

ADDICTIVE BEHAVIORS: ETIOLOGY AND TREATMENT

G. Alan Marlatt and John S. Baer

Department of Psychology, NI-25, University of Washington, Seattle, Washington 98195

Dennis M. Donovan and Daniel R. Kivlahan

Seattle Veterans Administration Medical Center, Department of Psychiatric and Behavioral Sciences, University of Washington, ZB-20, Seattle, Washington 98195

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INTRODUCTION AND OVERVIEW

Here we provide a selective review of significant evolving trends in the study of addictive behavior, especially those deriving from psychology and the behavioral sciences. As clinical psychologists, we focus on contributions having significant implications for the prevention and treatment of addiction problems. We therefore highlight studies involving human subjects over animal studies. Another bias is our common theoretical orientation, a perspective based on social-learning theory and on cognitive-behavioral principles. We embrace a commonalities approach for a variety of addictive behaviors, but emphasize alcohol abuse and alcoholism, the most costly of addiction problems in terms of frequency of usage and potential for harm. We refer to other substance abuses for illustrative purposes. Finally, we have limited our coverage to literature since 1980, and to review articles when these are available.

The chapter begins with an overview of the domain of addictive behaviors. Examples of these behaviors are provided, along with some of their defining characteristics. Various conceptual models of addiction are then outlined and critiqued. An emerging *biopsychosocial model* is described that posits multiple etiological determinants. One important component of this model is a *stages-of-change* analysis, based on the assumption that processes associated with becoming addicted and with the subsequent modification of this behavior appear to fall into discrete developmental stages. The bulk of our literature review is organized in terms of the stages-of-change model.

CONCEPTUAL MODELS OF ADDICTIVE BEHAVIOR

A spate of recent books describes a variety of addictive behaviors, including drinking, smoking, other forms of substance abuse, eating, gambling, compulsive sexual behaviors, and sometimes even “addictive relationships” (Levison et al 1983; Miller 1980; Mule 1981; Orford 1985; Peele 1985). These authors delineate the “addictive” potential of these behaviors by the use of adjectives such as compulsive, excessive, impulsive, uncontrolled, indulgent, etc. We define addictive behavior as a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems. Addictive behaviors are often experienced subjectively as “loss of control”—the behavior continues to occur despite volitional attempts to abstain or moderate use. These habit patterns are typically characterized by immediate gratification (short-term reward), often coupled with delayed, deleterious effects (long-term costs). Attempts to change an addictive behavior (via treatment or by self-initiation) are typically marked by high relapse rates.

A variety of approaches to the development (etiology) of addiction and to

the modification of these behaviors have been described (e.g. Peele 1985; Shaffer 1985). A model of helping and coping outlined by Brickman et al (1982) clarifies various conceptual approaches to understanding addictive behavior. In their analysis, Brickman and his colleagues posed the following two questions: (a) To what extent is the person considered responsible for the initial development of the problem? (b) To what extent is the person held responsible for changing the behavior or solving the problem? Based on responses to these two attributional questions, four general models were derived: the *moral model* (person is held responsible for both acquiring and solving the problem), the *medical/disease model* (person is held responsible neither for the etiology nor for the solution), the *enlightenment model* (person is responsible for development of the addiction but is incapable of changing without the help of a "higher power"), and the *compensatory model* (although the person is not held responsible for etiology, change is considered to be a personal responsibility).

The moral model has little support in the contemporary addictions literature, although this approach was predominant during Prohibition (Strug et al 1986). From the perspective of the moral model, addiction is viewed as a sign of weak character; addicts are urged to exercise greater willpower to overcome their sins. In the enlightenment model, so-called because it emphasizes enlightening people about the "true nature" of their addiction, change is possible only by relinquishing personal control to a higher power or collective entity. Brickman places the various anonymous self-help groups (e.g. Alcoholics Anonymous and Narcotics Anonymous) in this category. The self-help literature has recently been reviewed by Gartner & Riessman (1984).

The disease model of addiction developed as an alternative to the victim-blaming orientation of the moral and enlightenment models. First applied to alcoholism (e.g. Milam & Ketcham 1981; Royce 1981; Wallace 1985a), the disease model has been extended to include other forms of addiction (e.g. Norwood 1985). In conjunction with A.A., the disease model represents the dominant approach in American treatment programs (e.g. S. Brown 1985). Most recent advocates of a disease model hypothesize an underlying disease process with an emphasis on physical dependency (Tabakoff & Rothstein 1983), genetic predisposition (e.g. Crabbe et al 1985; Murray et al 1983; Murray & Stabenau 1982; Petrakis 1985; Schuckit 1983; Swinson 1983), and the assumption that the disease is progressive (Knott et al 1987; Mandell 1983).

Despite advantages of the clinical application of the disease model (e.g. allowing people to seek help without being blamed for their addictive behavior), there are several shortcomings associated with using this model as a scientific theory of addiction (Shaffer 1985; Peele 1986). Initially, because of notions about biological/genetic specificity, disease models of addiction fail

to account for *commonalities* among addictions, including addictions that do not involve substance use (e.g., compulsive gambling or sexual behavior). Furthermore, disease models of etiology suggest that individuals are not responsible for changing their behavior, and thus these models stop short of explaining how and why many people appear to overcome their addictions without any treatment or professional assistance (Armor & Meshkoff 1983; Perri 1985) or why they seem to benefit from a variety of different treatment approaches (Cox 1987a; Miller & Heather 1986; Perri 1985).

The final model outlined by Brickman is the compensatory model. Here individuals are not considered responsible for the initial development of the problem (since the etiology of the problem involves biological and learning factors beyond individual control) but are assumed to be capable of “compensating” for the addiction by taking an active, responsible role in the change process. Central to the compensatory model is the notion that addiction can best be understood as learned adaptive or functional behavior in the context of personal and environmental factors—i.e. that drug use or other addictive activity is motivated by the individual’s attempt to adapt to stress (including stress associated with the consequences of drug use) rather than by simple exposure to addictive substances (Alexander & Hadaway 1982; Peele 1985; Pohorecky & Brick 1983). Recognizing that addiction has multiple determinants, some theorists have suggested that addiction is best described as a biopsychosocial problem (e.g. Collins & Marlatt 1983; Donovan 1987; Ewing 1980; Galizio & Maisto 1985b; Zucker & Gomberg 1986).

