Substance Abuse: An Overview

in Disorders Associated with Social and Situational Problems

from Comprehensive Handbook of Psychopathology

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Introduction

Substance abuse and other addictive behavior disorders are among the most prevalent mental health disorders in our society. Significant health and societal costs are attributed to excessive involvement with alcohol, nicotine, illicit drugs, prescription drugs, industrial solvents, and impulse control problems (e.g., gambling, binge eating, risky sexual behaviors). This chapter will discuss conceptual models, assessment, and treatment of substance abuse, covering alcohol, illicit drugs, misused prescription drugs, and nicotine problems. Gambling disorders will be briefly reviewed. Although eating disorders and compulsive sexual disorders share features of addictive behaviors, these issues will be addressed in other chapters of this volume.

Prevalence

Current substance abuse or dependence is present in 11% of the U.S. population, and nearly 27% percent have met criteria during their lifetime, based on the results of a national survey (Kessler et al., 1994). Alcohol is the most widely used intoxicating substance. National household surveys report that 82% of Americans ages 12 and above have used alcohol and half drank alcohol in the past month (Substance Abuse and Mental Health Services Administration [SAMHSA], 1998), as shown in Table 1. Binge drinking, consuming five or more drinks on a single occasion, is most common among young adults ages 18 to 25, although evident among adolescents (Johnston, O’Malley, & Bachman, 1999). Frequent bingeing (5 times in the past month) indicates unhealthy drinking and was reported by 11% of young adults. Over 13% of the population has met diagnostic criteria for alcohol dependence at some point in their lifetimes, and more than 4% currently meet criteria (Grant, 1997). Alcohol-related economic losses due to decreased productivity, health care costs, and motor vehicle crashes are estimated at $148 billion annually (Harwood, Fountain, Livermore, & The Lewin Group, 1998). Alcohol is the third most prominent contributor to mortality in the United States (McGinnis & Foege, 1993).

Illicit drug use has increased in recent decades, and prevalence rates of individual substances fluctuate over time. Nearly 36% of the population over age 12, it is estimated, has used an illicit drug in their lifetimes (see Table 1). Marijuana is the most commonly used illicit drug, used by an estimated 9% of the population during 1997. Almost 12% of males aged 18 to 25 years have used marijuana more than fifty times in the past year. In 1997, 1.9% of the U.S. adult population used cocaine, 1.9% used hallucinogens, 1.1% used inhalants (the rate is 4.4% for 12–17-year-olds), 0.3% used heroin, and 2.8% reported nonmedical use of prescription medications (SAMHSA, 1998). Nearly 8% of the national population, it is estimated, met criteria for drug dependence at some point in their lifetimes, and almost 3% met criteria in the past year (Kessler et al., 1994). Illicit drugs present particular medical risks because the content of any drug obtained on the street is difficult to specify. Drug injectors are at risk for HIV, hepatitis, infections, vein deterioration, and endocarditis (Peterson, Dimeff, Tapert, & Stern, 1998). Drug use alone costs the United States an estimated $89 billion annually due to loss in productivity, crime, medical consequences, and treatment services (Harwood et al., 1998).

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Nicotine is the most abused addictive substance in our society. More than 70% of the U.S. population over age 12 has smoked at some point, and 30% currently smoke (see Table 1). Approximately three million people start smoking each year at the average age of 15.6 years. Current smokers are more likely to drink heavily and use illicit drugs than nonsmokers (SAMHSA, 1998). Although not considered an intoxicant, nicotine is associated with significant health problems across the lifespan (e.g., Myers & Brown, 1997), and tobacco is the leading preventable cause of mortality in the United States (McGinnis & Foege, 1993).

Gambling is an increasing problem in the United States. The expanding presence of casinos on U.S. Indian reservations and Internet gambling provide easily accessible means of risking monetary loss for a chance at quick winnings. Pathological gambling refers to a diagnosable disorder (American Psychiatric Association [APA], 1994) involving recurrent gambling, preoccupation, gambling with increasing amounts of money, loss of control, unsuccessful attempts to cut back, and jeopardizing jobs and relationships. A recent epidemiological survey reported that 46% of the population has gambled recreationally, 9% reported at least one gambling-related problem, and 1% met criteria for pathological gambling. Problem gamblers are commonly tobacco- and alcohol-dependent (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998).

**Definitions.**

Before we discuss theories of substance abuse, we will define key terms in this field of study. *Addictive behaviors* refer to “any compulsive habit pattern in which the individual seeks a state of immediate gratification” (Marlatt, 1985, p. 4). The gratification may be in the form of relief from discomforts such as tension, negative mood, or withdrawal states, or it may be the introduction of pleasure or euphoria. Addiction involves continued involvement with the behavior despite adverse consequences and attempts to stop (Roberts & Koob, 1997). Addictive behaviors include excessive use of psychoactive substances, such as alcohol, nicotine, and other drugs, or excessive, unhealthy levels of other behaviors with compulsive characteristics, such as gambling, eating, or sexual acts.

Substance dependence and substance abuse are clinical disorder diagnoses of the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV; APA, 1994) that require fulfilling specific criteria. The diagnostic criteria have changed with each revision of the DSM-IV (see Nathan, Skinstad, & Dolan, Chapter 21, this volume). *Substance dependence* implies an addiction to the drug, whereas *substance abuse* refers to a less severe condition involving continued use of a mind-altering substance despite problems caused by such use (American Psychiatric Association, 1994; Schuckit, 1995). Substance dependence is diagnosed in individuals who demonstrate at least three of seven criteria within the same year: (1) tolerance to the substance, (2) withdrawal from the

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Table 1. Percent of U.S. Adolescents, Young Adults, and Adults who Used Alcohol, Binge Drank, Used Illicit Drugs, and Used Nicotine in the Past Month\(^a\)

<table>
<thead>
<tr>
<th>Age group</th>
<th>Any alcohol use</th>
<th>Binge drinking(^b)</th>
<th>Illicit drug use</th>
<th>Nicotine use</th>
</tr>
</thead>
<tbody>
<tr>
<td>12–17</td>
<td>21%</td>
<td>8%</td>
<td>11%</td>
<td>20%</td>
</tr>
<tr>
<td>18–25</td>
<td>58%</td>
<td>28%</td>
<td>15%</td>
<td>41%</td>
</tr>
<tr>
<td>26–34</td>
<td>60%</td>
<td>23%</td>
<td>7%</td>
<td>34%</td>
</tr>
<tr>
<td>35 and older</td>
<td>53%</td>
<td>12%</td>
<td>4%</td>
<td>28%</td>
</tr>
</tbody>
</table>

\(^a\)SAMHSA, 1998.

\(^b\)Indicates consumption of five or more drinks on a single occasion.

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substance upon cessation of use, (3) taking more of the substance or over longer periods of time, (4) loss of control over the substance use, (5) loss of time related to use, (6) activities forsaken, and (7) continued use despite knowledge of consequences. A diagnosis of substance abuse applies to maladaptive patterns of substance use that do not meet the more severe criteria for substance dependence. Specifically, a person is diagnosed with substance abuse if one of the four following criterion are met as a result of the substance use: (1) failure to meet role obligations, (2) recurrent use in dangerous situations, (3) recurrent legal problems, or (4) continued use despite persistent social problems, and criteria for substance dependence are not met.

Substance dependence implies a psychological and/or a physical need for the drug. Psychological dependence can occur following repeated use of any drug of abuse and refers to users' perceptions that they need the substance to feel or function optimally. For example, regular marijuana smokers who feel they cannot relax at the end of the day without an evening joint have developed psychological dependence on marijuana. Physical dependence indicates the physiological adaptation of the body to prolonged exposure to the substance. Two aspects of this adaptation are tolerance and withdrawal. Tolerance refers to cellular and metabolic adaptations in response to continued presence of the substance (Koob & Bloom, 1988). As tolerance develops, more of the drug is necessary to obtain the desired effects, and use becomes more frequent. Cross-tolerance occurs when tolerance to one drug has developed and more of any drugs in that class is necessary to produce comparable effects, based on the similar organic structure of active ingredients and nervous system response. If a user simultaneously administers multiple drugs of the same class, potentiation occurs, and the additive or synergistic effects can result in an overdose.

Withdrawal is experienced when administering a substance to a physically dependent organism is halted. Characteristic withdrawal syndromes ensue, depending on the drug class used, and the withdrawal syndromes tend to involve opposite symptoms as intoxication effects of the substance (Koob & Bloom, 1988). For example, opiate intoxication reduces pain sensations, but opiate withdrawal involves increased sensitivity to pain. This neuroadaptation is illustrated by the opponent process model. Positive hedonic effects (e.g., a cocaine rush) are followed by compensatory negative hedonic experiences (e.g., negative mood and withdrawal symptoms after cessation of use; Koob, Caine, Parsons, Markou, & Weiss, 1997).

From a public health perspective, substance use and abuse can be conceptualized along a continuum, in which excessive use of a variety of substances is associated with increasing levels of the risk of negative consequences (Newcomb & Bentler, 1988a). The risk of adverse consequences decreases at moderate use levels and declines further with abstinence (Marlatt & Tapert, 1993).

Models of Addiction

As the substance abuse field has developed during the past several decades, controversies have arisen over the way to conceptualize addiction problems. The first controversy relates to the cause of substance abuse. Is it the fault of the addicted individuals, or is it due to circumstances beyond their control? The second controversy concerns treating substance abuse problems. Is recovery the responsibility of the addicted person, or are external entities responsible for recovery (Marlatt, 1992)? Opposing perspectives on these issues are summarized by four competing models of addiction (Brickman et al., 1982), highlighted here.

**Moral Model**
The moral model of addictive behaviors refers to movements such as the temperance movement that preceded the prohibition on alcohol and law enforcement approaches in the recent “War on Drugs” (Trebach & Zeese, 1990). In this model, responsibility for developing and resolving the addiction is attributed to the individual with the substance use disorder. Drinking, for example, is viewed as a “sign of weak character” (Brickman et al., 1982), and the only way out is to exert willpower. Genetic and environmental etiological factors do not modify this responsibility. The moral stance can foster guilt for developing the addiction problem and failing to change. From this perspective, relapse is ascribed to moral weakness (Marlatt, 1992).

**Medical Model**

The medical or disease model, which is the most common theoretical view employed in the United States, places responsibility for developing the addictive disorder on physiological factors, such as a family history of addiction or pathological metabolism (Jellinek, 1960). Treatment relies on external sources for specialized medical intervention into the pathological process. The addictive process, it is thought, has a deteriorating course, and, if left untreated, may result in death (Miller & Hester, 1995). Total abstinence from all intoxicating substances is the only acceptable treatment outcome and must be maintained lifelong to arrest disease progression (McCready, 1994). Relapses are viewed as triggered by factors beyond the individual's control, often with a physiological basis. Taking a biological perspective, drug properties appear to interact with genetics to determine the reinforcement of drug taking, thereby influencing repeated use (Koob et al., 1998). The advantage of the medical model over the moral model is that addicted individuals are not blamed for the problem and they are encouraged to seek help from specialists, rather than attempt to treat the problem alone. In addition, research on the biological substrates of addictive processes has greatly advanced our understanding of genetic risk and protective factors and enhanced treatment of these disorders.

**Spiritual Model**

The spiritual or enlightenment model is espoused by twelve-step programs such as Alcoholics Anonymous and Narcotics Anonymous (Alcoholics Anonymous, 1980; Miller, 1998b). The development of addiction is seen as related to a spiritual weakness. The concept of a “higher power” is emphasized for overcoming the addiction problem, and the individual must admit helplessness over the substance of abuse. Attending group meetings is considered imperative to prevent recurrence of the spiritual disease. A major advantage of this model is the social support and supplementary resources that members receive from meetings. Criticisms of the spiritual model include difficulty incorporating nonspiritual individuals into group processes that rely on religious beliefs and that peers or paraprofessionals with past histories of addiction deliver the intervention in lieu of addiction-trained professionals (Miller & Brown, 1997).

