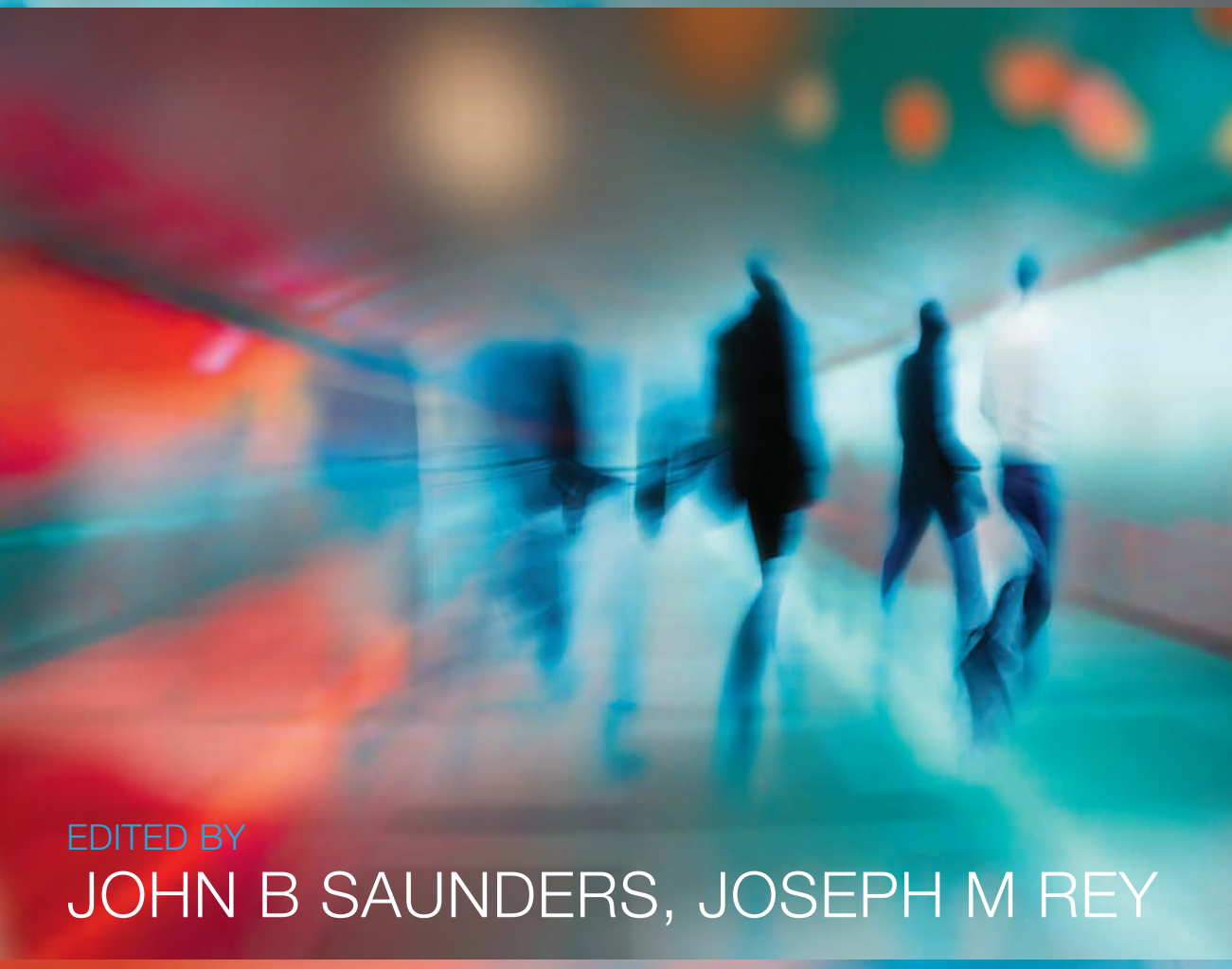
YOUNG PEOPLE & ALCOHOL

IMPACT, POLICY, PREVENTION, TREATMENT



EDITED BY
JOHN B SAUNDERS, JOSEPH M REY

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Impact, Policy, Prevention, Treatment

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Preface

In the United States in 2008, 8 million adolescents—almost one-third of all people aged 12–17—drank alcohol. On an average day, 205 adolescents presented to hospital emergency departments as a result of their alcohol consumption, often because of alcohol poisoning. Each day, 76 sought substance abuse treatment.[1] Ian Gilmore, President of the Royal College of Physicians, London, UK, said, "The nation's growing addiction to alcohol is putting an immense strain on health services, especially in hospitals, costing the NHS [National Health Service] over £2.7 billion each year. " He added, "This burden is no longer sustainable"—costs had doubled in less than 5 years.[2] A specialist clinic for children with problems related to alcohol misuse was to be launched in the Netherlands following a marked increase in admissions to hospital of children younger than 16 years because of alcohol poisoning.[3] In Thailand, formerly a low alcohol consuming country, consumption of alcohol increased 32-fold between 1961 and 2001 (from 0.26 to 8.47 L per capita, respectively), with a consequent rise in health and social problems, particularly among young women.[4] These events and data draw attention to the fact that youth alcohol use is a growing concern worldwide.

Although consumption varies between countries and among cultural and ethnic groups, patterns of use among the young seem to be converging due to the influence of the mass media, marketing, growing affluence, and globalization. The *Surgeon General's Call to Action to Prevent and Reduce Underage Drinking*[5] highlights that the highest prevalence of alcohol abuse and dependence in any age group is among people aged 18 to 20. The report goes on to stress that adolescents use alcohol differently from adults, that they react uniquely to it, and that alcohol has a powerful attraction for adolescents, with often unpredictable and potentially devastating outcomes.[5] The medical costs of underage drinking (below 21 years of age) in the United States are estimated to be in excess of $5 billion a year. Notwithstanding all this, alcohol problems in the young are often ignored or minimized. For example, Australian data[6]—similar to data elsewhere—show that parents are the most common source of alcohol among school students.