Such a conceptualization of addiction attempts to study commonalities across addictive behaviors. In brief, biological processes may increase the risk of developing a dependency in the context of environmental factors (Connors & Tarbox 1985). Learning factors, such as classical and operant conditioning, observational and social learning, and higher-order cognitive processes such as beliefs, expectancies, and attributions are all apparently common to addictive processes. The development of conditioned responses to drug cues (L. H. Baker et al 1987) and conditioned tolerance effects (Tiffany & Baker 1986) are examples. Assessment of outcome expectancies associated with alcohol use has provided a wealth of information critical to understanding how psychological dependency develops (Goldman et al 1987; Lang & Michalec 1987; Marlatt 1987). Addictive behavior is often characterized by biphasic reinforcement effects (an initial positive response followed by subsequent negative responses) (Marlatt 1987), and can be understood using opponent process theories (Shipley 1987). Hedonic responses to drugs may have common neurological bases (Bloom 1983; Simon 1983). Finally, addictive behaviors are not continuous processes but follow common stages of change (Prochaska & DiClemente 1985, 1986). Although terminology differs among investigators, the usual sequence includes the initiation of the addictive

behavior (experimentation and the acquisition of dependency), the transition to maintenance of ongoing use (sometimes called the “precontemplation stage”), and active change itself (attempts at reduction or cessation of addictive behavior). The behavior-change sequence (if it occurs) is further divided into three component stages: contemplation and motivation for change, active commitment to change (either self-initiated or treatment-aided), and finally postchange maintenance (successful change vs relapse). In the following sections, each of these stages is examined in greater detail with illustrations from the recent literature.

INITIATION PHASE

We assume a broad definition of initiation, encompassing biological, social, and physiological issues related to risk and initial use of addictive agents. We begin with research related to risk of addiction, before any substance has been encountered. Research on initial use and abuse of drugs is reviewed next, followed by interventions directed at early developmental stages of drug use. More complete reviews of this literature can be found in Galanter (1983, 1985) and Silbereisen et al (1986).

Genetic and Heritability Studies

The current literature frequently states that children of alcoholics are four times as likely to develop alcoholism as children of nonalcoholics, based on data derived from adoption and twin studies (Murray et al 1983; Peele 1986; Schuckit 1987).

The magnitude and dimensionality of this relationship continues to be a research question, however (Peele 1986). The operational definition of alcohol-related problems is a key issue (Alterman & Tarter 1986; Murray et al 1983). Some studies report strong heritability for heavy drinking, but little heritability for “loss of control” or social complications (Cloninger 1983). Other studies suggest heritability of dependency but not abusive drinking. The relatively high level of heritability is seen most clearly in the male children of male alcoholics, and less strongly in female children, when either parent is an alcoholic (Peele 1986).

These inconsistencies have led several authors to suggest typologies of heritability (Alterman & Tarter 1986; Cloninger 1983; reviewed below). Genetic effects are thought to be polygenic, interacting with environmental factors (McClearn 1983). Exposure to an extended period of heavy drinking appears necessary for development of the syndrome (Cloninger et al 1985; Stabenau 1984).

To determine how this apparent genetic vulnerability to alcoholism is physiologically mediated, researchers usually have compared children of

alcoholics (so-called high-risk populations) to matched controls who have no alcoholism in their family. Data assessed via self-reports of subject intoxication and body sway (static ataxia) when blood alcohol levels and expectations have been controlled have documented that sons of alcoholics, on average, respond less intensely to moderate doses of ethanol (O'Malley & Maisto 1985; Schuckit 1984). Such group differences in subjective response may indicate increased initial tolerance to ethanol, and may be related to differential cortisol and/or prolactin responses (Schuckit et al 1987a,b). Children of alcoholics tend to have decreased EEG alpha rhythms, a characteristic of practicing alcoholics (Propping et al 1981). Sons of alcoholics also appear to have decreased event-related potentials (P300), with and without challenges of ethanol (Begleiter et al 1984). These results may suggest attentional or orienting differences. No conclusive data differentiate metabolic differences between high-risk populations and controls, although studies have found that high levels of acetaldehyde usually protect against development of alcoholism in certain ethnic groups (e.g. Asians) (Schuckit 1987).

Other research has examined behavioral and neuropsychological characteristics of children of alcoholics. Sons of alcoholics show poorer language-related functioning and learning achievement (Hedegus et al 1984), poorer verbal intellectual performance (Gabielli & Mednick 1983), and general neuropsychological differences (Schaeffer et al 1984). Not all studies find differences, however (Hesselbrock et al 1985). The most meaningful differences are found when sociopathy is controlled in both high-risk and control samples (Alterman & Tarter 1986).

There is considerable evidence that the alcohol problems of alcoholics with and without a family history of alcoholism have somewhat different courses. Alcoholic children of alcoholics are thought to show symptoms earlier (Penick et al 1978) and to have more severe symptomology (Frances et al 1984), more binge and morning drinking (Valicer et al 1984), and less control over drinking (Stabenau 1984). However, these differences may reflect characteristics of an antisocial personality syndrome, which may represent one type of alcoholism problem (Alterman & Tarter 1986; Cadoret et al 1987; see reviews of typologies below).

Studies of Adolescent Drug Use and Abuse

Since 1960, there have been several large-scale panel studies of the initiation of drug use among adolescents; the reader is referred to Chassin (1984), Long & Scherl (1984), Jessor (1986), Kaplan (1985), and Sadava (1987). A number of consistent predictors of drug-use initiation and drug abuse have been found, including peer drug use, parent drug use, delinquency, parental sociopathy, poor self-esteem, lack of social conformity, and stressful life changes. [For a compendium of 43 theories of drug abuse, see Lettieri et al

(1980).] Recently, research emphasis has begun to focus on multivariate models of drug use in adolescence to determine patterns of drug use and interrelationships of these psychosocial factors.

