

DRUG ABUSE

CONCEPTS, PREVENTION,
AND CESSATION

Steve Sussman
Susan L. Ames

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Drug Abuse

Concepts, Prevention, and Cessation

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E2009003723



CAMBRIDGE
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Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi

Cambridge University Press

32 Avenue of the Americas, New York, NY 10013-2473, USA

www.cambridge.org

Information on this title: www.cambridge.org/9780521716154

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First published 2008

Printed in the United States of America

A catalog record for this publication is available from the British Library.

Library of Congress Cataloging in Publication Data

Sussman, Steven Yale.

Drug abuse : concepts, prevention, and cessation / Steve Sussman, Susan L. Ames.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-521-85892-2 (hardback)

ISBN 978-0-521-71615-4 (pbk.)

1. Drug abuse. I. Ames, Susan L., 1956– II. Title.

[DNLM: 1. Substance-Related Disorders – etiology. 2. Social Behavior. 3. Substance-Related Disorders – psychology. 4. Substance-Related Disorders – therapy. WM 270 S9649d 2008]

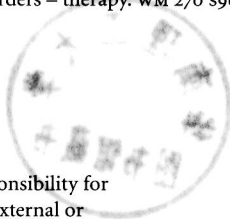
RC564.S8384 2008

362.29–dc22 2007029964

ISBN 978-0-521-85892-2 hardback

ISBN 978-0-521-71615-4 paperback

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DRUG ABUSE

This text provides a thorough understanding of the parameters of drug abuse, broadly defined. Conceptual issues regarding definitions of drug use, misuse, abuse, and dependence are discussed in full. In addition, this text serves as a comprehensive source of information on the etiology, prevention, and cessation of drug abuse. It organizes etiologic, prevention, and cessation information into neurobiological, cognitive, microsocial, and macrosocial/physical environmental units. For example, modification of neurobiological, cognitive, social, and larger socioenvironmental and physical environmental influences are addressed in separate chapters. This text addresses a variety of theoretical bases currently applied to the development of prevention and cessation programs, specific program content from empirically based model programs, and program processes and modalities. It is hoped that this text will facilitate advancement in the arena of research on drug problems.

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Preface

The topics of drug misuse and abuse are anchored by the terms used to define or describe them. Using current economic strain-type terminology, the annual economic cost of “drug abuse” has been estimated to be approximately \$600 billion worldwide and \$200 billion in the United States (Sussman & Ames, 2001). Approximately 70% of the costs are related to *decreased productivity* (illness, premature death, and incarceration), 10% are due to the *costs related to health care* (prevention, treatment, and hospitalization), and 20% of the costs are related to *property damage and enforcement efforts* (Office of National Drug Control Policy, 2001; Sussman & Ames, 2001).

Misuse of drugs by the general public incurs a notable percentage of these costs. For many people, drug misuse appears to be a voluntary, social behavior. There are people who feel reasonably comfortable with themselves and their lives but may misuse some drugs (particularly alcohol and tobacco but also other drugs, such as over-the-counter medications) on occasion as a part of celebratory rituals or to relieve disease symptoms. These people may have succumbed to social pressures to celebrate or may lack information on how to use a drug or drugs correctly, which could lead to negative consequences.

The misuse of drugs can lead to accidents and brief periods of nonproductivity. The probability of anyone suffering an accident that causes potential injury (usually minor) nears 100% over the course of many years. Many “normal” people consider “living life” and using a drug as increasing the likelihood of experiencing an accident. Of course, drug misuse may increase the odds of an accident occurring in the near future because of effects that may impair coordination and planning skills. Public campaigns that (1) attempt to make drug misuse a less acceptable behavior, (2) provide instruction on proper use of nonprescription and prescription drugs, or (3) provide means to reconcile the costs of prohibition with the costs to society morale and productivity are quite important to reduce drug use-related costs for a wide audience.

For many people, drug cessation also appears to be a voluntary, self-directed effort. Certainly, some of these people may die because they make unwise choices pertaining to their drug misuse. However, deaths among these people demonstrate a pattern of behavior in which drug use is a relatively minor part of their lives, more specifically that they hardly used drugs and/or used very little or that they often only used drugs on occasions socially deemed as appropriate. We doubt that everyone who is drunk on New Year’s Eve or at a rock concert is somehow physiologically abnormal and prone to negative drug consequences.