The latest research demonstrates a compelling need to address alcohol use early, in the context of human development, and using a systematic approach that spans childhood through adolescence and into adulthood. The coming tide of medium- to long-term health consequences of increased youth alcohol use is tragically illustrated by Gary Reinbach, a 22-year-old Englishman from Dagenham, Essex, UK. This young man died in hospital after he was refused a liver transplant because he could not prove he had not drunk alcohol for at least 6 months—one of the requirements for liver transplant in the United Kingdom.

Mr. Reinbach had been admitted to hospital 10 weeks earlier with cirrhosis of the liver. His family said he had started drinking at 11 years of age and drank heavily after the age of 13.[7] Most physicians, educators, policymakers, youth workers, teachers, and parents underestimate this problem and are poorly equipped to deal with it. This book aims to fill this gap by providing workers from a range of professional backgrounds working with people aged 12–25 years with authoritative and up to date information about the effects of alcohol use in the young and, particularly, its management, with an emphasis on interventions whose effectiveness is supported by evidence.

The first three chapters deal with the sociological and developmental aspects of alcohol use. Chapter 1 examines the phenomenon of youth drinking in the context of youth culture in the twenty-first century, highlighting recent changes in drinking patterns, a convergence between wine-, beer-, and spirit-drinking cultures, and the novel phenomenon of drinking specifically to become intoxicated as quickly as possible. While Chapter 2 considers the factors associated with early onset drinking and its consequences, Chapter 3 reviews the research on the short- and long-term consequences of adolescent alcohol use; in particular, how much of these outcomes can be actually attributed to alcohol use and how much to other confounding factors.

The next three chapters focus on the biological aspects of alcohol use. Chapter 4 describes how alcohol is handled by the body, its effects on consciousness and behavior, and summarizes the neurobiological mechanisms by which alcohol exerts its acute effects and leads to dependence. Chapter 5 examines a considerable body of new research showing that alcohol has specific effects on the developing adolescent brain. Chapter 6 discusses advances in our understanding of the genetic contributions to alcohol use across the life span but with a focus on adolescence and early adulthood.

Chapters 7–10 describe in some detail prevention and early intervention strategies. Chapter 7 focuses on universal preventive measures such as alcohol policies, legislation, and their effect on youth drinking and on preventing harms such as motor vehicle accidents. There is currently much discussion in the literature and in several countries' media about minimum pricing policies, thus far rejected by legislators on the incorrect belief that they unfairly penalize moderate drinkers. Chapter 8 describes the practicalities of how to mobilize community resources to develop and implement prevention policies and programs in a specific community. Chapter 9 deals with brief alcohol interventions in young people and their effectiveness, with a particular focus on those that can be delivered using new technologies such as the Internet and cell phones. Finally, Chapter 10 examines preventative interventions in schools, colleges, and military, which are receiving considerable attention in the clinical and policy domains. For example, there is a widespread belief that college life encourages heavy drinking.

The next two chapters deal with the assessment and diagnosis of alcohol use disorders in youth, including diagnostic concepts and the classification of alcohol use disorders in the international diagnostic systems (Chapter 12). This chapter also describes the use of scales, diagnostic interviews and biological markers. Chapter 11 outlines the clinical interview of young people who misuse alcohol and emphasizes the importance of empathy and understanding of the young person's experiences with alcohol.

The final 6 chapters address various aspects of treatment, with an emphasis on those that have demonstrated effectiveness or show promise. Chapter 13 deals with the acute

management of alcohol intoxication and withdrawal, highlighting the early signs of alcohol poisoning. Chapter 14 draws attention to the importance and issues involved in working with families of adolescents who misuse alcohol. Chapter 15 reviews the large body of literature on the psychological approaches to the treatment of adolescents who misuse alcohol that are the current mainstay of treatment, and offers practical advice on the implementation of these interventions in youth.

The last 10 years have witnessed a dramatic renewal of interest on the pharmacological approaches to the management of alcohol use disorders, resulting in a burgeoning literature. Although research targeting adolescents and young adults is still limited, these efforts are presented in Chapter 16. Chapter 17 describes the evidence for using 12-step programs such as Alcoholics Anonymous and advises clinicians on how to make them more attractive for adolescents and youth. Finally, Chapter 18 gives an excellent picture of the problems managing alcohol use disorders comorbid with other conditions, a very common occurrence in clinical practice.

At the beginning of each chapter, there is a list of "key points" that summarize the thrust of the chapter. At the end, when appropriate, there is a list of sound resources for practitioners, patients, and families, mostly available in the Internet free of charge. We also provide a glossary explaining the abbreviations and some of the technical terms used in this very broad field.

We would like to finish by thanking the contributors very much; they generously agreed to share their wisdom, knowledge, and clinical experience and adhered to a demanding and tight schedule. We are in their debt.

John B. Saunders
Joseph M. Rey

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Glossary and abbreviations

Joseph M. Rey

Acamprosate: A drug used in the treatment of alcohol dependence that blocks glutamatergic *N*-methyl-D-aspartate (NMDA) receptors and activates gamma-aminobutyric acid (GABA) type A receptors. Acamprosate's main effect in alcohol dependence seems to be suppression of glutamatergic hyperactivity, resulting in a dampening of craving.

Acetaldehyde: A toxic by-product of alcohol metabolism.

Acetate: A salt or ester of acetic acid; produced from the metabolism of acetaldehyde.

ADH: Alcohol dehydrogenase.

ADHD: Attention-deficit hyperactivity disorder.