Adolescent drug use appears to be one component of a syndrome of problem behaviors that may reflect a deviant or unconventional developmental pattern. Bivariate relationships among these variables, predictions from composite indexes, as well as recent factor analyses support this conceptualization (Donovan & Jessor 1985). Drug involvement develops in stages, beginning with beer and wine, moving to liquor and cigarettes, then to marijuana and other illicit drugs. Different social and psychological factors differentially predict initiation of different kinds and levels of drug use (Yamaguchi & Kandel 1984).

Complex models of family and social influences are being explored. Zucker & Noll (1982) have suggested that drug use is influenced directly by intraindividual (genetic and/or temperamental) factors, which are secondarily influenced by social variables (family and peers) and sociocultural and community factors. Predictive relationships are hypothesized to shift with developmental stages. For example, peer influences may be minimal at early ages but highly important at later adolescent stages (Zucker 1979). More recently, Zucker has suggested that some factors may be continuously related to drug and alcohol use (i.e. sociopathy, see below), whereas other factors are important only at certain developmental periods (Zucker 1987). Further research efforts have been directed at early parental influences on childhood knowledge of alcohol and its effects (see Zucker & Noll 1987 for a review).

Huba & Bentler (1982) have proposed a DOMAIN model of drug use development, which defines risk factors within biological, sociological, interpersonal, and intrapersonal domains of influence. This "metatheory" is a framework using latent-variable modeling procedures to define empirically the relative and causal roles of various risk factors. These techniques have been useful in describing, for example, that maternal drug use does not directly influence adolescent drug use, but appears to influence drug use indirectly through the development of deviant attitudes (Newcomb & Bentler 1987). Relatedly, Brook et al (1986) have suggested that certain positive characteristics of family and personality can ameliorate the risk factors stemming from peer involvement.

A host of other studies have begun to specify the roles of stressful life issues (P. Baer et al 1987; Newcomb & Harlow 1986), self-derogation (Kaplan 1985), and role status and social environments (Bachman et al 1984) within broad multivariate frameworks. The many correlates of drug abuse have also been used in a risk-factor analysis of drug involvement (Bry et al 1982; Newcomb et al 1986). In both studies, strong relationships were obtained between the number of risk factors present for an individual and the amount of drug use.

Primary and Secondary Intervention

A great deal of national interest and money has recently been directed at interventions to prevent initiation of adolescent drug and alcohol use. These clinical programs are generally considered primary interventions, organized for entire schools or communities (see Glynn et al 1983; Nathan & Niaura 1987; Schaps et al 1981 for reviews). Programs generally derived from successful anti-smoking campaigns in schools (Flay 1985), health promotion programs for cardiovascular risk (Johnson & Solis 1983), and personal competency training with adolescents (Botvin 1983). The vast majority of intervention programs are poorly evaluated, and most show only minor effectiveness in changing attitudes and behavior (Schaps et al 1981). One carefully controlled study with a two-year follow-up (Project Smart) supports the use of social-skills training programs over values clarification and personal/stress coping approaches (W. B. Hansen et al 1987, unpublished). Other skills-training programs have been adapted with some success to specific ethnic groups, such as Native Americans (Gilchrist et al 1987). Large-scale media campaigns have varying impact (Flay & Sobel 1983).

Recently some attempts have been directed at high-risk groups (secondary prevention) within families. Both Zucker (Zucker 1987, Zucker & Noll 1982) and Patterson (Dishion et al 1987) have developed programs designed for families with conduct-disordered youth. Conduct disorder is highly associated with drug abuse and is thought to be characteristic of chaotic family patterns. Parent-training programs are used to facilitate better parental monitoring and control of adolescent drug use.

Two large-scale information and intervention campaigns directed at alcohol and drug use on college campuses were generally unsuccessful (Kraft 1984; Mills & McCarty 1983). On the other hand, cognitive-behavioral skills-training programs designed specifically for college students who drink at high levels have yielded encouraging initial results (Kivlahan et al 1987).

TRANSITION AND MAINTENANCE OF ADDICTIVE BEHAVIOR

An important factor in the addictive process is the transition from social to deviant drinking patterns (Edwards 1984). Factors likely to be involved in these processes are related to (a) the pharmacological effects of the drug; (b) the user's psychological set (including personality function, attitudes, mood states, and expectations concerning the drug's effect on physical function, feelings, thinking, and behavior); and (c) the complex system of physical and social stimuli that comprise the setting in which the drug is used (Donovan 1987; Galizio & Maisto 1985a; Peele 1985; Wallace 1985b; Zinberg 1984).

This section briefly reviews the salient factors that may contribute both to

the transition from initial to problematic use of alcohol and drugs and to the maintenance and escalation of problematic use. Broader and more detailed reviews of such factors are available in a number of recent books (T. B. Baker & Cannon 1987; Blane & Leonard 1987; Chaudron & Wilkinson 1987; Cox 1987b; Donovan & Marlatt 1987; Galanter 1986, 1987; Galizio & Maisto 1985b; Miller & Heather 1986).

Epidemiological Studies

The few long-term prospective studies that exist indicate that most adolescents who drink heavily moderate their alcohol use in later life (Donovan et al 1983; Fillmore & Midanik 1984; Kandel & Logan 1984). By age 21, those who have not initiated use of cigarettes, alcohol, or marijuana are unlikely to do so. Initiation of cocaine continues in the 20s, but this finding may reflect period or cohort effects (Raveis & Kandel 1987).

Recently, Newcomb (1987) has reviewed theory and relevant data pertaining to the effects of adolescent drug use. He concludes that only modest data exist to document the socially held notion that experimentation with drugs is dangerous for long-term physical and mental health. Of primary interest to us here are the characteristics of adolescent drug use that may be associated with later problem use. Intensity of prior use has significantly predicted later use in one sample (Raveis & Kandel 1987). In other samples, the breadth or range of involvement with alcohol (Fillmore & Midanik 1984) and the degree of problem involvement (Donovan et al 1983) have been suggested as better predictors of future alcohol problems. Such longitudinal studies, if continued into the next decade, will no doubt provide valuable prospective information about the transition from adolescent use to adult problem use.