**Biobehavioral and Interactionist Models**

Several integrative models have been proposed to incorporate the accumulating knowledge base of addictive behaviors from both biological and psychological sciences. The compensatory model (Brickman et al., 1982) posits that people with addiction problems need not be held at fault for developing the problem but are responsible for changing the behaviors, either independently or by seeking assistance. Substance abuse acquisition is conceptualized as a maladaptive response that occurs when stressors overpower appropriate coping strategies (e.g., Windle & Windle, 1996). Physiological, conditioning, social learning, and cultural factors exacerbate this process (Roberts & Koob, 1997; Vogel-Sprott, 1995). A relapse is viewed as a mistake in a new learning process.
Recent refinements of interactionist theories of addictions include behavioral-genetic perspectives on the development of substance use disorders (McGue, 1997; Rose, Kaprio, Winter, Koskenvuo, & Viken, 1999) and behavioral economics views on addictive behavior problem resolution (Tucker, Vuchinich, & Pukish, 1995; Vuchinich & Tucker, 1998). In summary, the accumulating knowledge base of factors involved in developing addiction problems strongly suggests a multifaceted process, involving biological, psychological, and cultural components.

Initiation, Maintenance, and Remission of Addiction

Substances of abuse have unique pharmacological properties and somewhat distinct use consequences, but they also share a great deal in common. A number of risk factors and developmental pathways in and out of addictive behaviors are shared across substances. The initial experimentation with substances of abuse is primarily determined by social and environmental risks. Biological and environmental factors combine to influence decisions to use again, the development of adverse consequences, and ultimately, efforts to reduce or stop substance involvement.

Genetic Risk

Genetically influenced factors, it has been shown, affect the risk of developing substance use disorders (e.g., Pickens et al., 1991; Schuckit, 1985; Wall & Ehlers, 1995), although the heritability of dependence on drugs other than alcohol is less clear. Sons of male alcoholics are two to four times more likely to develop alcohol problems than sons of nonalcoholics (Cloninger, Bohman, & Sigvardsson, 1981). Approximately a quarter to half of the variability in drug abuse or dependence is attributable to heredity (Grove et al., 1990; Pickens, Svikis, McGue, & LaBuda, 1995), and the genetic risk is greater for male offspring. High rates of comorbidity with antisocial personality disorder complicate determining the genetic risk of drug dependence (Kessler et al., 1997). The risk of behavior control problems are also elevated for offspring of alcoholics (Sher, 1997), whereas risk of depression and anxiety problems has not been demonstrated (Schuckit & Smith, 1996).

Learning Influences

Classical Conditioning.

Self-administration of a variety of substances of abuse has been conditioned across several species. Drug-induced euphoria (unconditioned stimulus) over time becomes associated with environmental stimuli present during the euphoric state (conditioned stimuli), such as drug-taking paraphernalia, locations, behavior, and people (Vogel-Sprott, 1995). After continued pairing with the drug-induced euphoria, these associated stimuli may produce intense urges or cravings to take the substance again (Roberts & Koob, 1997). However, not all individuals with substance dependence use drugs in response to cravings (Vogel-Sprott, 1995). Similarly, stimuli associated with unpleasant periods of abstinence may elicit withdrawal-like symptoms. This conditioning principle can be observed in individuals who attempt to quit substance use and are constantly reminded of the addictive substance by a wide range of cues in the environment (Ludwig, Wickler, & Stark, 1974; Vogel-Sprott, 1995).

Instrumental Learning.

Any reward following a behavior will increase the chance that the behavior will occur again. With substance use, both the acute pharmacological impact and social/environmental factors may produce rewards following drug self-administration, which increase the chance that drug taking will recur. For example, if individuals smoked marijuana, then experienced pleasurable pharmacological
effects or experienced social approval, they would be likely to smoke marijuana again. Additionally, relief from aversive states, such as withdrawal or distress following drug self-administration also increases the likelihood of repeated drug-taking behaviors (Alexander & Hadaway, 1982). Euphoric sensations associated with drug taking are mediated by specific groups of connected neurons in the brain. Extant research indicates that the brain’s reward circuitry involves connections between the ventral tegmental area and the basal forebrain, encompassing the dopaminergic neurotransmitter system, as well as opioid, serotonergic, and gamma-aminobutyric acid (GABA) neurotransmitter systems. These brain regions and systems, it has been demonstrated, subserve reinforcement of using a variety of addictive substances, including repeated alcohol, cocaine, and opiate self-administration, as well as other addiction cycles such as pathological gambling, binge eating, and compulsive sexual behaviors (Koob & Le Moal, 1997).

Environmental factors

Family.

Aspects of an individual’s environment may act independently or in concert with biological factors to protect or imperil the chance of developing an addiction (Sher, Gershuny, Peterson, & Raskin, 1997). Positive, loving parent–child bonds reduce the risk of substance abuse (Kandel, 1978). Conversely, high levels of parent–adolescent conflict (Needle, Glynn, & Needle, 1983) and lack of familial cohesion (Hundleby & Mercer, 1987) increase this risk. Offspring of substance abusing parents have a significantly increased risk of using substances above and beyond genetic risks because substance use is often a common coping response modeled to offspring (Chassin, Pillow, Curran, Molina, & Barrera, 1993; Holden, Brown, & Mott, 1988). Parental monitoring and attitudes influence teen substance use directly by limiting opportunities to engage in deviant behavior (Forehand, Miller, Dutra, & Chance, 1997) and indirectly by influencing peer selection (Brown, Mott, & Stewart, 1992; Dishion, Patterson, & Reid, 1988). In general, three family characteristics elevate the risk of subsequent substance abuse: (1) parental dysfunction (e.g., substance dependence), including antisocial behaviors, alcoholism, and drug abuse; (2) minimal parental involvement with their children; and (3) dearth of affectionate, supportive parent–child interactions (Sadava, 1987). These family climate factors may interact with shared genes to contribute to the development of substance problems (McGue, Sharma, & Benson, 1996). Some studies of adoptees have indicated that siblings may be a greater source of environmental influence than parents for risk of substance use disorder (McGue, 1997; Rose et al., 1999).

Life Stress.

Researchers have associated a variety of stressful life circumstances with the onset and progression of substance involvement. Life adversity, such as relationship problems, familial difficulties, legal troubles, and academic failure, increases the risk factors of substance abuse during adolescence (Duncan, 1977; Pandina & Schuele, 1983). Life stress is higher in families with substance abusers, suggesting an interactive mechanism by which positive family histories may increase the risk of substance abuse (Brown et al., 1995; Sher, 1991). Among adults treated for substance use disorders, those experiencing taxing psychosocial stressors appear more vulnerable to rapid posttreatment relapses (Brown, Vik, Patterson, Grant, & Schuckit, 1995).

Cognitions

Expectancies.

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Expectations regarding the effects of substances are related to consumption patterns in youth and adults. These expectancies mediate initiation of use and progression to problematic use (Brown, 1993; Goldman, Brown, Christiansen, & Smith, 1991; Smith, Goldman, Greenbaum, & Christiansen, 1995). Expectancies develop from both direct and vicarious experiences with substances and reflect culturally held beliefs, as well as personal learning about substances in school, in the media, and from peers and family (Goldman et al., 1991). Research has also linked family histories of substance use disorders, particularly when exposed to abusing models during youth, with increased positive expectancies of certain substance effects (Brown, Tate, Vik, Haas, & Aarons, 1999; Sher, 1993). Although very young children of substance abusers may hold more negative expectancies for substance effects, these expectancies are more likely to become quite positive as offspring acquire personal substance use experiences (Lundahl, Davis, Adesso, & Lukas, 1997; Wiers, Gunning, & Sergeant, 1998). Expectancies are generally substance-specific, but some (e.g., tension-reduction effects) are common to several classes of substances. Overall, individuals who anticipate that substances will produce positive effects have a greater chance of developing substance-related problems than those who do not hold this belief. In contrast, expectancies of negative substance effects may deter the initiation of involvement with certain substances (Brown, 1993). Expectancies may also result in anticipatory psychological responses of a compensatory nature (Ross & Pihl, 1988) that are linked to behavioral tolerance.

**Perceptions of Normative Use.**

Users of alcohol and other drugs tend to perceive that others use amounts similar to those they use (Baer, Stacy, & Larimer, 1991). Erroneous perceptions of normative use are particularly notable among substance abusing adolescents and college students. These biases preserve cognitions of personal use patterns as nonproblematic and accelerate consumption to conform to perceived normative use levels (Marks & Miller, 1987; Perkins & Berkowitz, 1986).

**Personality**

Individuals with substance abuse or dependence are quite heterogeneous with regard to lifestyle, social background, and personality characteristics (Babor, Hesselbrock, Meyer, & Shoemaker, 1994). Several personality traits are more common among people with addiction problems. These include rebelliousness, autonomy striving, liberalism, willingness to try new experiences, and independence (Segal, Huba, & Singer, 1980). Similarly, research has linked sensation seeking (Kohn & Annis, 1977; Zuckerman et al., 1994), impulsivity (Vistor, Crossman, & Eiserman, 1973), low self-esteem (Kaplan, 1977), reduced self-efficacy (Schnie, Botvin, & Orlandi, 1991), nonconventionality (Brook, Whiteman, & Gordon, 1983), behavioral undercontrol (Jessor & Jessor, 1977), and aggressive tendencies (Krueger, Caspi, Moffitt, Silva, & McGee, 1996) to high rates of substance involvement. Children with personalities characterized by deviance, emotional lability, inattention, lack of involvement in activities, and stubbornness are at greater risk of using substances frequently in late adolescence (Shedler & Block, 1990). Although evidence for a unitary “addictive personality” has not received empirical support (Sutker & Allain, 1988), more individuals with substance use disorders meet criteria for antisocial personality disorder and other mental health problems (e.g., anxiety and depressive disorders), even after substance-related pathology is excluded (Verheul, Hartgers, van den Brink, & Koeter, 1998). These personality characteristics that are relatively common among substance abusers appear to be inherited traits which may exacerbate or mediate familial substance abuse or dependence (McGue, 1997; Sher, 1997).
Developmental Issues

In the past decade, increased awareness of the prevalence of youthful substance use and the risks involved has brought about growth in research focused on developmental issues. Experimentation with a variety of socially unapproved behaviors during adolescence is fairly common. Approximately 54% of eighth-grade students in the United States have used alcohol, and 38% have used an illicit drug (Johnston, O'Malley, & Bachman, 1998). This experimentation, especially with alcohol, cigarettes, and marijuana, can be part of the developmental process of individuation (Hawkins, 1982; Schinke et al., 1991). However, age of onset of substance use has recently been linked to lifetime risk of both alcohol abuse and dependence (Grant, 1997).

The relevance of various risk and protective factors for substance abuse fluctuates across developmental stages (Newcomb & Bentler, 1989). For example, the influence of peer behaviors and attitudes is greatest during adolescence (Hawkins, 1982), and spousal support among adults is a significant predictor of successful recovery without treatment (Sobell & Sobell, 1998). Personality traits and substance expectancies stabilize with maturity and play a powerful role in perpetuating substance involvement in young adulthood (Tapert, Stewart, & Brown, 1999). The consequences of adolescent substance use may develop slowly and include physical problems, psychological maladjustment, unstable employment patterns, higher divorce rates (Brown, Myers, Mott, & Vik, 1994; Kandel, Davies, Karus, & Yamaguchi, 1986; Newcomb & Bentler, 1988a), and impaired social development (Baumrind & Moselle, 1985). Troubled life trajectories are particularly associated with multiple drug problems during adolescence (Brown et al., 1994; Newcomb & Bentler, 1988b, 1989).

The natural course of substance abuse involves fluctuating levels of use across time (Schuckit, Tipp, Smith, & Bucholz, 1997), including reductions and cessation without formal treatment. For example, only 12% of opiate-dependent Vietnam veterans continued their addiction after returning to the United States (Robins, Davis, & Nurco, 1974), likely due to major reductions in both stress and drug-related cues (Alexander & Hadaway, 1982; Robins, 1993). Individuals who remedy addictions without professional assistance have become a recent focus of attention, because the majority of adults who develop alcohol problems and resolve them do not seek treatment (Sobell & Sobell, 1998). Several studies of adolescents also demonstrate that many high school students deescalate their alcohol and drug involvement over the course of a school year (Stice, Myers, & Brown, 1998) and that youth routinely make serious attempts to reduce or stop their tobacco, alcohol, and other drug use (Wagner, Brown, Monti, Myers, & Waldron, 1999). The availability of desirable activities other than substance use greatly enhances the chance of natural recovery for adults (Tucker, 1995; Vuchinich, 1998), and youth use multiple strategies simultaneously (e.g., social supports, alternative activities) to sustain their behavior change efforts (Wagner, Brown, Monti, Myers, & Waldron, 1999). Investigations of the natural change process suggest that many individuals initiate behavior change before entering formal treatment and that interventions may assist primarily in maintaining change efforts (Tucker et al., 1995).