Alcohol abuse: The term alcohol abuse is a DSM-IV diagnosis, but is not in the ICD 10. In DSM-IV, it is defined as a maladaptive pattern of alcohol use leading to clinically significant impairment or distress and social consequences, with at least one of the following occurring within a 12-month period:

- Recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, home (e.g., alcohol-related absences, suspensions, or expulsions from school).
- Recurrent alcohol use in situations in which it is physically hazardous (e.g., when driving an automobile or operating a machine).
- Recurrent alcohol-related legal problems.
- Continued use of alcohol despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the alcohol.

Alcohol dehydrogenase (ADH): An enzyme that breaks down alcohol by oxidation, converting it to acetaldehyde.

Alcohol dependence: Alcohol dependence is a diagnostic entity in both ICD 10 and DSM-IV, and is described in essentially similar terms in the two systems. In ICD 10, it is defined as a cluster of behavioral, cognitive, and physiological phenomena that develop after repeated alcohol use and that typically include a strong desire to consume alcohol, difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to its use than to other activities and obligations, increased tolerance, and sometimes a physical withdrawal state.

Alcohol intoxication: See intoxication.

Alcohol misuse: Alcohol misuse is the use of alcohol in a way that is not consistent with legal or medical guidelines. It is not a diagnostic term in either ICD 10 or DSM-IV. It tends to be used as an umbrella term encompassing a range of drinking patterns leading to disorders, harm, and social problems.

Alcohol Use Disorders Identification Test (AUDIT): A screening and brief assessment instrument for alcohol misuse approved by the World Health Organization.

Alcohol withdrawal: It is defined by the American Psychiatric Association (DSM-IV) as the cessation of heavy or prolonged alcohol use resulting in two or more of the following: autonomic hyperactivity, increased hand tremor, insomnia, nausea or vomiting, hallucinations, psychomotor agitation, anxiety, and seizures.

Alcoholics Anonymous (AA): AA is a self-help group "of men and women who share their experience, strength and hope with each other that they may solve their common problem and help others to recover from alcoholism." The only requirement for membership is a desire to stop drinking. AA is an informal society of more than 2 million recovering alcoholics throughout the world and is not allied with any religion, political organization or institution. AA is nonprofessional—it does not have clinics, doctors, counselors or psychologists and there is no central authority controlling how groups operate. The "12 steps" provide a framework for self-examination and a road to recovery.

Alcoholism Type A: See Type A alcoholism.

Alcoholism Type B: See Type B alcoholism.

Allele: One of two or more variants of a certain gene.

Amino acids: The principal building blocks of proteins and enzymes.

Andersen model of health services utilization: A model developed by Andersen and Laake to determine the use of health services whereby medical contacts are determined by three factors: Predisposing (gender, age, and socioeconomic status), enabling (conditions that facilitate or inhibit the use of physician services—for example, the distance to the health center, the type of municipality, working hours, and family size) and need (such as chronic diseases, disability, new illnesses, and psychological well-being).

AODs: Alcohol and other drug use disorders.

Attention-deficit hyperactivity disorder: A common childhood condition characterized by developmentally inappropriate inattention, impulsivity and hyperactivity that causes significant functional impairment.

AUD: Alcohol use disorder.

AUDIT: The Alcohol Use Disorders Identification Test.

BAC: Blood alcohol concentration.

Baclofen: A $GABA_B$ receptor agonist which is typically used as muscle relaxant for the treatment of spasticity, and which is under investigation as a treatment for alcohol dependence.

BAL: Blood alcohol level.

BASICS: Brief Alcohol Screening and Intervention for College Students.

Behavioral inhibition: A temperament or style of reacting displayed by some infants and children when confronted with novel situations or unfamiliar adults or peers. Behavioral inhibition is characterized by withdrawal, avoidance, fear of the unfamiliar

and overarousal of the sympathetic nervous system. These children tend to be fearful, cautious, quiet, introverted, and shy in unfamiliar situations.

Behavioral undercontrol: The inability, unwillingness or failure to inhibit behavior even in the face of anticipated or already received negative consequences. Behavioural undercontrol is considered a risk factor for alcohol misuse.

Binge drinking: The term "binge drinking" or "binge" has no generally accepted definition. Traditionally, a "binge" was used to describe an episode of heavy drinking occurring over a prolonged period set aside for the purpose. Recent use of the term "binge" refers to a single drinking session intended to achieve, or actually leading to, intoxication. The World Health Organization has defined it as consumption of six 10 g drinks (60 g alcohol) in a single session, an amount that would be expected to lead to perceptible impairment. The United States has recently introduced a definition of binge drinking meaning the consumption of five or more US standard drinks in a single session for males (65 g alcohol) and four for females (52 g alcohol). This is also called the "five/four" measure.

Blood alcohol concentration: It is the concentration of alcohol in a person's blood; it is measured either as mass per volume, or as a percentage of mass by mass. Several measurement units are used:

- Mass per volume of blood in the body (e.g., 80 mg/100 mL).
- Mass of alcohol per mass of blood (e.g., 0.08 g/kg).

Because 1 mL of blood is equivalent to 1.06 g of blood, units by volume are similar but not identical to units by mass. In anglophone countries, the mass per volume of blood (e.g., 80 mg/100 mL) is typically used. In many countries, BAC is measured and reported as grams of alcohol per 1,000 mL (1 L) of blood (g/L). For purposes of law enforcement, BAC is used to define intoxication and provides a rough measure of impairment.

Buspirone: A serotonin-1A partial agonist drug that is typically used for the treatment of anxiety, and is being investigated in the treatment of alcohol dependence.

CA: Cocaine Anonymous.

CD: Conduct disorder.

CDC: Centers for Disease Control and Prevention.

C57BL/6 mouse: An inbred mouse resulting from no less than 20 consecutive generations of brother–sister matings. This allows the offspring to possess both genetic and phenotypic uniformity. C57BL/6 mice show a high alcohol and morphine preference.

CHDS: Christchurch Health and Development Study.

Cocaine Anonymous: A 12-step self-help program for recovering cocaine users.