There are also some drug users who experience a more dramatic and elongated fate. Some people continue to misuse drugs even though they routinely experience negative consequences. In other words, they experience recurrent, consequential behavior that bewilders the drug user as well as the observer. A continuum notion of drug misuse helps in the clarification of behavior (Sussman & Ames, 2001). One may place drug misuse on a continuum of drug involvement, consisting perhaps of (1) frequency or quantity of use, (2) subjective degree of lack of control over frequency or quantity of use, (3) preoccupation with use to the exclusion of other activities, or (4) public consequences of use. People at one end of the continuum may misuse drugs as a participant in an occasional social event (e.g., a holiday). They may have subjective control over the occasion and the amount consumed, although they occasionally may overuse drugs and suffer the adverse consequences as a “mistake.” They may view each decision to use or overuse drugs as a conscious decision, not as an impulse over which they have no control.

Persons on the other end of the continuum use drugs frequently or use too much on most use occasions. They may report a subjective degree of lack of control over frequency or quantity of use, or perhaps they think they are in control; however, others observe their drug use as adversely and repetitively affecting their lives. They suffer numerous public consequences of use that hardly appear to be merely a rare mistake of judgment. They may try to limit their exposure to public settings to reduce the probability of public consequences. They may feel surprised, confused, or frustrated by the changes they experience in their behavior as a result of drug intake. If they try to reduce or discontinue their drug use, they may find, to their surprise, that they are unsuccessful.

Regarding recurrent and consequential drug misuse, researchers may have chosen the wrong outcome variable as the focus. In particular, drug abuse, drug misuse, or drug use may not be the right dependent (outcome) variable. “Drug abuse” generally refers to an official definition involving legal, social, safety, and role-based consequences stemming from recurrent drug use (American Psychiatric Association, 2000). This concept provides the rudiments for diagnosing a problem, but it does not provide three useful behavioral determinants of outcomes for more valid diagnoses: *etiology*, *process*, and *prognosis*. A variety of social and environmental variables predict diagnosable consequences of risky lifestyle behaviors that make identification of a consistent process for diagnosis difficult. For example, the behavior of getting drunk and using public transportation to get home likely has different consequences than the behavior of getting drunk and attempting to drive home. The likelihood of using public transportation is contingent in part on its availability. Of course, it might be difficult to defend an argument that adding a bus system can avert drug abuse. The point is that much of the variation in the behavior is unexplained when examining whether certain consequences occur, because very complex situational factors may affect the occurrence of consequences.

Another difficulty in establishing an etiology or process to a drug abuse diagnosis is that behavioral consequences are defined in part by the social context within which they occur. For example, drinking too much at a wedding may be considered appropriate in some groups, whereas it may be inappropriate in other groups. Further, a set of consequences describes or defines the result of a behavior but does not explain the reasons for the behavior that precedes the consequences (etiology). Many people in recovery from drug abuse will suggest that drug use was a solution “to the problem” at first. Unfortunately, even after drug use begins to cause more problems than it solves, physiological and psychological

dependence mechanisms make cessation extremely difficult for some people. Drug use behavior may then become a more attractive option than experiencing withdrawal symptoms (Sussman & Unger, 2004) or the unmedicated realization of the years of devastation one may have caused to self or others. (In addition, drug use may still feel good.) Thus, the etiology of trying drugs, continuing to use them, or maintaining drug use after consequences set in may differ and may not easily confirm or disconfirm a particular etiological system.

Using “drug misuse” as an outcome variable, although not bounded by an official set of criteria, is fraught with value-laden biases. That is, drug misuse to one person or in one culture may not be considered drug misuse to another person or in another culture. Any recreational drug use may be considered drug misuse to some groups (e.g., Church of the Latter Day Saints and Scientology) but may be considered normative to other groups (e.g., Rastafarians and the Church of Spiritual Enlightenment). Drug misuse also may vary in meaning over time (see Chapter 2 of this text on the ancient history of drug use).

Using the term *drug use* as an outcome variable could imply that all drug use is dangerous or immoral. It is useful to remember that at some points and locations in history, the mere use of a range of available psychoactive substances was labeled as deviance, with users being called “sinners,” which was then followed (e.g., in the United States in the 1920s) by a period of criminalization. The “medicalization” and “pathologization” of substance use (disorders) and users is a relatively recent process (e.g., Terry & Pellens, 1928). In summary, these three drug behavior terms do little to help explain the difficulties in living experienced by persons at the relatively “hopeless” end of the continuum.

Related work on problem behavior syndromes, process and substance addictions, and notions of substitute addictions suggests that people on that “problem” extreme of the continuum will engage in different behaviors that are problematic for very similar reasons (Sussman & Ames, 2001). These behaviors may include using various drugs, gambling, compulsive sex or shopping, or even out-of-control eating. What then should be the focus of our work if not drug abuse, drug misuse, or drug use per se?