Personality

Researchers have continued to focus on the personality structure of individuals who ultimately develop problems with alcohol and drugs. Cox (1985) noted over 1500 references in the PsyINFO data base related to personality and alcoholism, drug abuse, and other addictive behaviors, but he and others have found a number of methodological problems in research on personality and addiction (Cox 1985; Donovan et al 1986). Measured features of personality or psychopathology may represent antecedents, concomitants, or consequences of substance abuse (or be independent of it), but these features further complicate the interpretation of the underlying relationship (Meyer 1986; Nathan 1987).

The most consistent finding is that many substance abusers have a history of antisocial behavior (e.g. nonconformity, acting out, and impulsivity) and a high level of depression and/or low self-esteem (Cox 1985; Nathan 1987; Tarter et al 1985; Vaillant 1983; Vaillant & Milofsky 1982; Zucker &

Gomberg 1986). Depression and low self-esteem are more likely to be concomitants of either the social conditions surrounding the substance abuse or the pharmacological effects of the substances themselves. Although anti-social behavior may precede the initial signs of alcohol problems and is relatively specific as a precursor to this disorder, Nathan (1987) questions the viability of personality as the determining factor. He notes that a constellation of behaviors and overt acts are predictive of later substance use problems. Nathan finds that the base rates of such acts in the general population are high, that a large number of abusers have never demonstrated antisocial behavior, and that many individuals who have manifested such behaviors in their earlier life do not develop addictive behaviors. He concludes that the predictive utility of antisocial behavior, as a personality construct, is uncertain at best.

An additional inference to be drawn from his conclusion is that individuals at risk exhibit excessive behaviors reflecting their lack of appropriate self-control and coping skills. This, in turn, may contribute to their subsequent substance abuse by providing both a psychological set and social setting in which they are exposed to a variety of role models for the use of alcohol and drugs as part of a general life-style, as a method of gaining social inclusion and reinforcement, and as a means of trying to cope with and exert control over certain areas of their lives (Donovan & O'Leary 1983; Orford 1985; Rodin et al 1984; Wills & Shiffman 1985). This behavior at pattern of drug and alcohol abuse may represent one subtype of drug-related problems (reviewed below).

Drug Effects

Once a substance has been ingested, a number of psychopharmacological factors become operative in determining whether the individual will continue to use the drug (Bardo & Risner 1985; Barrett 1985; Matuschka 1985). Any model of addictive behavior must consider the direct tropic effects of alcohol and drugs of abuse and distinguish them from the indirect behavioral manifestations of these substances (Kaufmann et al 1985; Peele 1985; Zinberg 1984). Distinguishing tropic effects from behavioral manifestations is difficult for three reasons. First, the same drug will have differing pharmacological actions at different dose levels and at different phases of its intake/excretion (e.g. ascending versus descending blood alcohol levels). Second, different drugs within the same class share similar pharmacological properties and behavioral manifestations. Third, the pattern of changes at an affective level may vary across time but appear to be similar across different classes of drugs (Bardo & Risner 1985; Barrett 1985; Donegan et al 1983; Matuschka 1985; Shipley 1987; Solomon 1980; Stewart et al 1984).

The most notable feature of drugs of abuse is that they appear to produce an

initial positive affective state or reinforcement (Barrett 1985; Hunt 1987a,b). A corollary is that all psychoactive drugs that are abused produce some alteration in the chemical signals transmitted within the central nervous system. Changes in these neurotransmitters or their receptor sites may mediate the positively reinforcing properties of such substances; the most promising candidates to date are the catecholamines, particularly dopamine and serotonin, and the endogenous opioids (Bardo & Risner 1985; Hunt 1987a,b).

The initial pleasurable feelings associated with drugs of abuse appear to motivate people to continue using them—the positive “hedonic” state that immediately follows drug use is preferred to the state that existed prior to the use (Barrett 1985). Haertzen et al (1983) found that the degree of perceived reinforcement associated with the first drug experience was directly related to the magnitude of the subsequent drug habit; this relationship held for all classes of drugs sampled except for caffeine and nicotine. Barrett (1985) concluded that it is unnecessary for drug users to feel good or to experience euphoria to motivate continued use, but only that they feel better shortly after taking the drug than they did immediately before. This suggests that an important parameter is the relative mood-enhancing properties of the drug, even after chronic use, rather than the absolute level of the resultant mood state.

Stewart et al (1984) and Cox (1987b) have presented incentive models of drug use based on approach behavior and the acquisition of positive affective motivational states. Through conditioning processes, those social and environmental stimuli, as well as the pharmacological effects of an initial dose of a drug after a period of not using it, acquire the power of conditioned positive incentive stimuli, which will generate a desire for the positive effects of the substance and motivate continued use.

Expectancy Factors

Pharmacological effects, by themselves, may be insufficient either to develop or maintain an abusive use pattern (Marlatt & Donovan 1981). As Lindesmith (1968) noted, addiction appears to be an interactive product of social learning in a situation involving physiological events as they are interpreted, labeled, and given meaning by the individual. Important in the latter process, representing the individual’s “set” (Zinberg 1984), are the individual’s expectations concerning the direct pharmacological and indirect behavioral, interpersonal, and social effects of the drug.

Two primary forms of expectancies have received considerable research attention in the addictions (Adesso 1985; Critchlow 1986; Donovan & Marlatt 1980; Goldman et al 1987; Lang & Michalec 1987; Oei & Jones 1986). Outcome expectancies represent an individual’s belief that alcohol or drugs

will produce a desired outcome, typically by providing a positive effect or by allowing him or her to avoid, minimize, or escape negative emotions or situations. Brown et al (1980) have found that a wide range of beliefs are held about alcohol's effects. The most notable and global is that alcohol serves as a positive transforming agent or a "magic elixir" (Marlatt 1987). Alcohol is expected to enhance social and physical pleasure, enhance sexual performance and responsiveness, increase power and aggression, increase social assertiveness, and reduce tension. These findings, based upon a self-report scale, parallel the results of a variety of early laboratory studies on the influence of alcohol and expectancies on behavior (Marlatt & Rohsenow 1980). The findings are also consistent with more recent theoretical and empirical perspectives concerning alcohol's tension-reducing or stress-response dampening effects (Cappell & Greeley 1987; Langenbucher & Nathan 1987; Marlatt 1987; Sher 1987; West & Sutker 1987).