Conduct disorder: A common childhood and adolescent disorder characterized by a persistent pattern of breaking rules or age-appropriate societal norms (stealing, truancy, running away from home overnight . . .).

Cosegregate: The tendency for closely linked genes and genetic markers to be inherited (segregate) together.

COT: Children of twins design in genetic studies.

Cotinine: An alkaloid found in tobacco and a metabolite of nicotine. Serum and urinary levels of cotinine are used as a biomarker for exposure to tobacco smoke.

CPR: Cardiopulmonary resuscitation.

Cytochrome P450: A family of cytochromes, one of which (CYP2E1) can oxidize alcohol to form acetaldehyde; high alcohol levels stimulate CYP2E1 activity.

DA: Dopamine.

Disulfiram: A drug that inhibits the enzyme aldehyde dehydrogenase and prevents the metabolism of alcohol's primary metabolite, acetaldehyde. The accumulation of acetaldehyde in the blood causes unpleasant effects when alcohol is ingested: Sweating, headache, dyspnoea, lowered blood pressure, flushing, palpitations, nausea, and vomiting.

Dizygotic (twins): Also called "fraternal" twins, develop from two separate eggs (zygotes) that are fertilized by two separate sperm. Like other brothers and sisters, they share about half of their genetic material.

Dominance: In genetics, it is the phenomenon by which one of a pair of genes (alleles) exerts a greater influence that affects the expression of an inherited character. "Dominant" is the opposite of "recessive." However, a dominant trait does not mean higher potency, and recessive does not mean weak; the terms simply refer to the visible trait, the phenotype, seen in a heterozygote. If only two phenotypes are possible, and a heterozygote exhibits one phenotype, by definition the phenotype exhibited by the heterozygote is called "dominant" and the "hidden" phenotype is called "recessive."

Dopamine: A neurotransmitter that plays important functions in many brain systems such as those controlling motility, motivation and cognition. Dopamine has a key role in the reward systems of the brain, providing feelings of enjoyment and reinforcement to motivate a person to proactively perform certain activities, thus essential in the mechanisms underlying addiction.

Driving under the influence: A legal term that describes individuals found driving a motor vehicle while having a blood alcohol concentration above a determined level that varies between legislatures, for example, 0.05% (g/100 mL) in Australia.

"Dry" pattern of drinking: Refers to a pattern of drinking leading to intoxication, usually in nonfamily oriented social events. This pattern is common in Northern European countries.

DSM: The *Diagnostic and Statistical Manual of Mental Disorders* of the American Psychiatric Association, currently in its fourth edition (DSM-IV). The fifth edition is in preparation.

DUI: Driving under the influence (of alcohol).

DZ: Dizygotic or fraternal (twins).

Early onset drinking: Usually, but not universally, understood as alcohol use which starts before age 14.

Earned media: Also called "free media" (as opposed to paid media—publicity obtained through paid advertising) refers to publicity achieved through promotional efforts other than advertising.

Effect size: A measure of the strength of the relationship between two variables in a population. The most commonly used measure of effect size in the biomedical sciences is Cohen's d, which is defined as the difference between two means (e.g., mean days abstinent among a treated sample minus mean days abstinent among those treated with placebo) divided by the standard deviation for the whole group. An effect size of

0.2–0.3 is usually considered "small," around 0.5 "medium," and above 0.8 "large"; *d* can be larger than one.

Emerging adults: Young adults aged 18–25 years.

EMS: Emergency medical service.

Endophenotypes: Measurable biomarkers that are not directly observable or components of a disorder. An endophenotype may be neurophysiologic, biochemic, endocrine, neuroanatomic, cognitive, or neuropsychologic in nature. Endophenotypes represent more easily understood and measurable variables than the disorder itself.

EOD: Early onset drinking.

Epigenetics: The study of heritable changes in gene function that occur without a change in the DNA sequence.

Epistasis: The interaction between two or more genes (modifier genes) to control a single phenotype. The gene whose phenotype is expressed is said to be epistatic, while the phenotype altered or suppressed is said to be hypostatic.

ESPAD: European School Survey Project on Alcohol and Other Drugs

Event related potential (ERP): Any stereotyped electrophysiological response to an internal or external stimulus. ERPs are obtained by recording the electrical brain currents detected on the scalp through an electroencephalogram (EEG).

Executive functions: Term used to describe a set of higher level cognitive abilities that control other cognitive processes. They include the ability to initiate and stop actions, to monitor and change behavior as needed, and to plan when faced with novel tasks and situations. Executive functions allow individuals to anticipate outcomes and adapt to changing situations.

Externalizing disorders: A broad category of childhood behavior disorders that manifest in children's outward behavior rather than their internal thoughts and feelings (internalizing disorders). These conditions include conduct disorder, oppositional defiant disorder, and attention-deficit hyperactivity disorder. This term is not used to describe adult conditions.

FAS: Fetal alcohol syndrome.

FASD: Fetal alcohol spectrum disorder.

FDA: U.S. Food and Drug Administration.

Fetal alcohol spectrum disorder: A variety of alcohol-induced problems that include fetal alcohol syndrome and other alcohol-induced abnormalities that do not meet criteria for fetal alcohol syndrome. Fetal alcohol syndrome does not represent the full spectrum of alcohol teratogenesis, but a subset of individuals exposed to alcohol during pregnancy that have a recognizable pattern of malformation.

Fetal alcohol syndrome: Fetal alcohol syndrome is a set of malformations occurring in children exposed to alcohol during pregnancy. It is characterized by physical abnormalities in the face and reduced size of the newborn, as well as behavioral and cognitive problems. The facial abnormalities include short palpebral fissures and abnormalities in the premaxillary zone (e.g., flat upper lip, flattened *philtrum*, and flat midface); evidence of growth retardation (e.g., low birth weight for gestational age, disproportionally low weight to height); and evidence of neurodevelopmental anomalies (e.g., decreased cranial size at birth, microcephaly, partial or complete agenesis of the *corpus callosum*, and cerebellar hypoplasia).