This text intends to provide a better understanding of the parameters of drug abuse, broadly defined. Simply put for the moment, one may assert that substance abuse is a multifactorial biopsychosocial process that involves a variety of negative consequences to the individual or to the individual’s social environment, involving not only environmental and social influences that may be amenable to change but also intraindividual differences in susceptibility resulting from a complex interplay of genetic influences on neurobiological processes that affect personality, affect, and cognition. We present one general systems model that illustrates a process that can lead to and maintain problematic drug use.

In addition, this text serves as a comprehensive source of information on the prevention and cessation of tobacco and other substance abuse. Many of the intraindividual influences (e.g., neurobiological) are more difficult to change or simply are not changeable with current methods and technology, but nevertheless, they play a significant role in substance abuse vulnerability and eventually may be amenable to modification. Modification of neurobiological, cognitive, social, and larger socioenvironmental and physical environmental influences are addressed. This text addresses a variety of theoretical bases currently applied to the development of prevention and cessation programs, specific program content from empirically based model programs, and program processes and modalities (settings of delivery). We have organized etiologic, prevention, and cessation information into neurobiological, cognitive, microsocial, and macrosocial units.

This text, although serving as a scholarly source for researchers, also intends to be of relevance to educated practitioners, drug dependency counselors, and students. The text provides a thorough, integrative perspective toward drug abuse and its prevention and cessation for different contexts and populations.

Acknowledgments

We thank the University of Southern California, the National Institute on Drug Abuse, and the California Tobacco-Related Disease Research Program for giving us the flexibility to write this text. We also thank Cambridge University Press, Philip Laughlin, and Eric Schwartz for their interest in working with us. We have tried to provide an international relevance to the book, and we thank all of our colleagues around the world who have helped us think globally. Also, we thank Beth Howard, Pallav Pokhrel, and Katie Greczylo for their editorial assistance and Alan Stacy for providing a flexible and supportive research environment. We also want to thank the people in our lives who taught us how to think outside the box (Alan Sussman, Harry Upshaw, Alexander Rosen, Robert Rychtarik, Brian Flay, and Michael Borens). Finally, we thank our families (Rotchana, Guang, Evan, Max, Mikey, Terry, Bill, Karen, Pam, Marc, and Ethel) for providing the balance in our lives that made it possible to go for the big picture.

This book is dedicated to the memory of Karen Anne Ames, a beloved sister, friend, and incredible scholar.

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SECTION ONE

CONCEPTS AND CLASSES OF DRUGS

1 Concepts of Drugs, Drug Use, Misuse, and Abuse

First the man took a drink, then the drink took a drink, then the drink took the man.

– Recovery movement proverb

This first chapter provides a discussion and clarification of various concepts relevant to drug abuse. Although we attempt clarification of many terms and concepts, it is important to note that there are different substantive distinctions and “fuzzy” boundaries between the concepts. For example, distinctions between drug misuse and abuse, and terms such as *street drugs* or *hard* or *soft drugs* are somewhat ambiguous and perhaps dependent on sociocultural contexts. The chapter begins by providing an overview of a definition of a drug, drug use, and drug action and then distinguishes drug use from misuse and provides terms used to refer to drugs that might be misused.

What Is a Drug and Drug Use?

A drug is a substance that can be taken into the human body and, once taken, alters some processes within the body. Drugs can be used in the diagnosis, prevention, or treatment of a disease. Some drugs are used to kill bacteria and help the body recover from infections. Some drugs assist in terminating headaches. Some drugs cross the blood–brain barrier and affect neurotransmitter function. The varieties of drugs that produce a direct or indirect effect on neurotransmitter function in the brain are of primary interest in this book.

Drugs are processed by the body in four steps, and these drugs also may have various effects on each other when used together. First, “administration” refers to how the drug enters the body (e.g., ingestion [swallowing], inhalation [smoking or vaporous], injection [intravenous, intramuscular, subcutaneous], or absorption [through skin or mucous membranes]). Most classes of drugs are used through several alternative methods. For example, marijuana may be smoked or swallowed. Methamphetamine may be smoked, swallowed, sniffed, or injected. Heroin may be sniffed, smoked, or injected. Depending on the method of administration, drugs generally exert their effects within an hour of intake (e.g., through ingestion) or within minutes or seconds of use (e.g., through injection).