Individuals may acquire their beliefs about alcohol's effects even before beginning to drink (Christiansen et al 1982). These early expectancies appear to be powerful predictors of both adolescent drinking status (Christiansen & Goldman 1983) and adult alcoholism (Christiansen et al 1985). However, drinking behavior may further reinforce and stabilize these beliefs. Both the nature and strength of alcohol-related outcome expectancies vary as a function of a family history of alcoholism (O'Malley & Maisto 1985), drinking status (e.g., Brown et al 1985; Connors et al 1986; Rohsenow 1983), dose levels or perceived levels of intoxication (Connors et al 1987; Southwick et al 1981), and the setting in which the drinking occurs (Sher 1985). In general, heavier drinkers expect more positive and fewer negative consequences from alcohol consumption than do light drinkers (Oei & Jones 1986). Also, the expectancies move from generalized to specific with increased drinking experiences (Adesso 1985).

A second form of expectancy that may play an important role in the maintenance of substance use are beliefs in self-efficacy (Bandura 1977). Self-efficacy is defined as an individual's belief about his or her ability to generate a behavior necessary to produce a desired outcome. Efficacy expectancies are important components in a number of theories of substance use and relapse (e.g. Donovan & Chaney 1985; Litman 1986; Marlatt & Gordon 1985; Rollnick & Heather 1982). These theories state that individuals are more likely to use a drug when they feel unable or incompetent to cope with stress or negative mood states. Although the construct of efficacy expectancies appears to be valuable heuristically, theoretically, and clinically, it has been less well researched than the construct of outcome expectancies. Most research using the construct of self-efficacy has been in smoking relapse (e.g. Baer et al 1986); the role of self-efficacy in the development and maintenance of substance use is less clear.

Tolerance and Dependence

The diminished response to a particular dose of a drug, or tolerance, is a central construct in addiction (Tabakoff & Rothstein 1983; Tiffany & Baker 1986). Less tolerance appears to develop to the reinforcing effects of drugs, whereas more tolerance may develop to certain aversive effects (Tiffany & Baker 1986). There is no consensus on the basic physiological or biochemical processes responsible for tolerance effects (Tabakoff & Rothstein 1983; Tiffany & Baker 1986). A number of psychological models, based upon the classical conditioning of compensatory responses (e.g. Newlin 1985; Shapiro & Nathan 1986; Siegel 1983) and habituation processes (Baker & Tiffany 1985), have been proposed. Although most assume that both tolerance and withdrawal are mediated by the same physiological mechanisms, this assumption has not been supported by recent findings (Tabakoff & Rothstein 1983; Tiffany & Baker 1986). Again, classical conditioning processes play an important role in the development and elicitation of withdrawal and the experience of craving (Baker et al 1987; Donegan et al 1983; Tabakoff & Rothstein 1983; Tiffany & Baker 1986). Increased drinking is predicted to achieve a previously obtained drug-related effect or to avoid the aversiveness of withdrawal distress.

Tolerance and withdrawal distress have been cornerstones in the definition of addiction and are necessary components in the differential diagnosis of alcohol abuse and dependence (American Psychiatric Association 1980, DSM-III). This distinction between abuse and dependence has not been empirically supported (Schuckit et al 1985). A multiple-syndrome approach to alcohol and drug dependence has gained in prominence (Wanberg & Horn 1983). Dependence is viewed as a multidimensional construct involving a system of subjective, behavioral, physiological, and biochemical components (Hodgson & Stockwell 1985). The dependence syndrome (Edwards 1986; Hodgson & Stockwell 1985) is described as a clustering of a number of key elements, including a narrowing of one's drinking or drug-using repertoire, an increased salience of alcohol- or drug-seeking behavior, increased tolerance, repeated withdrawal symptoms, relief or avoidance of withdrawal symptoms by further drinking or drug use, subjective awareness of a compulsion to drink or use drugs, and a tendency to relapse following abstinence.

The syndrome is not an all-or-none phenomenon, but rather occurs with graded intensity. Not all of the elements need always be present or present at the same degree within the clustering; however, as the intensity of the syndrome increases, there is a greater coherence among the elements. Once limited to describing alcohol dependence, the syndrome concept has been extended to and validated for drug dependence as well (Babor et al 1987a; Skinner & Goldberg 1986).

Skinner (1986) has suggested that there are both state- and trait-like com-

ponents of the dependence syndrome. The psychobiological elements (e.g. withdrawal, tolerance, relief drinking) appear to fluctuate in severity across situations as a function of the quantity of alcohol consumed and the time since a last drink. The behavioral and subjective elements (e.g. impaired control over drinking, compulsive drinking style, craving) appear to remain relatively consistent across situations and long periods. The basic construct of an alcohol dependence syndrome, as well as those self-report scales developed to measure it, have been validated for the desire or craving for alcohol, the impact of an initial "priming dose" of alcohol, the likelihood of and speed of taking a drink, the amount of medication required for detoxification, and the likelihood of relapse (Babor et al 1987a; Cooney et al 1986; Edwards 1986; Hodgson & Stockwell 1985).