5-HT: 5-Hydroxytryptamine or serotonin.

Fluoxetine: A selective serotonin reuptake inhibitor drug, typically used for the treatment of depression.

Fluvoxamine: A selective serotonin reuptake inhibitor drug, typically used for the treatment of depression.

fMRI: Functional magnetic resonance imaging.

Functional family therapy (FFT): A multisystemic treatment that focuses on the multiple domains and systems within which adolescents and their families live. In this context, FFT seeks to develop family members' inner strengths and sense of being able to improve their situation, providing the family with a platform for change and future functioning. FFT follows three phases: "engagement and motivation" (e.g., reattribution —reframing, developing positive themes); "behavior change" (e.g., therapists provide concrete behavioral interventions to guide and model specific behavior changes such as parenting, communication, and conflict management); and "generalization" (e.g., helping to generalize positive family change to other problem areas or situations, and to maintain change and prevent relapse).

Functional magnetic resonance imaging: Detects changes in blood flow in regions of the brain when performing a task; increases in blood flow reflecting increased neural activity.

GABA: Gamma-aminobutyric acid.

Gamma-aminobutyric acid: The main inhibitory neurotransmitter in the central nervous system, playing a key role in regulating neuronal excitability. GABA is also responsible for the regulation of muscle tone.

Gamma-glutamyl transferase: (Also known as gamma-glutamyl transpeptidase, gamma-glutamyltransferase, GGT, GGTP, and gamma-GT) is an enzyme present in cell membranes in many tissues and particularly the liver. Elevated serum GGT activity can be found in diseases of the liver, biliary system, and pancreas. GGT is used as a biomarker for abuse and dependence (elevated in about 50%) and to monitor for alcohol use in people receiving treatment for alcohol dependence.

Gene–environment interaction (GxE): It is the phenotypic effect of interactions between genes and the environment. Practically all human diseases result from the interaction of genetic susceptibility and modifiable environmental factors (infectious, chemical, physical, nutritional, and behavioral). Many people tend to classify the cause of disease as either genetic or environmental when practically all the common illnesses are a result of the complex interplay between genes and the environment. Often, what is inherited is sensitivity to the effects of various environmental risk factors. For example, sunlight exposure has a much stronger influence on skin cancer risk in fair-skinned humans than in individuals with an inherited tendency to darker skin.

Genotype: The complete genetic makeup of an organism determined by the particular combination of alleles for all genes.

GGT: Gamma-glutamyl transferase.

Health Beliefs Model: It is a psychological model that seeks to explain and predict health behaviors. It was developed in the 1950s by the US social psychologists Hochbaum, Rosenstock, and Kegels in response to the failure of a free tuberculosis health screening program. Since then, this model has been adapted to explore a variety of health

behaviors, including sexual risk behaviors and the transmission of HIV/AIDS. The Health Beliefs Model is based on the understanding that individuals will take a health-related action (e.g., use condoms) if they: (a) feel that a negative health condition (e.g., HIV) can be avoided; (b) have a positive expectation that, by taking a recommended action, they will avoid a negative health outcome (e.g., using condoms will prevent HIV); and (c) believe that they can successfully take a recommended action (e.g., they can use condoms comfortably and with confidence).

Hepatocytes: The principal cells of the liver, which carry out most of the liver's metabolic activities.

Hippocampus: A pair of brain structures, one in each hemisphere, similar in shape to a seahorse, which are located beneath the cortical surface, inside the medial temporal lobe. The hippocampus is part of the limbic system and plays an important role in long-term memory.

ICD: International Classification of Diseases.

Ignition interlock: A mechanical device that does not allow a car to be driven by a driver who is over the legal alcohol limit.

Internalizing disorders: A group of psychiatric conditions characterized mostly by problematic internal thoughts and feelings such as depressive and anxiety symptoms (e.g., major depressive disorder, generalized anxiety, separation anxiety)—in contrast with "externalizing disorders." This term is chiefly used to describe child and adolescent disorders but not to adult conditions.

International Classification of Diseases: ICD is the World Health Organization's taxonomy of diseases, currently in its tenth revision (ICD 10). The eleventh revision is currently in preparation.

Intoxication (alcohol): A short-term state that occurs following ingestion of alcohol and has features compatible with the known physiological effects of alcohol (e.g., at increasing doses: euphoria, disinhibition, talkativeness, slurred speech, incoordination, memory impairment, stupor, and coma). Alcohol intoxication as clinical diagnosis (DSM or ICD) is a condition that follows consumption of alcohol to the extent that it causes significant disturbances in consciousness, cognition, perception, affect, behavior, or psychosocial functioning.

Lean body mass: The mass of the body minus the fat (i.e., bones, muscles, and organs).

Licensed (premise): When alcohol can be consumed in the premises (e.g., bars, pubs, and restaurants).

Linkage analysis (genetics): A statistical method used to associate functionality of genes to their location on chromosomes. When genes occur on the same chromosome, they are usually inherited as a single unit, that is, have a tendency to stick together when passed on to offspring. Genes inherited in this way are said to be linked, and are referred to as "linkage groups." For example, in fruit flies the genes affecting eye color and wing length are inherited together because they appear on the same chromosome. Thus, if some disease is often passed to offspring along with specific markers, then it can be concluded that the genes that are responsible for the disease are located close on the chromosome to these markers.

Mandated students/patients: Individuals who have violated alcohol policies or laws and are ordered by the appropriate authority or court to undergo treatment.

Mating, assortative: When individuals choose to mate with individuals that are similar (positive assortative mating) or dissimilar (negative assortative mating) to themselves in some specific manner. Assortative mating have the effect of reducing (positive) or increasing (negative) the range of variation (trait variance), when the assorting is cued on heritable traits.