Second, *distribution* refers to how efficiently a drug moves throughout the body. Distribution is influenced by the size of the various drug molecules and their solubility – protein, water, fat bound – among other factors. As a general rule, the rate of entry of a drug into the brain is determined by the fat solubility of the drug (Julien, 2005). The rate of entry is faster

if the fat solubility is greater. Conversely, highly ionized drugs, such as penicillin, penetrate the blood–brain barrier poorly.

Third, *metabolism* refers to the effects (action) of the drug. All drugs that might be misused or abused “feel good” in different ways; for example, the drug user may feel more alert, relaxed, or happy. Almost all drugs that are misused or abused affect mesolimbic reward pathways. However, each drug also may have specific target receptor sites in various brain structures and affect some different neurotransmitter pathways (see Chapter 4 for more detail on the brain). For example, there are concentrations of opioid receptors in the nucleus accumbens, whereas functionally important nicotinic receptors are found in the medial habenula, the superior colliculus, and the anteroventral thalamic and interpeduncular nuclei. Amphetamines mimic the effect of norepinephrine at its receptor sites and significantly impact dopaminergic activity in the mesolimbic reward circuitry. Benzodiazepines (e.g., Valium) are less likely to be a sole drug of abuse (though they are associated with withdrawal symptoms that may last 3 weeks), perhaps because they act primarily on the γ -aminobutyric acid (GABA) neurotransmitter system and not the dopaminergic system (Julien, 2005).

Drugs can have four different types of *interaction effects* when used together (Sussman & Ames, 2001). First, these effects may be additive (e.g., $1 + 1 = 2$; the effects of the drugs simply add together). Second, these effects may be synergic (e.g., $1 \times 1 = 5$; the effects become much, much stronger when the drugs are used together). Third, these effects may be potentiating (e.g., $0 + 1 = 2$; a drug may exert its effects only in conjunction with the use of another drug). Finally, these effects may be antagonistic (e.g., $1 - 1 = 0$; the effects of two or more drugs may cancel each other out).

Fourth, *elimination* refers to the breakdown and excretion of drugs from a body. Drugs are excreted in time primarily through sweating or urination, involving the skin and kidneys. Drugs have measurable and differential distribution and elimination half-lives (i.e., the amount of time it takes for half of the drug to reach sites of action and be eliminated from the body). For example, nicotine, when smoked in a cigarette, has a 9-minute distribution half-life (very fast) and a 2-hour elimination half-life. Marijuana, when smoked, has a similar distribution half-life, but it also has a 28- to 56-hour elimination half-life, which involves complex metabolic processes. Nicotine is metabolized mostly through the liver, whereas tetrahydrocannabinol (THC; the active ingredient of marijuana) may be stored and released slowly from various bodily organs. As a general rule, regular interval dosing can result in a relatively steady blood level concentration of the drug that is reached after approximately six elimination half-lives (see Julien, 2005).

Overdoses

Overdosing refers to taking enough of a drug such that functioning is grossly impaired and even survival may be jeopardized. Regarding drug use action, there are doses that produce the intended effect for a percentage of drug users (i.e., effective dose) and a dose that will kill the drug user (i.e., lethal dose). Different means of administration, time for distribution, time for action, time for elimination, and context factors may affect the effective-to-lethal dose relation. Overdosing often refers to reaching a near-fatal dose but not always; it may also mean loss of function such that special care is needed (Figure 1.1).

Overdosing tends to result in admissions to emergency rooms. About 31% of emergency room visits in the United States are due to the combined use of alcohol and other drugs.

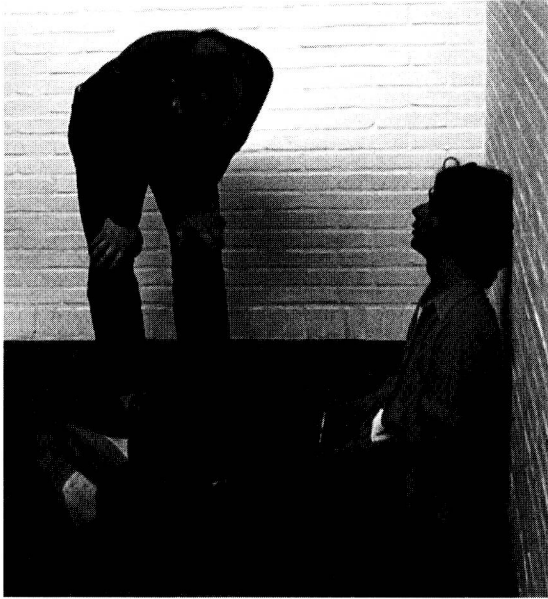


Figure 1.1. Drug addiction.