Integrative Typologies of Etiology

An approach consistent with heterogeneous and multiple risk factors for transition to addiction is the development of subtypes within the population of abusers (e.g. Alterman & Tarter 1986; Hesselbrock 1986; Meyer et al 1983; Morey & Blashfield 1981; Morey & Skinner 1986; Nerviano & Gross 1983). The idea of subtypes of alcoholics was originated over 100 years ago (Babor & Meyer 1986). However, this approach has previously been limited by an exclusive reliance on personality variables to derive subtypes (Donovan et al 1986; Meyer et al 1983; Morey & Blashfield 1981). The identification of meaningful subgroups is, theoretically and clinically important, especially to match patients more adequately to the most effective treatments. However, it appears necessary to increase the breadth of assessment beyond the scope of personality, employing instead a multiple-domain approach, including drug, set, and setting factors, if such subtyping is to be of practical utility (Donovan et al 1986; Meyer et al 1983).

Several authors have recently suggested typologies of alcohol problems that attempt to incorporate genetic and developmental perspectives. Cloninger et al (1985) have suggested that there are at least two different types of alcoholism heritability. The most common form occurs in both men and women and appears to interact with environmental factors (e.g. unskilled occupational status of parents). A second, less common type may be limited to males. Independent of environment, this type is more related to sociopathy in fathers and somataform disorders in daughters. Zucker (1987) proposes four types of alcoholism, including antisocial, primary (nonenvironmental), developmental limited (abusive-temporary), and negative affect, each with different etiological pathways. He argues that most genetic and drug initiation research has been conducted on only one of the subtypes, and that high predictability of alcoholism may be true for only certain subgroups. Alterman & Tarter (1986) have similarly suggested that sociopathy represents one subtype of alcohol-related problems.

Such fine-grained etiological problems can only be addressed using longitudinal, multivariate studies in which the comparative and interactive relationships of genetic, psychological, and social processes can be studied. For example, Cadoret et al (1987) suggest that heritability of alcoholism and sociopathy may be distinct, and that alcohol problems result from both heredity and alcohol abuse in the environment (adoptive family). Most noteworthy is the 33-year longitudinal study by Vaillant (Vaillant & Milofsky 1982; Vaillant 1983). Although this study did not make use of fine-grained subtyping of alcohol problems, Vaillant was able to compare the prospective predictive power of measures of ethnicity, social class, adolescent delinquency, family integration, adolescent drug use, and family history of alcoholism. Vaillant concluded that, whereas ethnicity and alcohol heredity are predictive of later drinking, personality factors of competence, truancy, and emotional problems appear to be the result of alcoholism, rather than its cause. Among others, Peele (1985) and Zucker & Gomberg (1986) have reinterpreted Vaillant's data, and they argue that Vaillant overlooked certain personality characteristics of sociopathy that they reason are consistently related to later alcohol problems. Future research efforts will no doubt elaborate on these important integrative issues.

INITIATION OF THE CHANGE PROCESS

Many individuals with problematic drinking styles or at early stages of the dependence syndrome do not perceive themselves as having significant problems. They are in a precontemplation stage of change (DiClemente & Prochaska 1982; Prochaska & DiClemente 1986). However, as individuals increasingly experience difficulties in a variety of areas of life function, they often begin to contemplate the need to change their use patterns and to initiate a process of self-change.

Self-Change

The ability to change without the assistance of formal treatment is often described as "spontaneous" remission. Many individuals choose not to seek treatment because they perceive themselves as having been responsible for the development of their problem and assume that they are capable of overcoming it on their own; others have negative attitudes toward treatment and also wish to avoid the labeling process (e.g. alcoholic, addict) and its related stigmatization (Tuchfeld 1981). However, self-change does not appear to be spontaneous, for a number of factors have been found to be related to the initiation of change efforts (Ludwig 1985; Stall & Biernacki 1986; Tuchfeld 1981). These factors include a personal illness or accident, hitting a personal "bottom" (involving real or perceived humiliation, shame, despair, or loss), some meaningful religious experience, direct support from or intervention by

family or friends, financial and/or legal problems related to substance use, or the alcohol-related death or illness of another person. The common feature of these factors is that the apparent internal psychological commitment appears to be mediated by external events or aspects of the individual's social environment.

The initial level of commitment to change may be tenuous in contrast to the relative power of the biopsychosocial factors that have maintained the substance use. The individual must actively engage in a set of coping behaviors to maintain motivation, initially disengage from substance use, and persist in this change. Factors associated with successful self-change include public announcements, social support, alterations in one's social and leisure-time activities, general life-style changes to avoid cues that may elicit conditioned craving, strategies for coping with stress, and the generation of negative expectations of continued use and positive expectations concerning continued abstinence (DiClemente & Prochaska 1985; Litman 1986; Ludwig 1985; Marlatt & Gordon 1985; Perri 1985; Prochaska & DiClemente 1985; Stall & Biernacki 1986; Tuchfeld 1981; Wills & Shiffman 1985). For example, Perri (1985) found that individuals who were successful in their self-change attempts had higher levels of motivation and commitment to change, set higher goals and standards for change, and reported more frequent and persistent use of coping strategies and self-reinforcement methods than did their unsuccessful counterparts.

Seeking Treatment

Individuals seeking treatment may well represent a biased sampling of individuals attempting to quit alcohol or drug use; namely those who are unsuccessful with self-change (Fillmore & Midanik 1984; Schacter 1982; Vaillant 1983). When an individual seeks treatment, he or she appears to have a high level of ambivalence and a tenuous commitment similar to that noted in the initial stages of the self-change process. Kanfer (1986) has suggested that one's initial commitment when seeking treatment is usually based on a desire to change the negative consequences of the addiction rather than the behavior itself.

How the clinician affectively, cognitively, and behaviorally approaches the client, the addictive behavior, and the ambivalence around change will affect the client's level of motivation and commitment. The clinician's task is to 'hook' the side of the individual's ambivalence that is positively inclined toward change (Donovan 1987) by a number of interventions, the primary goals of which are awareness-building, consciousness-raising, and developing or reinforcing a state of dissonance between the continued engagement in the addictive behavior and one's personal beliefs, attitudes, values, and feelings (Miller 1985). Methods relevant to these goals include a com-

prehensive assessment, the provision of objective feedback concerning the extent and severity of one's addiction, the provision of advice to change, the elicitation of self-motivational statements from the client, and the establishment of appropriate target goals or standards of behavior (Appel 1986; Donovan 1987; Kanfer 1986; Kristenson 1987; Miller 1985; Prochaska & DiClemente 1986).