Substances of Abuse

The principles underlying development of substance abuse problems are quite similar across different substances of abuse, but substances differ in intoxication effects, withdrawal syndromes, resulting consequences, and the sequence in which experimentation tends to occur.

Sequence of Substance Experimentation
Substance involvement tends to follow a predictable sequence, from the use of “gateway” substances that are legal for adults (i.e., alcohol or cigarettes) to the use of marijuana, hard drugs, and prescribed psychoactives in adulthood (Ellickson, Hays, & Bell, 1992). This common sequence was investigated in more than 1000 high school students followed through young adulthood (Kandel, Yamaguchi, & Chen, 1992). Alcohol use has a stronger link to progression in this sequence for males than for females, whereas cigarette use has a stronger link for females than for males. The use of a substance at a particular stage in the sequence does not necessarily dictate progression to the next stage; rather, entry into a use stage is a prerequisite for the next stage.

The following section details the properties and consequences of specific substances of abuse. It should be remembered that polysubstance use involving multiple substances used concurrently is relatively common (Earleywine & Newcomb, 1997), particularly among adolescents and young adults (Stein, Newcomb, & Bentler, 1987; Stewart & Brown, 1995), complicating acute effects, withdrawal, and clinical course.

**CNS Depressants**

Central nervous system depressants include alcohol, sedatives, and anxiolytic drugs. These drugs depress excitable tissues at all brain levels, produce a subjective sensation of intoxication, and are physically addictive (Schuckit, 1995).

**Alcohol.**

Properties specific to alcohol are discussed in detail by Nathan and colleagues (this volume). Briefly, intoxication generally involves subjective sensations of relaxation, tension reduction, sociability, disinhibition, and euphoria. Toxic reactions occur at higher doses or with potentiation from other CNS depressants and involve confusion, irritability, slowed pulse, reduced body temperature, low blood pressure, and possible respiratory failure. Some degree of alcohol withdrawal is generally observed in daily drinkers who quit drinking and involves sweating, increased heart rate and respiratory rate, increased body temperature, tremor, nausea, vomiting, depressed mood, and muscle aches. More severe symptoms of seizure and delirium tremens, a condition marked by increased tremor, profound confusion, and hallucinations, appear in 5% of those who experience alcohol withdrawal (for a review, see Schuckit, 1995).

Approximately half of adults with alcohol dependence evidence cognitive impairments in visuospatial functioning, verbal learning and memory, visual memory, psychomotor functioning, or non-verbal abstract reasoning (Beatty, Hames, Blanco, Nixon, & Tivis, 1996; Brandt, Butters, Ryan, & Bayog, 1983) and tend to be more pronounced in older drinkers (Adams et al., 1993). The majority of these cognitive deficits improve with extended abstinence (Reed, Grant, & Rourke, 1992). Neuroimaging studies also demonstrate adverse brain changes associated with alcohol dependence (Jernigan, Pfefferbaum, & Zatz, 1986) that tend to resolve with abstinence (Carlen et al., 1986) and worsen following alcohol relapse (Pfefferbaum et al., 1995).

**Depressant drugs.**

This class of drugs includes hypnotics (e.g., barbiturates, methaqualone, chloral hydrate), anxiolytics, and benzodiazepines (e.g., Xanax®, Valium®, Librium®, Ativan®). These drugs are prescribed at high rates (approximately 15% of the U.S. population), and although used effectively for most, misuse is observed in 5–10% of patients for whom these medications are prescribed. Effects experienced after ingestion include euphoria, disinhibition, cognitive impairment, loss of motor coordination, and
slurred speech. High doses can produce hallucinations or paranoia, ataxia, sedation, and increased risk of accidents (e.g., vehicular). Very high doses can produce depressed heart rate, respiratory failure, coma, or death. These substances show cross-tolerance and present a high risk of lethal overdose if used simultaneously with alcohol or other CNS depressants. Abrupt cessation can be fatal and is especially dangerous from agents with short half-lives (e.g., Xanax®—10 hours). The typical withdrawal syndrome is characterized by anxiety, insomnia, headaches, tremors, muscle aches, increased heart and respiratory rates, fatigue, and, sometimes, disorientation, hallucinations, depression, and convulsions. This withdrawal syndrome can persist for days to weeks. Individuals who withdraw from depressant drugs should receive medical monitoring (Schuckit, 1995). The chronic use of barbiturates is associated with persisting deficits in abstraction, psychomotor processing, and nonverbal learning (Bergman, Borg, Engelbrekston, & Vikander, 1989).

**Stimulants**

CNS stimulants include caffeine and nicotine, but the major intoxicating stimulants of abuse are cocaine and amphetamines. Drugs of this class typically produce physiological arousal, euphoria, insomnia, and diminished appetite.

**Cocaine.**

Users can insufflate (snort) or smoke cocaine powder, sprinkle the powder in rolled cigarettes, smoke it in cooked form (“crack” or “rock”), or inject it in a dissolved form. Crack is more potent than powdered cocaine and causes intense effects that diminish rapidly. Cocaine use produces euphoria, expansive mood, loquaciousness, restlessness, mood swings, irritability, aggression, and insomnia. In higher doses, loss of control, paranoia, panic attacks, and hallucinations may occur. Common physical effects include elevated heart rate, dry mouth, sweating, numbness of the mucous membranes, and hand tremors. Tolerance develops rapidly, usually within days of continued use. Withdrawal symptoms include fatigue, depressed mood, craving, agitation, and, in some cases, physical aggression. The half-life of cocaine is 1 hour, and withdrawal lasts for days to months (Kuhn, Swartzwelder, & Wilson, 1998). Chronic cocaine use adversely influences short-term memory (Ardila, Rosselli, & Strumwasser, 1991; Manschreck et al., 1990), verbal recall (Mittenberg & Motta, 1993), speed of information processing, attention (Ardila, 1991; O'Malley & Gawin, 1990), and abstraction (O'Malley, Adamse, Heaton, & Gawin, 1992).

**Amphetamines.**

Amphetamines include pharmaceutically prepared substances (e.g., Benzedrine®, Dexedrine®, Ritalin®, and other drugs prescribed for obesity, attention deficit/hyperactivity disorder, and narcolepsy) as well as substances produced illegally, such as methamphetamine (“crystal meth,” “speed,” or “ice”). Users can snort powder forms of these drugs, dissolve and inject the substances, smoke them, or ingest the drugs orally. Amphetamines produce subjective experiences of euphoria, sociability, hypervigilance, anxiety, stereotyped behaviors, and impaired judgment. As with cocaine, smoked and injected forms are more concentrated, and behaviors are more dramatically altered than with use of other forms. The primary difference between cocaine and amphetamines is the longer half-life of the latter (6 to 12 hours). Physical effects include increased heart rate, pupil dilation, and psychomotor agitation. Withdrawal symptoms involve 1 week to 6 months of depression, irritability, fatigue, and hypersomnia and can involve aggression and hallucinations (Maxmen & Ward, 1995).

**Tobacco.**

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Nicotine, the addictive substance in tobacco, is delivered through cigarettes, cigars, and smokeless tobacco products such as chew and snuff. Long-term use of tobacco has been associated with a wide range of health problems, particularly cancers (of the lung, mouth, and esophagus), coronary artery disease, atherosclerosis, cerebrovascular disease, emphysema, compromised immune function, decreased fertility, and low birth-weight offspring (see review by Baer & Brady Murch, 1998). Although a third of smokers attempt to quit each year, less than 5% remain smoke-free longer than 12 months (see review by Haaga & Kirk, 1998). Cigarette smoking is the leading preventable cause of mortality in the United States (McGinnis & Foege, 1993), and elevated rates of respiratory problems have been noted in youth with as little as 2- to 4-year histories of smoking (Myers & Brown, 1997).

The acute effects of nicotine are less dramatic than those of other substances of abuse; intoxication is mild and generally nonimpairing. Nicotine delivery products tend to be used throughout the day: the half-life of nicotine is only 30 to 120 minutes and increases the environmental associations that may cue the user to smoke. Significant withdrawal symptoms of depressed mood, fatigue, irritability, and craving that last 2–3 weeks are reported in youth and adults who stop or cut down nicotine intake and make the quitting process particularly arduous.

**Opiates**

This drug class includes derivatives of the opium poppy (e.g., opium, morphine), semi-synthetics (heroin), medication preparations synthesized to have morphine-like properties (e.g., codeine, hydromorphone, methadone, oxycodone, meperidine, and fentanyl), and medications with both opiate agonist and antagonist properties (buprenorphine, pentazocine). Opiates are prescribed for pain relief, cough suppression, or to alleviate opiate withdrawal symptoms. Opiate users inject, snort, smoke, and swallow the drug.

Opiate users report the intoxicating effects of euphoria, especially during the “rush” immediately following administration, as well as apathy, dysphoria, impaired judgment, and relaxation. Physical effects of intoxication include suppressed respiratory functioning, slurred speech, psychomotor retardation, reduced pain sensations, impairment of attention and memory, constricted pupils, and constipation. Tolerance develops rapidly. Due to the comparatively short half-life of heroin (30 minutes versus 2 to 3.5 hours for morphine), administration four times per day is common in addicts. Thus, daily activities revolve around obtaining and administering opiates. Withdrawal is generally very unpleasant and involves nausea, vomiting, diarrhea, muscle aches, tremor, fatigue, insomnia, fever, dysphoric mood, and cravings and can last up to 8 days (Tapert et al., 1998). Administration of street opiates poses a particular risk for overdose because purity levels remain unknown to the user. Because many opiate users inject, additional risks of HIV infection, hepatitis, cellulitis, endocarditis, and tuberculosis are imminent. Death from opiate overdose most commonly results from respiratory depression. No consistent neuropsychological deficits have been identified among tolerant users or detoxified former users (Zacny, 1995).

**Cannabinols**

Marijuana is the most commonly used illicit drug in the United States. Users ingest THC by smoking marijuana leaves (“pot,” “weed”), smoking resin (“hashish”), or eating cannabinoids mixed with food. Intoxicating effects include relaxation, euphoria, altered perception, impaired motor coordination, the sensation of slowed time, impaired judgment, and social withdrawal (APA, 1994). THC has a
relatively long half-life of 2 to 7 days. Anxiety, paranoia, attention and memory impairment, panic, and hallucinations may occur acutely. Physical symptoms include increased appetite, dry mouth, bloodshot eyes, and tachycardia (Tapert et al., 1999). Although its use involves fewer physiological changes than most other drugs of abuse, the consequences of chronic use may include amotivational syndrome as well as lung diseases similar to those experienced by tobacco smokers. Males may suffer impaired sperm production, decreased testosterone secretion, and decreased size of prostate and testes. Females can experience blocked ovulation (Cohen, 1981; McGlothlin & West, 1968, Tapert et al., 1998).

Studies of marijuana’s influence on cognition have yielded mixed results (Culver & King, 1974; Wert & Raulin, 1986). Recent studies have demonstrated some mild impairments in attention, problem solving, and verbal learning following at least 1 day of abstinence among chronic, heavy users (Pope & Yurgelun-Todd, 1996), visuospatial memory problems in chronic female users (Pope, Jacobs, Mialet, Yurgelun-Todd, & Gruber, 1997), and complex problem solving (Block, Farinpour, & Braverman, 1992).

Hallucinogens
These drugs produce dramatic alterations in sensation and perception and include lysergic acid diethylamide (LSD), psilocybin (from certain mushrooms), dimethyltryptamine (DMT), mescaline (from the peyote cactus), 2,5-dimethoxy-4-methylamphetamine (DOM or STP), methylene dioxymethamphetamine (MDA), methylene dioxyamphetamine (MDMA, “ecstasy,” “E,” or “X”), 2C-B (“Nexus”), ibotenic acid, and muscimol.