Of those individuals admitted for overdoses, approximately 30% are admitted because of cocaine use, 18% because of marijuana use, 17% because of use of benzodiazepines, 17% because of use of narcotic drugs (14% because of heroin use), 6% because of amphetamine or methamphetamine use, and the remainder are admitted because of use of drugs such as Tylenol or Advil, selective serotonin reuptake inhibitors (SSRIs), and sedatives (see discussion in Levinthal, 2005).

An overdose is less likely to occur if a drug is used in the same location (known as “behavioral tolerance”). Physiological tolerance for a drug involves adjustment in bodily organs to the presence of the drug (metabolic tolerance; e.g., faster metabolism of alcohol in the liver with repeated alcohol intake) and neural adaptations to a drug (cellular tolerance; postsynaptic receptors may become less sensitive to a drug and presynaptic sites may manufacture less of an endogenous ligand [naturally occurring neurotransmitter] to compensate for the introduction of the drug that mimics its effects; for a drug that blocks transmission, an increased number of receptor sites may be manufactured or an increased amount of the endogenous ligand may be supplied), which also may effect the lethal dose. Of course, regular use of drugs can lead to physical dependence (i.e., physical and/or psychological withdrawal symptoms occur when drug use is stopped abruptly). Craving the effects a drug produces can be referred to as “psychological dependence,” which is affected by neurobiological processes (e.g., associative learning processes; for discussion, see Weiss, 2005; for review, see Franken, 2003).

What Are Drugs of Misuse?

Drug use really implies only that one has taken a drug into the body and that the drug will go through the four steps of processing. However, the whole idea of problematic drug use stems

from the perception that drug use can lead to negative or undesired consequences. There are at least three terms that may be applied to use of a drug: use as appropriate, directed, or prescribed. Use as appropriate implies that there are no specific directions for frequency and quantity of use. However, one generally learns bounds of frequency and quantity of use that generally do not lead to undesirable consequences. For example, drinking one or two alcoholic drinks in a sitting over the course of several hours is unlikely to result in negative effects (e.g., obvious intoxication, depending on the context, or accidents). Use as directed connotes that there exists instruction on use frequency and quantity. Over-the-counter drugs provide such instructions. Finally, for drugs that require a physician's approval, a prescription is provided that also describes the active or safe frequency and quantity of use. If a drug is used inappropriately, not as directed, or not as prescribed, one might say that the drug is being misused. Of course, one might use too little of a drug for it to be effective. Arguably, that would be an example of drug misuse. However, most drugs that affect neurotransmitter function are said to be misused when they are used too often and/or at too high a quantity. Higher drug use may lead to danger (e.g., toxicity, intoxication), whereas lower than recommended use probably will not.

The U.S. Drug Enforcement Administration (DEA) was created in 1973 to enforce the provisions of the Controlled Substances Act of 1970 (<http://www.usdoj.gov/dea/index.htm>). The DEA shares concurrent jurisdiction with the U.S. Federal Bureau of Investigation regarding narcotics enforcement matters. The Controlled Substances Act provides the authority and administrative structure to establish scheduling of drugs to avoid hazards to public safety, monitoring of use of different drugs, including manufacture, distribution and labeling, and offences and penalties for violations of the rules the DEA establishes. Some rules also extend to drug paraphernalia. These drug schedules with examples are shown in Table 1.1.

The types of drugs of misuse that this text focuses on are those that are relatively likely to cause negative consequences if used too often or at too high a quantity, that generally tend to readily cross the blood–brain barrier and affect neurotransmitter function, and that in some way achieve a function desired by the drug user. Desired functions of these drugs tend to be described as alterations in arousal, affect, or sensory perception/cognitive experience. Drugs that alter arousal, affect, or sensory-cognitive experience often are referred to by one or more terms.

Terms Used to Refer to Drugs That Might Be Misused

Drugs that affect the central nervous system (CNS) can be classified by the substance from which they are derived, such as *opiates* or *opioids*, or by their effects on the human nervous system, such as *stimulants*, *hallucinogenic drugs*, or *psychotropic drugs* (Julien, 2005). Although there might be overlap in the drugs that each of these terms encompasses, these terms are relatively unbiased. (Certainly, for example, there are exceptions that might be defined across categories; ecstasy may be defined alternatively as a stimulant or a hallucinogen or both.) There are several typologies of classes of drugs that are not purely based on physical qualities of drugs. We briefly discuss five widely applied terms: *street drugs*, *hard or soft drugs*, *illicit drugs*, *designer drugs*, and *club drugs*. We discuss the meaning of these terms and consider the usefulness of such variable drug terminology (see Sussman & Huver, 2006).