Mating, random: When individuals choose a mate regardless of any physical, genetic, or social preference, that is, mating is not influenced by any environmental, hereditary, or social interaction (i.e., potential mates have an equal chance of being selected).

Minimum pricing: When the minimum price paid for gram of alcohol in beverages is set by legislation. Minimum pricing circumvents discounting or other measures to reduce the price of alcohol.

Monozygotic (twins): Also called "identical," develop from one single egg (zygote) that splits and forms two embryos. They share about 100% of their genetic material. The degree of separation of monozygotic twins in the uterus depends on when they split into two zygotes, which determines the chorionicity (the number of placentas) and amniocity (the number of amniotic sacs) and how much they share the uterine environment. Dichorionic twins divided within the first 4 days. Monoamnionic twins divide after the first week.

Motivational enhancement therapy: A form of therapy that follows motivational interviewing principles.

Motivational interviewing: Motivational interviewing is a directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence. Compared with nondirective counseling, it is more focused and goal directed. The examination and resolution of ambivalence is its central purpose, and the counselor is intentionally directive in pursuing this goal. Motivational enhancement strategies are based on the theory that individuals alone are responsible for changing their drinking behavior.

MST: Multisystemic therapy.

Multisystemic therapy (MST): An intensive family- and community-based treatment that focuses on the entire world of the young person. MST targets chronic and violent juvenile offenders—often with concurrent alcohol or drug problems—their homes and families, schools, and teachers, neighborhoods and friends. MST does not take place in a clinic but clinicians go to where the child is (home, school, and neighborhood) and are on call 24 hours a day, 7 days a week, supported by a skilled team. They work intensively with parents and caregivers to put them in control, to keep the adolescent focused on school and on gaining job skills; and the therapist and caregivers introduce the youth to sports and recreational activities as an alternative to "hanging out." MST is resource intensive.

MZ: Monozygotic (twins).

NA: Narcotics Anonymous.

Naltrexone: An opioid receptor antagonist (i.e., it blocks the opioid receptors in the brain and therefore blocks the effects of heroin and other opioids). Naltrexone and its active metabolite 6-β-naltrexol are competitive antagonists at μ (mu)- and κ (kappa)-opioid receptors, and to a lesser extent at δ (delta)-opioid receptors. Naltrexone is used primarily in the treatment of alcohol dependence and, to a lesser extent,

opioid dependence (e.g., for the controversial rapid detoxification of opioid dependent individuals).

Neocortex: It is the top layer of the cerebral hemispheres. It is involved in higher functions such as sensory perception, complex motor activities, spatial reasoning and, in humans, conscious thought and language. It is called "neo" because it is the most recently evolved part of the brain.

NIAAA: National Institute on Alcohol Abuse and Alcoholism.

NMDA: *N*-Methyl-D-aspartate, an amino acid derivative that acts as a specific agonist at the NMDA receptor, and therefore mimics the action of the neurotransmitter glutamate on that receptor. In contrast to glutamate, NMDA binds to and regulates the NMDA receptor only, with no effect on other glutamate receptors. Ethanol has an NMDA antagonist effect.

NNT: Number needed to treat.

Nonshared environment: A term used in behavioral genetics to represent the effect of nongenetic factors other than those shared by siblings (i.e., those that uniquely affect individuals, making siblings different). An event is nonshared if it is experienced by only one sibling in a family regardless of the consequences it produces, this includes unsystematic, idiosyncratic, or serendipitous events such as accidents, illnesses, or traumas. In general, genetic and shared environmental factors explain about 50% of the differences between siblings; the other 50% is unexplained and is attributed to "nonshared" environmental factors.

Nucleus accumbens: It is a bilateral collection of neurons within the striatum, located where the head of the caudate and the anterior portion of the putamen meet, just lateral to the septum pellucidum. The nucleus accumbens maintains close links with the ventral tegmental area and the prefrontal cortex. Its operation chiefly involves two neurotransmitters: dopamine and serotonin. There is evidence the nucleus accumbens plays an important role in reward, pleasure, addiction, aggression, and fear.

Number needed to treat (NNT): The number of individuals who need to be treated in order to prevent one additional case or bad outcome (i.e., relapse in drinking). Data from randomized controlled trials are required to compute NNT, which is equal to one divided by the rate or response in the control group minus the rate of response in the treatment group (this is also called "absolute risk reduction"). For example, in the acamprosate meta-analysis of Mann and colleagues (see reference 205 in Chapter 16), 36.1% of participants achieved abstinence at 6 months compared with 23.4% of those on placebo. In this case, NNT = 1/(0.234–0.361) = 7.9. That is, eight patients (it is customary to round to the next whole number) will need to be treated with acamprosate for one additional patient to abstain from alcohol at 6 months. The lower the NNT the more effective the intervention.

Odds ratio: The ratio of the odds of an event occurring in one group to the odds of it occurring in another group. The odds ratio is a statistic that quantifies the strength of association or nonindependence between two variables. An odds ratio of 1 implies that the event is equally likely in both groups. An odds ratio greater than one implies that the event is *more likely* in the first group. An odds ratio less than one implies that the event is *less likely* in the first group.

Off-license: When alcohol can be purchased but not consumed in the premises (e.g., bottle shops and supermarkets)

Ondansetron: A serotonin 5-HT_3 receptor antagonist drug used mainly as antiemetic to treat chemotherapy-related nausea and vomiting.

One-on-ones: A term used in both clinical practice and health service organization and human resource management. In clinical practice, it is typically employed to describe an assessment or therapy session involving a patient or client and a health professional. In the organizational context, when they may also be known as "relational meetings," they are face-to-face discussion between two people (organizer and potential leader or leader and potential leader) for the purpose of exploring a relationship between a potential leader and an organization. Relational meetings are often used as recruitment and teaching tools. They are the building blocks of community organizing in community prevention initiatives. In this case, it is a conversation with individual community members to learn about their concerns in relation to the project's goals, level of interest and commitment for the project, and the resources they might bring to the project.