Hallucinogens are usually taken orally. Users experience intensification of perceptions, visual hallucinations, derealization, euphoria, alertness, and emotional lability. Confusion, paranoia, panic, loss of control, and depression may result. The most imminent risk during intoxication is acting on delusional beliefs (e.g., ability to fly). Physical effects include pupillary dilation, tachycardia, tremors, nausea, and sweating (Tapert et al., 1998). Heavy, long-term LSD use has been inconsistently associated with mild deficits in speeded visuomotor scanning abilities (Culver & King, 1974), and MDMA (“ecstasy”) may produce verbal learning and memory impairments (Krystal & Price, 1992). Incorrect chemical synthesis of MDA and MDA can produce substances that cause severe Parkinsonian symptoms (e.g., MTPT). Hallucinogenic effects tend to be more intense for younger users than for older users. Tolerance can develop with frequent use (Tapert et al., 1999).

Dissociatives
Phencyclidine (PCP, Sernylan®, “Angel Dust”) and related compounds (Ketamine®, Ketaject®) were developed as anesthetics and became street drugs in the 1960s. Users can smoke, snort, orally ingest, or inject them. Because PCP is relatively inexpensive, drug dealers often mix it with other drugs (particularly marijuana) to intensify effects. Intoxicating effects include marked behavioral change, assaultiveness, belligerence, unpredictability, impaired judgment, euphoria, hallucinations, intensified perceptions, and heightened emotions. Some users experience hyperactivity, panic, paranoia, and confusion. Physical effects include numbness and diminished response to pain, psychomotor agitation and discoordination, tachycardia, slurred speech, and sometimes, catatonia, convulsions, respiratory depression, coma, and death (see review by Tapert et al., 1999). PCP has a half-life of approximately 18 hours, and, due to profoundly impaired judgment and reduced fear of pain, users may engage in very violent or destructive behaviors while high. PCP use is associated with long-term impairments in abstraction and motor skills (Carlin, Grant, Adams, & Reed, 1979).
Inhalants

Inhalants of abuse include industrial and household compounds, such as glues, aerosol sprays, gasoline, paints, paint thinners, nail polish remover, correction fluid, certain cleaning solvents, and nitrous oxide (“poppers,” “rush”). Due to availability and low cost, children, adolescents, and youth from economically disadvantaged regions comprise the majority of inhalant users. Euphoria, floating sensations, temporal distortion, and visual hallucinations occur acutely, followed by apathy, confusion, irritability, assaultiveness, and panic. Physical effects include loss of coordination, dizziness, headache, slurred speech, lethargy, psychomotor retardation, tremor, and blurred vision. Inhalant abuse can lead to serious physiological problems, including respiratory damage, eye, nose, and throat damage, as well as kidney, liver, heart, gastrointestinal, and nervous system damage (Morton, 1990). Death can occur from heart arrhythmias or suffocation from breathing out of plastic bags containing the solvent. Inhalant abuse is robustly associated with impaired attention, memory, fine motor, and visuospatial functioning (Allison & Jerrom, 1984).

Assessment

Treatment planning and evaluation of treatment response are accomplished by assessment procedures developed specifically for the field of substance use disorders. Methods for assessing substance use may involve screening for alcohol or drug problems, assessing substance use behaviors, determining diagnosis, or evaluating outcomes. Measures of substance involvement described in this chapter are exemplars of instruments available to assist treatment providers and researchers in tailoring interventions and evaluating substance use behaviors. Although substances differ in consumption patterns and physiological properties, broad similarities across psychoactive substances guide diagnostic procedures, as evidenced by the adoption of uniform dependence criteria across substances in the DSM-IV (APA, 1994). Thorough assessments should include evaluating alcohol and illicit drug use, given the prevalence and poorer treatment outcomes associated with polysubstance disorders (Kolar, Brown, Weddington, & Ball, 1990; Rounsaville, Dolinsky, Babor, & Meyer, 1987).

Self-Report Assessment Issues and Strategies

The accuracy of self-reported substance use has been questioned due to acute and chronic memory problems associated with substance use, motivation to avoid the negative consequences of use, stigmatization, and minimization of personal problems (Carroll, 1995). However, empirical investigations have found that self-reports of substance use are relatively reliable and valid. Studies have substantiated the reliability and validity of alcohol use self-reports across populations (e.g., adolescents, college students, inpatients, outpatient, and normal drinkers; Babor, Brown, & Del Boca, 1990; Babor, Stephens, & Marlatt, 1987; Brown, Myers, et al., 1998; Maisto, Sobell, Cooper, & Sobell, 1979), as well as the accuracy of self-reported tobacco and other substance use (Brown, Myers, et al., 1998; Ehrman & Robbins, 1994).

Specific strategies enhance the accuracy of substance-related assessments (Babor et al., 1987). A critical first step is to verify that the client is not intoxicated or experiencing withdrawal states that may compromise memory or attention at the time of assessment. Unlike many other clinical symptoms, substance use and associated problems are observable or detectable. Methods of increasing self-report accuracy capitalize on these features by obtaining corroborating information from spouses, relatives, friends, records (e.g., medical and legal), and biological tests (Babor et al., 1987; Maisto,
Informing a client that these resources will be used improves reliability. Assuring both the client and collateral contacts of confidentiality encourages disclosure without concern for repercussions. In the event of discrepancies among informants, the source indicating that substance use has occurred usually is more accurate (Carroll, 1995). Calendar prompts are helpful (i.e., linking dates to holidays, anniversaries, and important life events).

Computer versions are available for many diagnostic and screening assessment instruments. Individuals may be more comfortable and provide more accurate information on sensitive topics when reporting to a computer, as opposed to a live interviewer. Comparisons of interview, self-report, and computer assessments have typically revealed few differences in the information provided (Davis, Hoffman, Morse, & Luehr, 1992; Skinner & Allen, 1983), and clients may prefer computer assessments to interviews or paper-and-pencil self-reports (Millstein, 1987; Skinner & Allen, 1983) and respond to computer measures more completely (Erdman, Klein, & Greist, 1983).

Screening

Because substance use disorders are highly prevalent but treatment is sought at disproportionately low frequencies, identifying the need for intervention among non-treatment-seeking individuals may be beneficial. For example, alcohol and drug use problems are prevalent in medical patients (Rydon, Redman, Sanson-Fisher, & Reid, 1992), military personnel (Bray, Guess, Marsden, & Herbold, 1989), and college students (Gfroerer, Greenblatt, & Wright, 1997). Screening measures are designed to identify individuals who need intervention or who are at risk of developing substance-related problems in a time-efficient manner (Connors, 1995), and include brief self-report measures, short interviews, and biological markers of substance use.

Widely used self-report instruments developed to screen for alcohol problems include the ten-item Alcohol Use Disorders Identification Test (AUDIT), developed and tested cross-culturally by the World Health Organization (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993), the Michigan Alcoholism Screening Test (MAST; Selzer, 1971), that consists of twenty-five questions, and the four-item Cut down, Annoyed, Guilty, Eye opener (CAGE; Adams, Barry, & Fleming 1996; Mayfield, McLeod, & Hall, 1974), which is widely used in medical facilities. A comparison of the AUDIT and CAGE showed that the AUDIT performed significantly better in detecting drinking problems among general medical patients (Bradley, Bush, McDonell, Malone, & Finn, 1998). Even briefer versions of the AUDIT, using only the three questions related to alcohol consumption (frequency, typical quantity, frequency of six or more drinks in a single sitting), performed comparably to the full AUDIT for identifying individuals with current alcohol abuse or dependence. The single item on frequency of binge drinking detected 81% of patients with alcohol abuse or dependence, and only 17% of patients were falsely identified as positive (Bush, Kivlahan, McDonnell, Finn, & Bradley, 1998). Thus, the AUDIT is a preferable alcohol problem screening measure.

The Personal Experience Screening Questionnaire (PESQ; Winters, 1991) is a brief self-report instrument designed to screen for alcohol and drug use problems in adolescents. This forty-item measure takes approximately 10 minutes to complete. Sound psychometric properties have been demonstrated (Winters, 1991, 1992). The PESQ does not provide diagnoses but efficiently assists clinicians and schools in identifying teens who may need substance abuse assessment.

Biological Markers of Substance Use

In addition to self-report screening instruments, biological markers are available for a range of

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substances including nicotine, alcohol, and both licit and illicit drugs. Biological tests vary in cost, biological specimen (e.g., saliva, breath, urine, and blood), sensitivity, and specificity. Sensitivity refers to the likelihood that a substance will be identified by the test if the substance is present. Specificity refers to the proportion of biological samples that is accurately identified. Generally, tests that are very accurate (both highly sensitive and highly specific) are more costly. Thus, it is advisable to begin biological screening with a very sensitive method and follow positive results using a more expensive test with high specificity (Schuckit, 1995).

The majority of alcohol and other drug testing occurs through urine toxicology due to its relatively low cost. A limitation is that results indicate only the recent presence of the substance, not the quantity or timing of use. Alcohol use is detectable for approximately 24 hours postconsumption, amphetamines for 48 hours, opiates for 48 hours, cocaine for 3–5 days, barbiturates for for 1–7 days, and cannabinoids approximately for 5–7 days. Positive tests may result from regular cannabinol use for up to 3–4 weeks (Schuckit, 1995).

Expired carbon monoxide (CO) and cotinine improve the accuracy of self-reported nicotine use (Hughes, 1993). CO breath samples are less expensive, easily collected, and provide immediate results and reasonable sensitivity to past 24-hour nicotine use (Velicer, Prochaska, Rossi, & Snow, 1992). Cotinine can be tested using saliva, blood, or urine samples and has superior sensitivity and specificity for detecting nicotine use in the past 3–7 days.

Biological markers are also available for detecting prolonged heavy alcohol consumption and corroborating a suspicion of relapse. These include relatively inexpensive liver function tests such as gamma-glutamyltransferase (GGT), aspartate aminotransferase (SGOT), alanine aminotransferase (SGPT), and a red blood cell test for mean corpuscular volume (MCV). Medical problems can cause false positive results. These tests are most useful in combination (Irwin, Baird, Smith, & Schuckit, 1988). A newer test, carbohydrate-deficient transferrin (CDT), is more expensive but is more accurate than GGT or MCV in men under age 40, smokers (Yersin, Nicolet, Decrey, Burnier, van Mele, & Pecoud, 1995), patients with liver disease, and early relapsers (Schmidt et al., 1997).

A less studied biological screening method analyzes hair follicles. Most drugs are carried by the bloodstream to the scalp, where the substance is incorporated into the hair follicles. Because hair grows predictably over time, separate sections of hair samples can provide estimates of the months in which various drugs were used (Strang, Black, March, & Smith, 1993).

**Diagnosis**

Diagnosis assessment involves following a set of diagnostic criteria to determine if an individual has a clinical disorder. The DSM-IV (APA, 1994) is the most widely used diagnostic system in the United States and has criteria for substance disorders similar to the *International Classification of Diseases and Related Health Problems* (ICD-10; World Health Organization, 1992) which is used worldwide. In selecting diagnostic measures, considerations include available resources, administrative time, training required, cost of the measure, scoring methods, and client characteristics (e.g., age and culture). Many instruments were originally developed with predominantly Caucasian adult male samples and should be reviewed for reliability and validity for use with adolescents, older adults, women, and non-Caucasians.

Methods for diagnosis include structured and semistructured interviews distinguished by the level of interviewer judgment and flexibility incorporated in the assessment process. The NIMH Diagnostic
Interview Schedule (DIS; Spitzer, 1983) and the WHO Composite International Diagnostic Interview—Substance Abuse Module (CIDI-SAM; Cottler et al., 1995) are reliable structured interviews that do not require professional training, but some clinicians report a mechanical quality to this type of interview. Semistructured measures allow more discretion on the part of interviewers to determine when more detailed questioning is needed, but require more professional training. The Psychiatric Research Interview for Substance and Mental Disorders (PRISM; formerly known as the Structured Clinical Interview for DSM-III-R, Alcohol/Drug Version; SCID-A/D) is a widely used semistructured measure with more flexibility, that provides diagnoses for other Axis I and II disorders as well.

