

Figure 13: Time spent on social media and communication applications [84].

pared to women aged 62 to 88 who have a 2.7% prevalence rate [98]. Women are nine times more prone than men to engage in obsessive shopping [60].

Addictions during and after COVID-19

Large-scale disasters may affect drug usage and addictions in the COVID-19 global pandemic scenario. The use of certain substance(s) is also likely to change the risk of COVID-19 infection or course. Lockdowns have been implemented in numerous nations, and this quarantine or the lifting of lockdown restrictions will have an effect on addictions [10]. Researchers from all across the world now have an unheard-of opportunity to examine how stressful life situations affect people's psychological reactions and addictive behaviors [99]. Worldwide, 2.4 billion individuals consume the psychoactive substance alcohol, and alcohol use disorders are the most common drug use problem [100]. The prevalence of cigarette use is likewise very high [10]. Because smoking is linked to chronic lung disorders, doctors might see more smokers with severe COVID-19 variants [10]. Lockdown measures are intended to contain the pandemic, but they may have an impact on drug use and hence interfere with the outlook for the entire world. Social distancing norms and telehealth may potentially disrupt routine care, particularly in elderly people with SUD who risk being isolated from assistance if they are unable to utilize online therapy and self-help tools efficiently [101].

Alcohol

Alcohol is the drug that people of all ages use the most, and it can cause serious medical, functional, and psychological issues as well as sleep disturbance, falls, and other accidents and injuries [101]. Several long-term medical issues are linked to unhealthy alcohol use [101]. Of particular concern, older persons who suffer from both depression and alcohol use problems are more likely to commit suicide [101]. However, this remains speculative and unconfirmed by a recent clinical investigation on lifestyle risk variables. In general, hazardous drinking may decrease COVID-19 prognosis and raise risk of

lung infection [102, 103]. Due to the current problem, novel therapeutic modifications are needed to protect heavy drinkers from developing encephalopathy [10]. Physicians must be cognizant of the potential of increasing intake to treat anxiety symptoms when dealing with an alcohol use disorder, whether it has previously been identified or not, especially under lockdown [10]. In a Chinese online study of 1074 people during lockdown, anxiety, depression, risky and destructive alcohol consumption (as measured by the AUDIT), and mental wellness were all shown to be more prevalent [104]. Other nations elected to avoid the social stigma that could limit access to medical care and raise the danger of difficult withdrawals, as described in India, while Thailand or South Africa decided to outlaw alcohol [105-107]. Alcohol sales in the USA have soared by 55% in a single week [108]. A significant online poll conducted in France reveals a rise in alcohol consumption among 31% of participants [109]. Years after the epidemic, the effects of quarantine may make misuse and dependency signs more likely. We should anticipate significant repercussions of the COVID-19 pandemic in the coming ten years given that all previous economic crises were linked to an increase in long-term alcohol-related issues (particularly for men and people in low socioeconomic status) [10].

Tobacco

Natural disaster-exposed smokers typically smoke more than non-exposed smokers [10]. There is compelling evidence that cigarette use increases the chance of developing more severe COVID-19 symptoms [101]. Although it is believed that vaping nicotine is less dangerous than smoking tobacco, there are rising worries that lung damage caused by vaping nicotine may make users more susceptible to COVID-19-related symptoms [101]. In addition to encouraging tobacco use as a coping mechanism for former smokers, lockdown may also worsen mental health outcomes, increase relapses for former smokers, and promote isolation [10]. Quitting smoking lowers cardiovascular and other health issues in older persons, increasing COVID-19 survival probabilities [101]. According to a recent study of 1590 patients from 575 hospitals across China, smoking may be a major risk factor for the severity and fatality of COVID-19-related illnesses [110]. A significant USA sample found that the prevalence of current smoking was almost ten times lower than the population's average [111], compatible with Chinese data [112]. An extensive online poll conducted in France revealed that 35% of participants had increased their cigarette use [109].

Opioids

OUD users are more likely to acquire and disseminate COVID-19 because drug use and acquisition typically involve social contact [113]. Additionally, because of their social isolation, financial hardship, and the disruption of treatment services during COVID-19, people with opioid use disorders may be more vulnerable to overdosing on opioids [114]. In addition, opioids have an inherent immunosuppressive impact (by changing or squelching the functionality of the many cell types involved in both innate and adaptive immunity) [115, 116], and a recent study revealed that the risk of pneumonia is raised by the use of prescribed opioids, particularly higher-dose and immunosuppressive opioids [117]. Withdrawal might have an immunosuppressive impact as well [118]. Concerns that the COVID-19 pandemic is contributing to an increase in opioid overdoses are supported by empirical data from a recent USA study focused on Kentucky [114]. There was a 50% increase in calls for suspected opioid overdoses with deaths at the site between January and April 2020, a 17% increase in calls for emergency medical services opioid overdoses with transportation to an emergency department, a 71% increase in calls with transportation declined [10]. After the pandemic, the most crucial concern is to preserve service continuity and accessibility of opioid substitution therapy [118].

Online gambling

The COVID-19 pandemic could make mental health issues in the general population worse, leading to more people engaging in addictive behaviors [119]. Social isolation, physical distance, and these stressors, together with the pandemic's profound changes in the gambling markets (land-based and online), may have a considerable impact on gambling behavior [119]. Problem gambling is also significantly influenced by loneliness and boredom. Despite the worldwide suspension of major sporting events and the closing of betting establishments, online gambling has seen a sharp increase in popularity during the COVID-19 epidemic [120]. Some nations have put limits on or outright outlawed online gambling to address this issue [120]. When many people are confined to their houses and experience quick changes in their working conditions, depression, anxiety, and psychosocial stress, as has been reported in China, the properties of internet gambling may pose a specific health risk [121]. In Sweden, compared to contemporary online sports betting and other forms of internet gambling, online casino gaming was linked to greater rates of problem gambling and debt [122]. Although evidence is currently few, it appears that COVID-19-related financial worries may exacerbate harms associated with gambling, and this hypothesis needs thorough investigation [119].

Conclusion

Addiction is a global problem and can be difficult to manage individually. The pathophysiological data reported in several literatures and research articles has suggested an underlying and dominant root-cause. It is difficult to diagnose and offer preventive measures individually. Addiction causes distress to individuals, family, friends, and those associated with it and leads to financial, psychological, and behavioral burden. Addiction can be managed through mental health services involving professionals but cannot be cured completely, there is always a chance to relapse to addictive behavior. Thus, controlling or managing addiction requires continuous effort from individuals and those associated, which can be challenging task psychologically.

Acknowledgments

None.

Conflicts of Interest

None.

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