Opioid receptors: A group of receptors that bind with opioids (e.g., morphine and methadone) resulting in a wide array of cellular and physiological responses such as analgesia. The endogenous opioids include enkephalins and endorphins, among others. There are four major subtypes of opioid receptors: μ (mu), κ (kappa), δ (delta) and the nociceptin receptor.

OPRM1 gene: A gene that encodes the mu-opioid receptor—the primary site of action for the most commonly used opioids, including morphine, heroin, and methadone. It is also the primary receptor for endogenous opioid peptides such as beta-endorphin and the enkephalins.

OR: Odds ratio.

Oxidation: A chemical reaction that results in a loss of electrons by a substance and that usually involves removing a hydrogen atom from a molecule or adding oxygen to it, or both.

P300: The P300 (P3) wave is an event related potential elicited by infrequent, task-relevant stimuli. It is considered to reflect a person's reaction to the stimulus rather than to the stimulus itself.

Paroxetine: A selective serotonin reuptake inhibitor drug, typically used for the treatment of depression.

Phenotype: Represents the observable characteristics or traits of an organism, which are the joint product of both genetic *and* environmental influences (morphology, development, behavior, etc.).

Pleiotropy: When a single gene influences multiple phenotypic traits.

Polymorphism: Existence of a gene in several allelic forms.

Preference paradigms: The conditioned place preference paradigm is a behavioral model used to study the rewarding and aversive effects of drugs. The basic characteristics of this task involve the association of a particular environment with administration of a drug treatment, followed by the association of a different environment with the absence of the drug (i.e., the drug's vehicle). A conditioned place preference is found if the animals spend significantly more time in the drug-paired compartment *versus* the vehicle-paired compartment.

Prefrontal cortex: It is the very front of the brain, the anterior region of the frontal lobes, located immediately beneath the forehead. The prefrontal cortex is responsible for executive functions, complex cognitive behaviors, personality expression, decision making, and moderating correct social behavior.

Prevention:

- **Primary:** Primary prevention seeks to lower the incidence of new cases of a disorder in individuals who have not had the disorder.
- **Secondary:** Secondary prevention seeks to intervene following the first episode of a disorder or when the disorder is in its early stages, and prevent recurrence or progression of the disorder to a more severe stage.
- **Tertiary:** Tertiary prevention seeks through treatment of a disorder to ensure that the person affected recovers from its consequences and to prevent its continuing in a chronic phase.
- **Universal:** When preventive interventions are administered to a whole population; that is, do not select participants based on risk.
- **Selective:** When interventions are given to subgroups whose risk for the target factor is deemed to be above average.
- **Indicated:** When interventions are provided to people who have detectable, subthreshold level of signs or symptoms, but who do not yet meet diagnostic criteria for the condition. Indicated prevention is a form of early intervention.

PTSD: Posttraumatic stress disorder.

Randomized controlled trial: A controlled study using an experimental condition design in which participants are randomly allocated to receive an intervention (the "active condition") or a placebo (e.g., an inactive substance or what would be regarded as standard existing treatment). The term "double blind" in this context means that neither researchers nor participants are aware of the group allocation.

RBS: Responsible beverage server training.

RCT: Randomized controlled trial.

Receptor: A protein on the surface of a cell that recognizes and binds to chemical messengers.

Relational meetings: See "one-on-ones."

Responsible beverage server training: Also known as "server training," refers to educating owners, managers, servers, and sellers at alcohol establishments about strategies to avoid illegally selling alcohol to underage youth or to intoxicated patrons.

Ritanserin: A serotonin-2 receptor antagonist with potential therapeutic effects.

Selective serotonin reuptake inhibitors: A group of drugs that block the reabsorption (reuptake) of serotonin in the synaptic cleft of certain neurons, increasing the amount of serotonin available in the brain. Increased serotonin enhances neurotransmission—the sending of nerve impulses—and improves mood. They are called selective because they seem to affect serotonin and not other neurotransmitters. They are mostly used for the treatment of depression and anxiety disorders. Examples include fluoxetine, sertraline, and cytalopram.

Serotonin: Is a neurotransmitter that activates serotonin or 5-hydroxytryptamine (5-HT) receptors. These are a group of receptors (more than seven have been identified— e.g.,

5-HT_1, 5-HT_2...) found in the central and peripheral nervous systems. They are involved in both excitatory and inhibitory neurotransmission—the sending of nerve impulses. The serotonin receptors modulate the release of many neurotransmitters, including glutamate, GABA, dopamine, epinephrine and acetylcholine, as well as hormones, including oxytocin, prolactin, and vasopressin. The serotonin receptors influence various biological and psychological processes such as mood, aggression, anxiety, and appetite.

Sertraline: A selective serotonin reuptake inhibitor drug, typically used for the treatment of depression.

Shared environment: A term used in behavioral genetics to represent the effects of shared factors, those shared by siblings growing up in the same family making them more similar.

Single-nucleotide polymorphism (SNP): A sequence variation in the DNA in which a single nucleotide in the genome (or other shared sequence) differs between members of a species or an individual's paired chromosomes. SNPs are important because they allow for comparisons in regions of the genome between cohorts (e.g., matched groups with and without a disease) in regions of the genome.

SNP: (Pronounced snip) single-nucleotide polymorphism.

Sprague-Dawley rat: A breed of albino rat, calm and easy to handle, that is used extensively in medical research.

SSRIs: Selective serotonin reuptake inhibitors.