Specifiers that indicate severity and other characteristics (e.g., physiological dependence) can be useful in both clinical and research settings. For example, the Alcohol Dependence Scale (Horn, Skinner, Wanberg, & Foster, 1984) provides a reliable quantitative measure of the severity of alcohol dependence based on twenty-five questions covering withdrawal symptoms, impaired control over drinking, compulsion to drink, tolerance, and alcohol-seeking behaviors.

The Addiction Severity Index (ASI; McLellan et al., 1992) is a structured interview that queries personal/family characteristics and provides severity estimates for problems in six life areas frequently impacted by substance abuse (medical, employment/financial support, drug/alcohol use, legal/criminal justice involvement, family/social, and psychological/psychiatric). Separate categories of substances assessed include alcohol, heroin, methadone, other opiates/analgesics, barbiturates, other sedatives/hypnotics/tranquilizers, cocaine, amphetamines, cannabis, hallucinogens, inhalants, and polysubstance use. The ASI requires 45–60 minutes to administer and 10–15 minutes to score and has been normed on multiple samples that consistently demonstrate strong psychometric characteristics (Friedman & Granick, 1994). The composite score for drugs is a weighted sum of the frequencies of several different types of drug use, and consequently heavy users of a single substance are likely to receive lower scores than less frequent users of multiple drugs (Carroll et al., 1994). Therefore, evaluation of clinical progress may be influenced by the pattern of drug use for a particular client, and this measure may be less sensitive to change for some substance users (Carroll, 1995).

The Customary Drinking and Drug Use Record (CDDR; Brown, Myers, et al., 1998) is a structured interview that assesses recent (prior 3 months) and lifetime characteristics of adolescent alcohol and other drug involvement; it queries separately for marijuana, amphetamines, barbiturates, hallucinogens, cocaine, inhalants, opiates, prescription medications, and other substance not previously identified. Additionally, age of initiation and progression to regular use, negative consequences, withdrawal, and dependence are assessed. Reliability and validity have been demonstrated for community and clinical samples of adolescents and young adults (Brown, Myers et al., 1998).

**Detailed Substance Assessments**

Detailed assessments provide valuable information on patterns of substance use, including quantity and frequency of use, binge use, high-risk situations, and progress in treatment. Methods for assessing substance use have been classified into two categories: summary (also called aggregate or quantity-frequency) measures and detailed daily assessments (Room, 1990). Clients report the quantity of alcohol that they typically consume, the maximum number of drinks consumed in one sitting, how frequently they drink, and how frequently they use a variety of drugs. The three major types of alcoholic beverages (beer, wine, and hard liquor) are often queried for separately. Drug use...
is more difficult to quantify due to differences in quantity descriptions and quality of “street” drugs; thus, frequency of drug use is more reliable, although money spent on heroin or cocaine may estimate the quantity (Ehrman & Robbins, 1994).

Daily instruments such as the Timeline Follow-back (TLFB; Sobell, Kwan, & Sobell, 1995; Sobell, Toneatto, Sobell, 1994) use a calendar to prompt detailed assessment of a client’s substance use over a period of time up to 1 year. Individuals retrospectively estimate daily substance use. Salient event anchors (e.g., incarcerations, hospitalizations, pay days, birthdates, and holidays) aid recall. The TLFB was initially developed for assessing alcohol use, and has been adapted to assess other drug and tobacco use (Brown, Burgess, et al., 1998; Ehrman & Robbins, 1994). Daily techniques permit examining substance use patterns over time. Clients can record substance use on an ongoing basis with self-monitoring diaries and cards.

Other facets of drug involvement are useful in treatment planning, evaluation, and research. For example, self-efficacy (confidence in one’s ability to execute a given behavior) is related to alcohol and drug treatment outcomes (Marlatt, Baer, & Quigley, 1995). The Situational Confidence Questionnaire (Annis & Graham, 1988), Drug-Taking Confidence Questionnaire (Sklar et al., 1997), and Smoking Self-Efficacy Questionnaire (Colletti, Supnick, & Payne, 1985) assess self-efficacy related to alcohol, other drugs, and cigarette use. The Inventory of Drinking Situations (Annis, 1982) and Inventory of Drug-Taking Situations (Annis & Martin, 1985) identify situations in which the client drank or used drugs during the past year, based on eight relapse precipitant categories developed by Marlatt and Gordon (1985). Personal expectancies about the effects of alcohol or drugs have also been associated with use patterns (e.g., Brown et al., 1985; Schafer & Brown, 1991). The Alcohol Expectancy Questionnaire (Brown, Christiansen, & Goldman, 1987) assesses the anticipated effects of alcohol use and has been adapted for adolescent populations (Christiansen, Goldman, & Brown, 1996) and for other substances (e.g., stimulants, marijuana, and nicotine; Schafer & Brown, 1991). Profiles on these scales help identify relapse risks and can focus interventions on situations that require strategies and skills for avoiding future substance use. Summaries of a variety of substance use measures are described in a manual published by the National Institute on Alcohol Abuse and Alcoholism (Allen & Columbus, 1995).

**Treatment**

In any given month, an estimated 2.3 million adults meet clinical criteria for drug dependence or abuse based on household interviews (Regier et al., 1990). Including criminal justice populations (inmates, probationers, or parolees), homeless people, and pregnant women (bearing a lower threshold for treatment need), an estimated 5.5 million individuals need treatment at any given time (Institute of Medicine, 1990). People transition in and out of these diagnostic labels as a function of biology, conditioning, and social factors. Due to the heterogeneity among individuals with substance use disorders, different forms of treatment are needed (Institute of Medicine, 1990).

In response to this need for treatment, therapeutic strategies developed to treat addictive disorders have evolved over time. Because initial alcohol and drug cessation attempts were most commonly followed by resuming substance use (Hunt, Barnett, & Branch, 1971), the need for a more extensive framework for addressing addictive behaviors became evident. Addiction theory and therapies began to incorporate behavioral principles. Limitations of early behavioral theories that focused on immediate environmental contingencies led to consideration of cognitive and affective factors.
associated with substance use patterns (e.g., Blane & Leonard, 1987). Behavioral principles, cognitive and affective factors, and behavioral choice theory have been combined to form sophisticated models of addiction. Behavioral choice theory extended the scope of earlier behavior theories, recognizing that behaviors (such as substance use) depend on immediate environmental contingencies and also on the availability of valued alternate activities and environmental constraints (Vuchinich & Tucker, 1996). Contemporary interventions may encompass components of these theoretical contributions.

Thus, the clinician and client have a wide variety of treatment options. Alcohol and drug abuse treatments vary in multiple ways: the format of treatment services (individual, family, group), type of treatment provider (peers, paraprofessionals, professionals), length of treatment (brief interventions to lifelong participation), treatment intensity (inpatient hospitalization, outpatient treatment, or community meetings on an as needed basis), and treatment modality (pharmacological therapy, psychotherapy, therapeutic communities). These multiple facets coexist in various combinations, often with little empirical information to guide optimal treatment choices. In initial therapeutic sessions, interventions specifically developed to enhance motivation and engage the client in the treatment process have proven useful.

**Motivational Enhancement Therapy (MET)**

Because client motivation is a central concern in addressing addictive behaviors clients are often ambivalent about initiating or continuing treatment. A treatment approach specifically aimed at enhancing motivation was developed by Miller and Rollnick (1991) based on therapeutic elements found effective across interventions. Therapists work in an empathic manner with clients to develop cognitive dissonance between current substance use behaviors and personal goals or values, such as health, self-esteem, or role responsibilities. Therapists avoid confrontation with client statements and instead, “roll with resistance” to explore and resolve ambivalence. Therapists support client self-efficacy to change by examining alternative avenues for achieving desired goals, problem solving to remove barriers to behavior change, and encouraging clients to mobilize personal resources. These MET interview techniques have been empirically supported for treating less severe alcohol and nicotine problems. Although initially considered effective mostly for mildly dependent individuals, recent studies have shown efficacy with a variety of patients, including those who express high levels of anger (Miller & Hester, 1995; Project MATCH Research Group, 1998).

Changing substance abuse behaviors is challenging and complex. The transtheoretical model is a useful heuristic that illustrates the five steps of the change process (DiClemente & Prochaska, 1998): (1) precontemplation (unaware of the problem or unwilling to change), (2) contemplation (considering change), (3) preparation (deciding to change), (4) action (implementing change), and (5) maintenance (behavior change sustained several months and integrated into lifestyle; DiClemente & Prochaska, 1998). Individuals may progress or revert to previous stages. This model is helpful in depicting the complexities and motivational levels involved in behavior change (Miller, 1998a).

For some clients, brief motivational interventions may be adequate to inspire behavior change. Short-term approaches include a variety of low-intensity interventions, collectively known as brief interventions, that have proven beneficial in a range of settings.

**Brief Interventions (BI)**

BIs are a collection of techniques that generally involve one to three sessions of counseling,
psychoeducation, professional advice, and/or bibliotherapy (Miller et al., 1995). Commonly, reducing use or preventing problem use, not necessarily abstinence, is the therapeutic goal. Research findings demonstrate that not all substance users require protracted, intensive therapy for healthy behavior change. Four types of clients have been the primary focus of this type of intervention: (1) hazardous drivers, (2) smokers, (3) mildly to moderately alcohol-dependent individuals, and (4) highly dependent drinkers not reached by other services (Heather, 1995). BI is frequently administered in emergency departments or primary care settings. Providers include primary care physicians, nurses, and social workers. An extension of this cost-effective approach is Guided Self-Change (Sobell & Sobell, 1998), which provides readings, exercises, assessment, and personalized feedback regarding substance use patterns, high-risk situations, and relapse prevention techniques. Positive treatment outcomes have been reported following just two–four sessions for alcohol and tobacco problems (Sobell & Sobell, 1998).

Motivational Enhancement, Brief Interventions, and Guided Self-Change are typically delivered individually in outpatient contexts by professionals or paraprofessionals during brief time frames with flexible treatment goals. These approaches all strive to engage clients in initiating changes in substance use behaviors; at times they use personal and community resources.

Self-Help Groups
Self-help groups, one of the most widely recognized and readily available addiction resources, are composed of peers who face similar difficulties and shared goals for change. The most widely known contemporary self-help group, Alcoholics Anonymous (AA; Alcoholics Anonymous World Services, 1976), has 96,000 weekly group meetings throughout the United States and 150 countries. Similar groups have been developed for other substance use disorders (e.g., Narcotics Anonymous, Cocaine Anonymous, and Nicotine Anonymous) and other addictive behaviors (e.g., Gamblers Anonymous, Overeaters Anonymous). Twelve-step participants share experiences at meetings, obtain sponsorships by successful members, read literature on the principles and steps, and use a spiritual focus to achieve abstinence and seek life meaning. Recovery is considered a lifelong process, and complete abstinence is the only means of managing addiction. Groups are also available to support friends and families of those with addictions (e.g., Al-anon, Adult Children of Alcoholics).

Although twelve-step groups are dominant in the United States, the majority of individuals referred to them do not follow through with long-term attendance (National Academy of Sciences, 1990). Alternative support groups (e.g., Women for Sobriety, Men for Sobriety, Rational Recovery, Moderation Management, and Self-Management and Recovery Training) have emerged that differ from twelve-step groups by emphasizing self-reliance and secular methods of recovery. The primary drawback of these alternatives is limited availability outside of major metropolitan areas. Detailed descriptions of self-help and alternative support groups are provided by McCrady and Delaney (1995) and Horvath (1997), respectively.

In the event that low-intensity approaches prove ineffective for a particular client, short-term inpatient or outpatient treatment formats may be indicated. Treatment providers are professionals or paraprofessionals, and often combinations of individual and group formats are included. Group modalities offer unique therapeutic features, including observational learning and social support (Yalom, 1985). In addition, group counseling may be cost-efficient (Schuckit, 1995). Short-term inpatient treatment programs typically encourage continuing participation in more extended

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intervention programs following discharge, including outpatient aftercare, self-help groups, residential treatment facilities, or therapeutic communities.

A range of therapeutic approaches that have proven useful in outpatient and inpatient treatment settings is described next. It should be remembered that the features of these interventions overlap at times and multiple techniques are often provided in combination within a single treatment setting. Treatments developed by psychologists based on theoretical and empirical foundations will be presented first, followed by a brief presentation of effective pharmacotherapies available in these settings.