ACTIVE CHANGE PROCESS

Studies evaluating the effectiveness of treatment for addictive behaviors have increased in quality and quantity during the 1980s. Reviews of treatment outcome research typically focus on separate classes of addictive behaviors—i.e. smoking (Fielding 1985; Flay 1985; Lichtenstein 1982), opiate dependence (Tims & Ludford 1984), cocaine use (Washton & Gold 1987), and non-opiate dependence (Brown 1984).

The most extensive literature exists on evaluation of treatment for alcoholism. Reviews on outcome of undifferentiated (i.e. not matched to individual patient characteristics) alcoholism treatment yield a number of consistent conclusions. A particularly influential statement of this consensus comes from a Congressional report sponsored by the Office of Technology Assessment (Saxe et al 1983, pp. 4–5; more recent reviews focusing on elements of these conclusions have been added in brackets):

Despite methodological limitations [Maisto & Connors 1987; Nathan & Skinstad 1987; Sobell et al 1987], the available research evidence indicates that any treatment of alcoholism is better than no treatment [Lettieri et al 1985]. However, there is little definitive evidence that any one treatment or treatment setting is better than any other. Furthermore, controlled studies have typically found few differences in outcome according to intensity or duration of treatment [Miller & Hester 1986a]. . . . With respect to treatment setting, there is little evidence for the superiority of either inpatient or outpatient care alone [Miller 1986], although some evidence exists for the importance of continuing aftercare as an adjunct to short-term intensive rehabilitation (usually in an inpatient setting) [Ito & Donovan 1986]. Further research is needed both to specify how to match patient to treatment and setting and to test competing claims of effectiveness [Miller & Hester 1986c].

Factors Affecting Outcome

TREATMENT FACTORS Miller & Hester (1986a) have written the most comprehensive review of specific treatment modalities. They identify nine major classes of interventions. Consistent with a two-stage treatment process, they found aversion therapies (Cannon et al 1986) and behavioral self-control training (Miller 1987) generally effective for initial change in drinking behavior; whereas social-skills training (Hay & Nathan 1982) and marital/family therapy (McCrary et al 1986; O'Farrell 1987), and a combination of these

elements with disulfiram use (Azrin et al 1982), increased the probability of prolonged sobriety. They noted with concern the lack of overlap between these empirically supported interventions and the list of treatment approaches that are currently "standard practice" in alcoholism programs, such as A.A. (cf Glaser & Ogborne 1982), alcoholism education (Braucht & Braucht 1984), confrontation, group and individual therapy, disulfiram use (Antabuse; Fuller et al 1986), and other pharmacotherapy (Liskow & Goodwin 1987).

PATIENT FACTORS At the beginning of the decade it was stated that "The best predictor of patient outcome is the patient" (Institute of Medicine 1980, p. 145). Conclusions about specific patient characteristics previously thought to be related to outcome have since been disputed, including gender (Vanicelli 1984), motivation (Miller 1985), age (Janik & Dunham 1983), severity of alcohol dependence (Schuckit et al 1985), and personality (Nathan 1987).

In general, good prognosis is consistently associated with social stability (Ornstein & Cherepon 1985) and higher cognitive and psychosocial functioning (McLellan et al 1983a; Rounsaville et al 1987). Treatment factors and patient characteristics accounted for between 4% and 70% of outcome variance (Moos & Finney 1983). Consideration of extra-treatment or life-context factors such as work and family setting (cf Jacob & Seilhamer 1987) or life stressors accounted for an increment of between 7% and 27% of the variance in treatment outcome beyond that related to patient and treatment factors.

Evaluation Methodology

Conclusions about treatment effectiveness are reached within a context of the prevailing evaluation methodology. Several recent reviews have addressed the methodological state of the art within alcoholism treatment outcome research (Emrick & Hansen 1983; Maisto & Connors 1987; Moos & Finney 1983; Nathan & Skinstad 1987; Sobell et al 1987).

The selection of outcome criteria has generated intense debate since the first Rand Report (cf Polich et al 1981). Conflicts surrounding the appropriateness and possibility of successful non-abstinent (i.e. controlled drinking) treatment outcome have led to polarization within both the research and clinical communities (Cook 1985). Much of the controversy involved one early program of research (Roizen 1987). Whereas other long-term outcome studies (Helzer et al 1985; Nordstrom & Berglund 1987) and reviews (Heather & Robertson 1983; Miller 1987) reached somewhat different conclusions about the frequency and clinical predictors of controlled-drinking outcomes, most studies continue to include information about nonproblem drinking in reports of treatment outcome.

In addition to drinking outcome, a number of other areas of life function

have been identified as outcome dimensions (Emrick & Hansen 1983), including treatment completion, readmission to treatment, mortality, other health care utilization, physical health, other substance abuse, legal problems, vocational functioning, family/social functioning, emotional functioning, and life stressors. Assessment of this more comprehensive set of indexes is based on the assumption that treatment outcome varies along a number of relatively independent dimensions. One recent investigation (Babor et al 1987b) provided limited support for both the unidimensional and multidimensional approaches; it concluded that treatment outcomes should be evaluated using specific indicators of drinking behavior and other areas of life functioning as well as a global dimension of outcome.

A criterion receiving increasing attention is the cost-effectiveness of alcoholism treatment. Recent estimates place the direct treatment costs for alcoholism at approximately \$13.5 billion in 1983, with only \$1 billion of that spent for specialized alcoholism treatment as opposed to general medical settings (NIAAA 1987). Recent large-scale studies have documented significant reductions in other health care utilization after alcoholism treatment (Holder & Blose 1986; Saxe et al 1983). These savings were sufficient to offset the costs of treatment within two to three years. McCrady et al (1986) found equivalent clinical effectiveness of partial hospitalization and inpatient treatment; they concluded the former was the treatment of choice because of its substantially lower cost.