Standard drink: A standard drink is a drink that contains a specified amount of pure alcohol. One standard drink (see Figure G.1) always contains the same amount of alcohol regardless of container size or type of alcoholic beverage. The "standard drink" is used in many countries to quantify alcohol intake, although there is no international agreement ("standard") on what constitutes a standard drink, varying substantially from country to country—from 6 g of alcohol in Austria to 19.75 g in Japan. For example, a standard drink is 7.0 g of alcohol in the United Kingdom, 10 g in Australia, 12 g in France, and 14 g in Canada and the United States.

SUD: Substance use disorder.

Taste perversion: Distorted sense of taste, often as a side effect of a medication.

Therapeutic community: A treatment in which the community itself, through self-help and mutual support, is the principal means for promoting personal change. Therapeutic communities (TCs) for the treatment of drug abuse and addiction have existed for more than 40 years. In general, TCs are drug-free residential settings where clients/patients and therapists live together and include group psychotherapy as well as practical activities. Peer influence, mediated through a variety of group processes, is used to help individuals learn and assimilate social norms and develop more effective social skills. TCs differ from other treatment approaches principally in their use of the community—comprising treatment staff and those in recovery—as key agents of change. Treatment usually follows three stages. *Induction and early treatment* typically occurs during the first 30 days to assimilate the individual into the TC. The new resident learns TC policies and procedures; establishes trust with staff and other residents; initiates an assisted personal assessment of self, circumstances, and needs; begins to understand the nature of addiction; and should begin to commit to the recovery process. *Primary treatment*

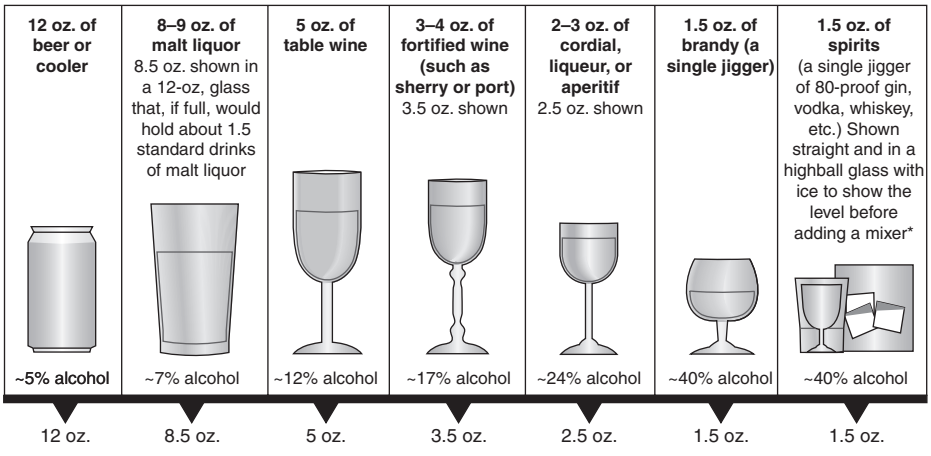

Figure G.1 Examples of US standard drinks. *Source*: National Institute on Alcohol Abuse and Alcoholism.

often uses a structured model of progression through increasing levels of prosocial attitudes, behaviors, and responsibilities. The TC may use interventions to change the individual's attitudes, perceptions, and behaviors related to drug use and to address the social, educational, vocational, familial, and psychological needs of the individual. *Reentry* is intended to facilitate the individual's separation from the TC and successful transition to the larger society. A TC graduate leaves the program drug-free and employed or attending school. Postresidential care may include individual and family counseling and vocational and educational guidance. Self-help groups such as AA are often incorporated into TC treatment, and TC residents are encouraged to participate in such groups after treatment.

Topiramate: A drug with multiple effects (such as blocking voltage-dependent sodium channels, augmenting the activity of some GABA receptors) that is typically used for treatment-resistant epilepsy and to prevent migraine, and is currently under investigation for the treatment of alcohol dependence.

Transfection: The process of deliberately introducing nucleic acids into cells (transfected cells), particularly if nonviral methods are used. This process is also called "transformation."

Twelve-step (12-step) groups/programs: Programs that follow the 12-step recovery model. The "12-steps" is a set of guiding principles outlining a course of action for recovery from addiction and other behavioral problems. The 12 steps were originally proposed by Alcoholics Anonymous but were later adapted to other problems in Narcotics Anonymous, Cocaine Anonymous, and Overeaters Anonymous.

Twelve-step (12-step) meetings: Meetings that have the same general format, content, and traditions of the "12-steps" recovery model.

Type A alcoholism: One of the two subtypes of alcoholism according to Babor and similar to Cloninger's classification. Type A is characterized by later onset (typically after the age of 25 years), fewer childhood risk factors, less severe dependence, fewer alcohol-related problems, and less psychopathological dysfunction.

Type B alcoholism: One of the two subtypes of alcoholism according to Babor and similar to Cloninger's classification. Type B is characterized by childhood risk factors, familial alcoholism, early onset of alcohol-related problems (typically before the age of 25 years), greater severity of dependence, polydrug use, a more chronic treatment history (despite their younger age), greater psychopathological dysfunction, and more life stress.

UK: United Kingdom (England, Northern Ireland, Scotland, and Wales).

Underage drinking: Consuming alcohol below the age in which the purchase of alcohol is legally allowed in a specific country (e.g., 21 years in the United States, 18 years in Australia, Canada, and the United Kingdom).

US: United States of America.

Vivitrol: Trade name of an extended-release (depot) formulation of naltrexone. It was formerly known as "vivitrex."

"Wet" pattern of drinking: It describes when small amounts of alcohol are consumed more frequently (e.g., at meal times) but consumption is less heavy. This pattern is more common in Southern European countries.

Wistar rat: It is an outbred (i.e., generated from breeding two genetically dissimilar strains of the same species) strain of albino rats. The Wistar rat is one of the most popular rat strains used for laboratory research. Wistar rats are more active than other strains like Sprague Dawley rats, which were developed from Wistar rats.

Withdrawal: See alcohol withdrawal.