**Relapse Prevention**

Relapse Prevention (RP), developed by Marlatt and Gordon (1985), was based on empirical observations that substance use disordered individuals could cease addictive behaviors briefly but had difficulty maintaining the change over time. RP provides behavioral and cognitive skills training to avoid or minimize relapse. Clients are taught to identify and anticipate situations that increase the risk for relapse and to prepare coping strategies to avoid or manage these high-risk situations. If a relapse occurs, it is viewed as a learning experience for fine-tuning strategies and efforts for the future. Balanced lifestyles are encouraged to reduce the reliance on psychoactive substances for pleasurable experiences.

**Coping and Social Skills Training**

Coping and Social Skills Training (CSST; Monti et al., 1990; Monti, Gulliver, & Myers, 1994) developed from social cognitive learning theory based on the premise that substance abusing individuals exhibit deficits in coping and social skills necessary for adaptive daily living. CSST interventions develop interpersonal skills, affect regulation, stress management, and coping with substance availability cues (Monti, Rohsenow, Colby, & Abrams, 1995). Treatment begins with assessing client strengths and weaknesses in these domains and specifying risky situations for relapse. Because alcohol and drug use cues are not always avoidable in natural environments, exposure to substance-use cues in the safety of the treatment setting seeks to extinguish craving responses (Niaura, Rohsenow, Binkoff, & Monti, 1988).

**Contingency Contracting**

Contingency contracting, based on operant behavior principles, involves creating a contract between the patient and treatment provider for reinforcers (or punishers) to eliminate substance use and shape goal-directed behaviors (e.g., attending therapy sessions, working). For example, cocaine abusers have been paid with vouchers for not using cocaine, and increases in voucher amounts escalate for successive weeks of abstinence (Silverman et al., 1996, 1998). Alternatively, clients may agree to an aversive consequence for relapse, such as having employers notified of their drug use (Anker & Crowley, 1982). Another study used small fines ($5) to patients for not attending therapy appointments without appropriate prior notification (Boudin et al., 1977). Contingency contracting has proven effective in reducing substance use (Dolan, Black, Penk, Robinowitz, & DeFord, 1985; Silverman et al., 1996, 1998) although effects have been transient in some studies (Magura, Casriel, Goldsmith, Strug, & Lipton, 1988). The success of contingency contracting relies on behavioral principles, and careful design and implementation are required. For example, voucher-reinforcement for smoking cessation demonstrated differing outcomes for fixed versus progressive rate reinforcement schedules (Roll, Higgins, & Badger, 1996).
Interpersonal Psychotherapy (IPT)

Long-term substance abuse is associated with multiple social and interpersonal problems, and relationships often become severely strained. Based on the principle that disturbances in interpersonal functioning are related to depressive disorders, IPT techniques were initially developed to focus on clients' difficulties, improve interpersonal skills, expand social support, and decrease depressive symptoms (Klerman, Weissman, Rounsaville, & Chevron, 1984; Rounsaville, Glazer, Wilber, Weissman, & Kleber, 1983; Rounsaville, Gawin, & Kleber, 1985). IPT is adapted to substance use disorders, and the therapist helps clients identify and change maladaptive interpersonal patterns in relationships and recognize the influence of substance use on interactions. IPT is designed as a time-limited, supportive intervention, and has been applied to eating disorders as well (Fairburn, Jones, Peveler, Connor, & Hope, 1991; Willfley et al., 1993).

Extending this approach focused on interpersonal relationships, approaches that include couples, family members, and multiple systems (e.g., home, school, and work in multisystemic therapy) have also demonstrated efficacy in addressing addictive behaviors (Henggeler & Borduin, 1995; Stanton & Shadish, 1997; Waldron, 1997).

Couple and Family Therapies

Positive couple and family environments are associated with better treatment outcomes (Moos, Finney, & Cronkite, 1990). Because interpersonal conflict is associated with relapse after treatment (Marlatt & Gordon, 1985), interventions to enhance couple and family functioning hold promise for improving treatment outcomes of substance use disorder. Couple and family treatment interventions motivate the substance abusing family member to enter treatment, support change efforts once initiated, and alter family interactions to provide a more conducive environment for maintaining abstinence. Strategies for reestablishing trust, increasing positive interactions, enhancing communication skills, and increasing problem solving and conflict resolution are established components of empirically validated couple and family therapies (O’Farrell, 1995). An important preliminary step involves evaluating the potential for domestic violence and appropriate provisions for the safety of all involved.

Multidimensional family therapy (MDFT) is a promising family-based therapy for adolescent substance abusers, with intervention strategies for teen, parent, and extrafamilial relationships (Liddle, 1995). Work with parents may include supportive therapy, education about adolescence, training in parental monitoring, family-management skills, and appropriate negotiating skills. The clinician provides support and empathy, problem solving, and assistance to the teen in making changes. Parents and teens are seen together to work on communication facilitation. MDFT interventions have been effective in treating adolescent drug abuse and improving conflictual teen–parent interactions (Diamond & Liddle, 1996; Liddle, 1995).

Multisystemic therapy (MST) has shown favorable results with adolescents who are involved in a variety of antisocial behaviors, including substance abuse (Henggeler, Melton, & Smith, 1992; Henggeler, Schoenwald, & Pickrel, 1995). Interventions are developed in collaboration with family members and delivered in the natural setting (e.g., home and school) to enhance generalization. Emphasis is placed on preserving the family system. Family, school, community, and peer influences on adolescent development and behaviors are addressed. Therapy intensity is adjusted based on client need (Henggeler et al., 1997). Positive outcomes have included improvements in family
cohesion, peer relations, and reductions in future arrests, criminal behaviors, and substance use.

**Community Reinforcement**

The Community reinforcement approach (CRA) recognizes the powerful influence of environmental contingencies and was developed to incorporate social, recreational, family, and job-related reinforcers into treatment (Smith & Meyers, 1995). Individually tailored skills training to improve these areas, as well as substance-related skills, are important elements of this behavioral treatment approach (e.g., communication skills, problem solving, drink refusal training, job counseling, recreational counseling, marital therapy). A key component of CRA is functional analysis of both substance-related and non-substance-related behaviors. Thoughts, feelings, events, and behaviors preceding and following substance use are assessed, and the function of substance use is explored with the client. This analysis helps to identify “high-risk” situations and develop coping strategies to manage or avoid these situations without resuming substance use. Additionally, a similar analysis is conducted for non-substance-related activities to assist the client in identifying pleasurable experiences other than alcohol or drug use. Strong support has been demonstrated for CRA with alcohol, cocaine, marijuana, and heroin abusers (Azrin, Sisson, Meyers, & Godley, 1982; Higgins et al., 1993; Smith, Meyers, & Delaney, 1998).

Couples, family, multisystemic, and community reinforcement approaches extend the influence of interventions beyond the specialized substance treatment setting to incorporate the client’s environment. Generalization of skills learned in therapy settings is likely to be enhanced by including natural environmental contexts, and environmental contingencies can be enlisted to aid in the recovery process. In addition to these psychotherapeutic and environmental interventions, pharmacological interventions to address physiological aspects of substance dependence, it has been shown are effective for some substances of abuse.

**Pharmacotherapies**

Pharmacotherapies for substance-related addictions work through various mechanisms: relieving withdrawal, reducing craving (replacement), blocking the reinforcing effects of drug consumption, or counterconditioning aversive responses. No medication can cure substance use disorders, but some pharmacotherapies reduce substance-related problems, as well as symptoms, associated with concomitant psychiatric disorders.

Short-term interventions for alcohol detoxification and short-term withdrawal include administration of benzodiazepines, slowly tapering the dose during a 5–7 day period (Schuckit, 1996). Long term pharmacotherapies include disulfiram (Antabuse®), which causes a severe adverse reaction to alcohol shortly after consumption and reduces the likelihood of relapses. Naltrexone, an opiate antagonist, has shown promising results in reducing relapse and severity of relapse to alcohol (O’Malley, Jaffe, et al., 1992; Volpicelli, Alterman, Hayashida, & O’Brien, 1992). Variable compliance with disulfiram and naltrexone therapy compromises the efficacy of these treatments. Acamprosate is a medication that increases GABA activity and decreases glutamate action with few side effects. Although not yet available in the United States, acamprosate has shown modest clinical benefits in extending initial abstinence, reducing drinking days, and increasing the proportion of patients who remained abstinent in initial human trials in Europe (Sass, Soyka, Mann, & Ziegglansberger, 1996; Whitworth et al., 1996).

Two opiate replacement therapies have significantly improved outcomes for opiate disorders.
Methadone is a long-acting (~24 hours), orally administered opiate that shares many pharmacological features with heroin. Due to cross-tolerance and the long half-life of methadone, the risks of illicit injection opiate use (e.g., impurity of “street” drugs, crime, HIV risk) are significantly reduced (Ball & Ross, 1991). \( L \)-alpha-Acetylmethadol (LAAM) is even longer acting (48–72 hours) and has also shown evidence that it reduces illicit opiate use, increases the duration of treatment participation, and reduces criminal behaviors (Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997; Ling, Charuvastra, Kaim, & Klett, 1976). Although improved outcomes have clearly been demonstrated, opiate replacement therapies continue to be stigmatized by some, based on the premise that one addiction is just being replaced by another. Although technically correct, a properly dosed methadone treatment coupled with ancillary services (e.g., self-help groups, psychotherapy, and access to condoms; Calsyn, Meinecke, Saxon, & Stanton, 1992; Calsyn et al., 1994) facilitates stable functioning. The long-acting properties of replacement therapies reduce the rapid cycling of euphoria, withdrawal, and drug seeking associated with short-acting, illegally obtained opiates such as heroin (Zweben & Sorensen, 1988). Naltrexone, an opiate antagonist, demonstrated modest reduction in heroin use in clinical trials. However, heroin addicts are more difficult to retain in this type of pharmacotherapy than in opiate replacement therapies (O’Brien, 1996; Tapert et al., 1998).

Nicotine replacement therapies (e.g., nicotine transdermal patch, gum, and nasal sprays) reduce the symptoms of nicotine withdrawal and have been helpful in achieving initial abstinence among smokers (Hughes, 1993). Modest but long-term (6–12 months) improved rates of abstinence have been achieved using these products as adjuncts to cognitive-behavioral relapse prevention approaches (O’Brien, 1996). One study examined the effect of the dose of nicotine patches and found that abstinence rates improved with increased doses (0, 7, 14, 21 mg; Transdermal Nicotine Study Group, 1991). Replacement therapies are the most developed pharmacotherapies for smoking cessation, but antidepressant medications such as bupropion (Wellbutrin®, Zyban®) may reduce nicotine craving (O’Brien & McKay, 1998). Clonidine, an anti-hypertensive agent that reduces alcohol and opiate withdrawal, also reduces tobacco withdrawal and craving, although beneficial effects are short-lived (Covey & Glassman, 1991; Niaura, Brown, Goldstein, Murphy, & Abrams, 1996). The mechanism of action for clonidine is not clear, and some studies suggest that effects may be limited to women (Covey & Glassman, 1991; Hughes, 1993). Mecamylamine, a nicotinic blocking agent that prevents the subjective reinforcing effects of tobacco use, is under investigation but has significant side effects that reduce treatment compliance (Hughes, 1993).

For patients with concomitant mental health disorders, treating persisting psychiatric symptoms improves substance abuse outcome. Negative affective states, frequently experienced by those with comorbid disorders, have been identified as relapse precursors (Marlatt, 1985). Thus, pharmacological interventions to reduce negative mood would also be likely to improve substance use outcomes. As an example, the selective serotonin re-uptake inhibitor, fluoxetine, is effective in treating major depression, and decreases in both depressive symptoms and alcohol consumption have been demonstrated among depressed individuals with alcohol dependence (Cornelius et al., 1997).

In summary, medications have demonstrated robust effectiveness in ameliorating withdrawal symptoms, modest efficacy in reducing alcohol and nicotine cravings, and significant benefits in replacing illicit opiates. Pharmacotherapies are most useful in a comprehensive treatment program that involves psychological interventions described previously (O’Brien, 1996; Schuckit, 1996). To
date, medications have not been identified that are effective in treating other substances of abuse (O'Brien, 1996).

Research has repeatedly demonstrated that initial addictive behavior changes, like other behavioral changes, are difficult to maintain over time. Often, a complete lifestyle change is beneficial. Various residential arrangements designed to promote substance-free living help extend gains achieved through psychosocial interventions and pharmacotherapy. Extended living arrangements following addictions treatment are also needed due to the prevalence of substance use disorders among homeless individuals (e.g., Bassuk, Rubin, & Lauriat, 1984).

**Therapeutic Communities and Residential Treatment Facilities**

Abstinence-focused residential facilities are known by a variety of names: sober living environments, halfway houses, recovery homes, residential treatment programs, and therapeutic communities, to name a few. They all share a common emphasis on providing substance-free living environments but vary in the methods and services offered. Many short-term inpatient and outpatient substance abuse treatment programs advise clients to reside in this type of environment for at least several months after initial abstinence, based on empirical findings of improved outcomes (Hubbard et al., 1997; Moos, King, & Patterson, 1996).

Community residential facilities provide substance-free environments to assist substance abusers between hospital discharge and subsequent independent living. Typically, continuous staffing is provided and is available for emergencies (Moos et al., 1994). Individual and group counseling, vocational and discharge planning, and connection with community resources such as self-help programs are common components of these facilities. Contracts for this type of residential program have been provided for 60 days of care and 30-day extensions, if needed, by the Department of Veterans Affairs since 1980 in response to the need for a transitional environment. Research on outcomes has evidenced reduced readmission rates for patients who participated in these residential programs (Moos et al., 1994).

Therapeutic communities (TCs) are based on “family” models; members of the program act as a surrogate family, helping each other to change substance-related behaviors (De Leon, 1989; Sorensen, Acampora, & Iscoff, 1984). TCs emphasize increasing residents’ self-esteem, self-reliance, and use of social supports, and provide education, vocational services, and, after several months of abstinence, independent living arrangements. Any substance use usually results in immediate expulsion to preserve the drug-free environment. Length of stay varies, but a year or longer is common to accomplish the complete transition to drug-free living.

Alternatively, if an individual is not considering treatment or is resistant to abstinence-focused interventions, alternative intervention strategies that target reducing the negative or harmful consequences of alcohol and drug use may be beneficial.

**Harm Reduction**

Harm reduction techniques, which emerged from a public health approach to substance abuse, focus on strategies for reducing the negative consequences of substance use (Marlatt, 1998). Harm reduction interventions operate at both the individual and public policy levels. The approach is pragmatic and nonjudgmental and is designed to engage individuals on their own terms while reducing personal and societal harm due to substance use. An advantage of harm reduction approaches is the potential to engage non-treatment-seeking individuals. Abstinence is viewed as an

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ideal (no risk for harm), but behavior changes that move the individual along a continuum away from harm are viewed as steps in the right direction. These approaches address risky behaviors that co-occur with substance use, such as unsafe sexual practices, violence, and driving while intoxicated. Harm reduction strategies for illicit drug users include drug replacement interventions (e.g., methadone) and programs to reduce the risks of drug administration (e.g., clean needle exchange programs and education to reduce the risks of needle use; Tapert et al., 1998). Reviews of studies on needle exchange programs (NEPs) report decreased rates of HIV risk behaviors (e.g., reductions in needle sharing and giving away used needles) and some evidence of reductions in subcutaneous abscesses and hepatitis B and C (Lurie et al., 1993). As another example of harm reduction strategies, a harm reduction intervention with college students was associated with significant reductions in both drinking and harmful consequences, compared to students assigned to a nonintervention group (Marlatt et al., 1998). An excellent, comprehensive presentation on harm reduction principles and strategies is provided by Marlatt (1998).

Project MATCH (Project MATCH Research Group, 1997) compared three different treatments and tested the hypothesis that matching substance abusers to treatments based on personal attributes would result in superior treatment outcomes. Clients were randomly assigned to 12-Step Facilitation (TSF), Cognitive Behavioral Coping Skills Therapy (CBT), or Motivational Enhancement Therapy (MET), and received the manual-driven, individually administered treatment. Extensive baseline assessments of client attributes facilitated evaluation of outcomes as a function of the type of treatment received (see Nathan et al., this volume for details). At 12 months posttreatment, clients had substantially reduced drinking from pretreatment levels in all three treatments. However, few client-treatment matching hypotheses were supported. Generalizations of results are limited by the sample studied, which excluded drug-dependent, homeless, psychiatrically diagnosed, and cognitively impaired individuals, and by delivery of treatment in a format not typical of standard practice. Thus, efficacy, but not effectiveness, of treatments was addressed by Project MATCH. Finally, the absence of a control group prohibits investigating the natural course in this specialized population.

The Drug Abuse Treatment Outcome Study (DATOS; Hubbard et al., 1997) examined substance use and life functioning outcomes of 3000 patients in eleven metropolitan areas during the 12 months following treatment. Four types of treatments were evaluated: long-term residential, outpatient drug-free programs, short-term inpatient, and methadone maintenance. Major reductions in most types of drug use were observed in the year following treatment relative to pretreatment use in all four treatment formats. In long-term residential programs, weekly heroin and cocaine use dropped by 66%, and marijuana and heavy alcohol use were reduced by more than 50% from the pretreatment to the posttreatment year. The weekly use of alcohol and all drugs was reduced by 50% in outpatient drug-free programs, and weekly use was 33% of pretreatment levels for those treated in short-term inpatient programs. In methadone maintenance programs, weekly heroin use declined by 33%, and weekly cocaine use was reduced by 50% from pretreatment levels, although marijuana and heavy alcohol use did not change after treatment. Rates of suicidal thoughts and attempts declined in all groups except the methadone clients. Predatory criminal activities and risky sexual behaviors were significantly reduced, but physical health limitations and less than full-time employment remained high in all treatment types.

DATOS evaluated the effect of treatment length on outcome. Clients who received 3 months or more
of treatment in long-term residential programs and outpatient drug-free programs reported lower rates of drug use at 12-month follow-up than clients who were treated for less than 3 months. Methadone maintenance clients who remained in the programs used significantly less heroin than clients who dropped out. Reduced illegal activity, risky sexual behaviors, and unemployment were also associated with longer treatment duration, but cocaine, marijuana, and alcohol use were not. These findings were generally consistent with previous major drug treatment studies (Drug Abuse Reporting Program [Simpson & Sells, 1982] and Treatment Outcome Prospective Study [Hubbard et al., 1989]).

In summary, the DATOS results confirmed that participation in drug treatment is associated with positive changes in substance use and life functioning in the year after treatment and that clients who remain in treatment longer than 3 months receive more benefits. DATOS findings must be considered in the context of two study limitations: data relied solely on self-reports without corroboration from biological tests or collateral interviews, and only 70% of follow-up interviews were completed.

Special Populations

No understanding of substance use is complete without acknowledging the special circumstances and variations in use, assessment, treatment, and outcome for different populations. Sensitivity to the unique characteristics and issues potentially relevant to individual clients is important in all phases of therapeutic contact. Following are some factors associated with commonly encountered special populations.

Women

Men and women experience many aspects of substance abuse similarly, but some important gender differences affect consequences and treatment for females. The most widely recognized issue for women is the teratogenic effect of substances on fetal development. Fetal alcohol syndrome (FAS) seen in the infants of women who consume large amounts of alcohol during pregnancy involves a cluster of physical (e.g., facial dysmorphology and small stature) and neuropsychological (e.g., mental retardation and attentional impairment) effects that persist throughout the life-span. Less severe fetal alcohol effects (FAE) have been documented at lower levels of alcohol consumption. Alcohol is not uniformly teratogenic, suggesting complex relationships with factors such as drinking patterns, gestational period, nutrition, and genetics.

Cigarette smoking is related to retarded fetal growth, premature birth, and low birth weight, and effects appear related to smoking levels (Collins, 1993). Cocaine use during pregnancy increases the likelihood of slow fetal growth, low birth weight, early labor, spontaneous abortion, and sudden infant death syndrome (Fox, 1994; Miller & Hyatt, 1992; Zuckerman et al., 1989), although other studies demonstrate modest effects of cocaine when drinking, smoking, and nutrition are considered (Lester, LaGasse, Freier, & Brunner, 1996). Infants born to mothers addicted to cocaine are irritable, respond excessively to stimulation, and show impaired motor coordination, and these effects are detectable months later (Cole & Cole, 1993). Mothers addicted to heroin or methadone give birth to babies who are also addicted; treatment is often necessary shortly after birth to avoid potentially life-threatening withdrawal. These infants are more likely to be premature, underweight, and at risk for respiratory illnesses. Mortality is twice as high for neonates of opiate-addicted mothers (Bolton, 1983; Ostrea & Chavez, 1979). Detoxification causes irritability, tremors, disturbed sleep, and diminished motor control in these infants. Impaired attention and motor control have been documented up to a year later (Jones & Lopez, 1990). Other gynecologic and obstetric problems are more common for women who smoke cigarettes, or abuse alcohol or drugs (Collins, 1993).
A relationship between victimization and trauma (e.g., childhood sexual abuse, domestic violence) and substance abuse has been documented in female populations (Downs, Miller, & Gondoli, 1987; Miller, Downs, & Gondoli, 1989), increasing the need for comprehensive assessment in these domains and treatment to address concomitant posttraumatic stress disorder, if indicated. Although women may face more consequences for substance abuse than men, services may be less available and less utilized by women (Dawson, 1996). Child-care responsibilities, limited financial resources, and societal stigmatization can be greater barriers to treatment for substance-abusing women than for men (Collins, 1993).

**Adolescents**

Substance use and related disorders are relatively common during adolescence (typically defined as ages 13 to 20) and have implications for adult functioning. Unique risk factors, consequences, diagnostic criteria, assessment approaches, and treatment methods are pertinent to understanding substance abuse and dependence during the teenage years. For youth, substance abuse may be considered a cluster of problem behaviors, rather than an independent diagnosis (Donovan & Jessor, 1985). Problem behavior theory describes adolescent deviancy as a single factor of unconventionality in which a variety of problematic behaviors co-occur, such as drug taking, smoking, precocious sexual involvement, gambling, and involvement in other criminal and health-threatening behaviors (Donovan & Jessor, 1985; Newcomb & Bentler, 1989).

Families and peers influence problem behavior and initiation of substance involvement. The influence of peers and the desire to “fit in” with group norms increases throughout child and adolescent development and is the most robust risk factor for early substance use (Bentler, 1992; Costanzo & Shaw, 1966). Peers influence exposure and access to drugs, model use or abstinence, and act as powerful reinforcers regarding substance use decisions. Youths select their peer groups and are selected by peers largely on the basis of shared values and interests (Dishion, Patterson, & Reid, 1988). Youths with social networks composed of substance users are likely to assume beliefs and values consistent with a substance-using lifestyle (Tapert et al., 1999). Youths without role models who reinforce healthy coping strategies are more likely to use (Holden et al., 1988; Tucker, 1982) or continue to abuse substances (Myers & Brown, 1990; Richter, Brown, & Mott, 1991). By contrast, positive social supports offset potential substance-related problems that may emerge in youth (Newcomb & Bentler, 1988b).

Negative health consequences for youth have been linked to abuse or dependence on the most commonly used substances. Teen smokers have increased rates of respiratory problems, and teen drinkers and drug users are more likely to experience motor vehicle crashes and other traumatic injuries (Aarons et al., 1999). Modest cognitive deficits have been associated with substance abuse in adolescence (Moss, Kirisci, Gordon, & Tarter, 1994), and withdrawal symptoms have been related to decreased retention of information and poor visuospatial functioning (Tapert & Brown, 1999).

Diagnostic criteria for substance abuse and dependence are based on adult symptom patterns. However, adolescents have characteristic substance use profiles and life consequences. Substance-involved adolescents typically use multiple intoxicating substances (Brown et al., 1994; Stewart & Brown, 1995). Adolescents can experience preoccupation with substances, loss of control over substance use, and reckless behavior while using, but are less likely than adults to report continued use despite medical problems (Martin, Arria, Mezzich, & Bukstein, 1993; Stewart & Brown, 1995). Current diagnostic criteria may not accurately capture all adolescent problematic substance
use patterns. For example, abuse criteria lack applicability to adolescent life demands and form a less useful diagnostic construct (Martin, Kaczynski, Maisto, Bukstein, & Moss, 1995; Martin, Langenbucher, Kaczynski, & Chung, 1996).

Optimal assessment tools used with adolescents tailor wording to an appropriate reading level, acknowledge that polysubstance use is the norm for adolescent substance abusers, use computer administration formats when possible (Wright, Aquilino, & Supple, 1998), and consider the previously mentioned diagnostic challenges. The Personal Experience Inventory (Winters & Henly, 1989) is a self-report measure that assesses the severity of substance use and psychosocial functioning in adolescents. The Problem Severity scales in this well-validated self-report instrument discriminate between clinical and nonclinical adolescent samples (Henly & Winters, 1988). The Adolescent Diagnostic Interview (Winters & Henly, 1993) is a structured interview developed to assess substance use disorders, global functioning, psychosocial stressors, and cognitive functioning. Extensive information beneficial in treatment planning for adolescents is attained with this instrument which has demonstrated sound psychometric characteristics. Similarly, the Teen Addiction Severity Index (Kaminer, Bukstein, & Tarter, 1991), modeled after the adult Addiction Severity Index, collects substance-related information across domains of adolescent life functioning. Adequate psychometric properties have been reported (Kaminer, Wagner, Plummer, & Seifer, 1993).

Avenues to success for youths with substance use disorders, include (1) engaging in treatment programs that incorporate family involvement or (2) participating in activities that are incompatible with substance use (e.g., sports, jobs, active participation in academics, and volunteer activities; Brown et al., 1994). Multidimensional family therapy (Liddle, 1995) is a family-based therapy that focuses on engaging the youth in the treatment process. Multisystemic therapy (Henggeler et al., 1992, 1995) works with teens, parents, school systems, community resources, and peers to decrease problem behaviors (see previous section on Treatments for more detail on these therapies). Incorporating families to the extent possible helps many recovering teens. However, involvement in healthy activities is critical for success for teens whose parents have substance use disorders or other major problems.

**Elderly**

Substance use and substance-related disorders are less prevalent among the elderly (over age 65) than in younger populations (Graham, 1986). However, characterization of substance use problems in older adults is hampered by assessment challenges. Older drinkers often underreport consumption and problems (Atkinson & Kofoed, 1982; Graham, 1986), and many assessment instruments have not been validated with older adults. Diagnostic criteria for role obligations and social functioning are insensitive for seniors with limited responsibilities and social networks and cause substance problems to go unnoticed. Additionally, symptoms of substance use disorders may resemble other age-related illnesses (e.g., dementia, malnutrition, or bone damage) and may complicate the diagnostic picture (Schuckit, 1990). Identifying substance abuse in this population is important, however, because more than 75% of adults over the age of 65 take prescription medications; many of them interact adversely with alcohol, tobacco, and illicit drugs (e.g., Adams, 1995). Due to physiological changes and medical problems associated with aging, the elderly are more sensitive to alcohol and drug effects and the synergistic effects of substances; Morgan et al., 1996; Smith, 1995). The MAST has been adapted specifically to assess problem drinking in older adults (Michigan Alcohol Screening Test—Geriatric Version; Blow et al., 1992).
Suggestions for treating older problem substance users include (1) avoiding confrontation and increasing the supportive nature of therapy; (2) focusing on coping skills related to loneliness, depression, and social isolation rather than occupational or relationship issues; (3) slowing the pace of group-based skills training; (4) addressing medical and transportation needs (Schonfeld & Dupree, 1995); and (5) specifically tailoring printed materials to an older audience (including seniors in photos and graphics, content specific to older age groups, especially the benefits of quitting at any age (Morgan et al., 1996)). Older adults have treatment outcomes similar to those of adults in general (Kashner, Rodell, Ogden, Guggenheim, & Karson, 1992; Kofoed, Tolson, Atkinson, Toth, & Turner, 1987).

Psychiatric Comorbidity

Individuals with other mental health disorders have a twofold increase in lifetime risk of alcohol abuse or dependence and a fourfold increase in lifetime risk of drug abuse or dependence. Among individuals with alcohol use disorders, 37% had another psychiatric disorder. Over half of those with drug use disorders have also had histories of psychiatric disorders (Regier et al., 1990). Substance use disorders and concomitant psychiatric comorbidity are often associated with a poor prognosis (e.g., Dickey & Azeni, 1996; Ouimette, Finney, & Moos, 1997; Rounsaville, Kosten, Weissman, & Kleber, 1986). Many clients with severe mental health disorders have difficulty connecting with substance-related self-help organizations for a variety of reasons (Noordsy, Schwab, Fox, & Drake, 1996). Youths with comorbid mood disorders and who start abusing substances at younger ages evidence greater difficulty maintaining problem-free status after treatment (Brown et al., 1994; Tapert et al., 1999).

Substance intoxication, chronic use effects, and withdrawal states can mimic symptoms of other psychiatric disorders, including depression, anxiety, paranoia, delusions, and hallucinations (Boutros & Bowers, 1996; Brown & Schuckit, 1988; Brown, Irwin, & Schuckit, 1991). Many alcohol-dependent individuals report clinical levels of depression when admitted for treatment, but only a small minority remains clinically depressed 4 weeks later (Brown & Schuckit, 1988). Similar findings have been reported for cocaine abusers (Brown, Monti et al., 1998). Correspondingly, many in treatment for alcohol problems report elevated levels of state anxiety at admission, which typically reduce to normal levels following several weeks of abstinence (Brown et al., 1991). Psychotic symptoms induced by substance intoxication or withdrawal (e.g., alcohol, stimulants, and cannabinoids) also tend to remit within days of abstinence. Exceptions include amphetamine-induced psychotic symptoms experienced by some abusers for up to a year or more of abstinence and PCP-induced psychotic symptoms that last for up to 30 days following the most recent use (Bacon, Granholm, & Withers, 1998). Accurate assessment determines whether psychiatric symptoms are substance-induced and likely to remit with abstinence or are indicative of an independent psychiatric disorder that requires specific treatments. Making this evaluation can be difficult, and the following guidelines are suggested:

1. The Timeline Technique (Bacon et al., 1998; Schuckit & Hesselbrock, 1994) involves constructing a lifetime calendar delineating the timing of specific substance dependence symptoms, psychiatric symptoms, and periods of abstinence. The clinician can evaluate whether psychiatric symptoms occurred before or after the onset of substance dependence, as well as whether psychiatric symptoms were experienced during periods of abstinence.
2. Familiarity with the quality and severity of substance-specific intoxication and withdrawal
symptoms (Bacon et al., 1998) and the duration of abstinence required for substance-induced symptom remission (e.g., Brown et al., 1991, 1994) will aid clinical evaluation.

3. A family history of psychiatric disorders with evidence of genetic influence (e.g., schizophrenia, bipolar disorders) may be indicative of independent psychiatric disorders.

4. Patients with concomitant psychiatric disorders are more likely to require repeated treatment for substance dependence (Rounsaville, Dolinsky, Babor, & Meyer, 1987).

**Ethnicity and Culture**

Substance use and problem development is influenced by genetic, social, and environmental factors, all of which may interact with culture. The Epidemiological Catchment Area (ECA) Study found prevalence rates of lifetime substance abuse or dependence comparable between African-American and Caucasian adults (Helzer, Burnam, & McEvoy, 1991), but African-Americans experience more social and medical consequences than Caucasians (Caetano & Schafer, 1996). Hispanic men have relatively high rates of alcohol use and abuse, whereas Hispanic women have low rates (Lex, 1987), and drug use rates are lower for Hispanics than Caucasians (Robins & Regier, 1991). Acculturation and U.S. nativity have been reported as risk factors for illicit drug use among Mexican-Americans (Vega, Alderete, Kolody, & Anguila-Gaxiola, 1998). Alcohol abuse and dependence are high among American Indians and Alaskan natives. The age-adjusted death rate due to alcohol dependence is nearly seven times higher than the overall U. S. rate (U. S. Department of Health and Human Services, 1997). Substantial variations are found in substance use patterns in relation to tribal affiliation, and some tribes now report high rates of abstinence.

Asian-Americans have lower rates of alcohol consumption, abuse, and dependence (Klatsky, Siegelaub, Landy, & Friedman, 1983), partially due to genetic influences that reduce their ability to metabolize alcohol, resulting in aversive physiological reactions to drinking among some Asian individuals. Jewish samples evidence particularly low rates of alcohol abuse and dependence (Weissman, Myers, & Harding, 1980).

**HIV**

Substance use continues to be significantly associated with HIV transmission. Methadone maintenance, LAAM, needle exchange programs, and community information programs demonstrate favorable HIV risk reduction for injection drug users (Ling et al., 1976; Magura, Rosenblum, & Rodriguez, 1998). Needle exchange and community outreach programs reach injection drug users who are not in treatment programs (Peterson, Dimeff, Tapert, & Stern, 1998). Risky sexual behaviors are more resistant to change (Haverkos, 1998). Alcohol reduces inhibitions and increases the likelihood of risky sexual activity (Steele & Josephs, 1990). Stimulant intoxication is associated with participation in highly risky sexual behaviors, but substance abuse treatment can result in reduced numbers of sexual partners (Shoptaw, Reback, Frosch, & Rawson, 1998). In summary, interventions decrease HIV risk by reducing the frequency of injection, decreasing needle sharing, and reducing risky sexual behaviors (Iguchi, 1998; Shoptaw et al., 1998).

**General Recommendations**

Substance use disorders are common mental health problems in our society and bear significant personal and societal consequences. The severity of problems may range from brief experimentation to protracted, life-threatening alcohol or drug involvement. Several models were presented that have

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been employed to conceptualize why people repeatedly engage in these harmful behaviors. Current models incorporate evidence from studies of genetics, conditioning, social learning, behavioral economics, and cognitive psychology. These theories guide our understanding of the way addiction processes are developed, maintained, and best treated.

Given the documented prevalence of substance use disorders, particularly in mental health settings, it is recommended that brief screening assessments for substance involvement and substance-related problems be conducted routinely. Positive results on screening assessments indicate the need for more extensive assessment. Detailed substance assessments should incorporate evaluation of comorbid mental health disorders that may influence clinical course and treatment planning decisions. In the event that assessments indicate problem substance use, the client’s current motivation to change should be discussed, and motivational enhancement strategies should be initiated based on the motivational level or stage.

Diverse treatment options are available for substance use disorders. Enlisting client participation in the treatment planning process and willingness to “meet the client” toward goal establishment have been empirically supported. Consideration of nonabstinence goals can be discussed openly and nonjudgmentally, weighing the advisability of this alternative goal in view of the client’s unique characteristics. Clear professional advice should be provided in support of abstinence when indicated, but research findings indicate that confrontation should be avoided. Situations in which abstinence should clearly be advised include the presence of liver disease, pregnancy, severe dependence, and the use of prescription medications. Studies support the involvement of family members in substance disorder treatments. Increasing availability and access to valued alternative non-drug activities will support the long-term process of behavior change. Pharmacotherapies in conjunction with psychotherapy interventions often enhance substance use outcomes for some substances, including tobacco, alcohol, and opiates.

Although significant progress has been made in understanding and treating substance use disorders in recent decades, significant limitations in our knowledge remain. Findings have not yet provided many clear guidelines to clinicians in attempting to optimally match clients to types of treatments. Some researchers have advised that clinicians maintain a stance of “informed eclecticism, an openness to a variety of approaches that is guided by scientific evidence” (Miller & Hester, 1995). Additionally, little is known regarding the efficacy and effectiveness of group versus individual interventions for substance use disorders.

A third limitation in the substance abuse treatment field is the lack of information on whether comorbid psychiatric disorders are best treated simultaneously or independently and whether treatments should be integrated. Researchers are working to address these questions, and client preferences may be the best guide for treatment selection at this time. For example, preliminary studies of tobacco cessation interventions conducted concurrently with other substance abuse treatment have suggested some success in outcomes. Researchers have proposed dual-diagnosis treatments for substance abusers with severe mental health disorders such as schizophrenia and bipolar disorders (Drake, 1996; Osher & Kofoed, 1989), and research findings are beginning to support such integrated treatments (e.g., Drake, McHugo, & Noordsy, 1993; Drake, Mueser, Clark, & Wallach, 1996).

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