To increase the proportion of alcoholics who receive treatment beyond the current estimated 15% (NIAAA 1987) and to improve cost-effectiveness, a graduated or stepped-care approach to treatment has been recommended (Babor et al 1986; Ritson 1986). Beginning with minimal intervention (e.g. Kristenson 1987), more intensive and expensive methods would be used only if conservative strategies were insufficient.

Once criteria for cost and effectiveness have been selected, issues of measurement and reporting can be addressed. The validity of patient self-report has been a central concern (Babor et al 1987c; Sobell & Sobell 1986). Data show acceptable validity of self-report relative to a variety of other criteria, none of which are without limitations. Recommendations include use of multiple corroborative data sources as well as other specific strategies to enhance self-report.

Because of evidence of the variability of drinking outcomes over time, Nathan & Skinstad (1987) recommended follow-up data be available for at least the first two years after treatment. Sobell et al (1987) called for reporting data over the entire follow-up interval rather than a limited period prior to the final assessment. Recommendations for lengthy follow-up increase the problem of subject attrition. A reduction in the attrition rate has been reported in studies published since 1980 (Sobell et al 1987).

Patient-Treatment Matching

Nearly 50 years have elapsed since Jellinek (Bowman & Jellinek 1941) called for research on matching alcoholic patients with optimal forms of treatment. Since 1980, some reference to “matching” has become a fixture in discussions of alcohol treatment outcome research.

The matching hypothesis challenges implicit assumptions about the uniformity of alcoholics and alcoholism treatment. Recognition of the wide variability that exists along many dimensions among individuals with alcohol problems has led to the search for clinically meaningful subtypes (reviewed above). Similarly, there are a number of variables to be differentiated within the treatment domain (Moos & Finney 1986). Based on a review of the above evidence, which found few powerful main effects for patient or treatment variables, the matching hypothesis posits significant interaction effects between patient subtype and treatment (i.e. differential effectiveness of a treatment intervention among subsets of patients).

Glaser (1980) identified three major variations of the matching hypothesis. Most of the limited empirical research on matching has tested the match between characteristics of clients and characteristics of therapists. The match between characteristics of clients and goals of treatment has focused primarily on controlled drinking vs abstinence outcomes (Ogborne et al 1982; Polich et al 1981; Sanchez-Craig et al 1984). Considerable recent research has investigated the match between severity or type of client problems (e.g. severity of alcohol dependence, degree of psychopathology, concurrent psychiatric diagnosis, level of cognitive functioning) and the specific focus or intensity of treatment received (McLellan et al 1983b; Meyer 1986; Walker et al 1983).

McLellan et al (1983a), using a 10-item measure of “psychiatric severity,” reported an interaction with treatment intensity among those with intermediate levels of severity. Those with high levels of severity did uniformly poorly and those with low levels of severity did well regardless of treatment intensity. In a nonrandom prospective design, the investigators attempted to match the intensity of treatment to the psychiatric severity. Matched cases showed significantly better outcomes than mismatched cases.

Miller & Hester (1986b) reviewed evidence suggesting that clients may benefit from the opportunity to match themselves to treatment. They tentatively concluded that clients permitted to choose the treatment approach from among alternatives show greater acceptance of, compliance with, and improvement following treatment. Similarly, Sanchez-Craig & Lei (1986) identified disadvantages of imposing abstinence goals on problem drinkers.

Although the number of empirical tests of the matching hypothesis remains smaller than the number of reviews calling for such work, important issues have been clarified. Finney & Moos (1986) identified three methodological issues to be resolved prior to conducting effective matching research. They

discussed five strategies for selecting relevant patient and treatment matching variables: (a) clinical judgment, (b) "cafeteria-style" patient selection, (c) post hoc exploratory data analysis, (d) empirical data reduction techniques (e.g. cluster analysis), and (e) theoretical analysis. They noted alternative criteria of effectiveness that matching might attempt to optimize. As we noted earlier, these criteria include drinking and nondrinking outcomes, and cost-effectiveness. A third conceptual issue is the need to consider matching as a multistage process, consistent with the stages-of-change perspective. Methodologically, three often overlooked and increasingly complex effects were noted: nonlinear, higher-order interaction, and multilevel (i.e. contextual or subject-within-group) effects. These effects encouraged investigators to maintain realistic expectations because of the complexity of the matching task and to appreciate that even affecting a small proportion of patients could have an impact on large numbers of individuals.

MAINTENANCE OF SUCCESSFUL CHANGE

Findings of major longitudinal studies (Helzer et al 1985; Fillmore 1987; Nordstrom & Berglund 1987; Polich et al 1981; Vaillant 1983) document the instability of drinking patterns and the low probability of complete abstinence over the long term.

Riley et al (1987) reviewed 68 alcoholism treatment outcome studies published from 1978–1983 involving 14,546 subjects followed over 6–144 months after treatment. Of the total sample, 2% were reported as deceased, 22% were lost to follow-up, 34% were "successful," and 40% continued to drink with associated problems. Varying definitions of "successful" typically included nonproblem drinking as well as abstinence outcomes, with more extensive follow-up studies finding nonproblem drinking at least as likely as abstinence (Helzer et al 1985; Polich et al 1981). In both studies, fewer than 15% of subjects were completely abstinent following treatment. Similarly high rates and patterns of relapse are found across addictive behaviors (Tims & Leukefeld 1986).

An emerging approach to the understanding and prevention of relapse focuses on the process by which single lapses or mistakes develop into a more problematic relapse outcome. Marlatt & Gordon (1985) present a cognitive-behavioral model of the relapse process that assumes that risk for relapse is determined by an interaction of individual, situational, and physiological factors.

A number of research questions remain to be investigated, including natural history of relapse, various effects of lapses and relapses, determinants and predictors of relapse, and effectiveness of methods for relapse prevention (Brownell et al 1986). Despite the need for further research, several clinical

implications consistent with the stages-of-change model follow from available relapse research (Marlatt & Gordon 1985; Rounsaville 1986), including recognition of the likelihood of relapse; training in identification of and preparation for early signs and increased risk of relapse; and efforts to provide aftercare and/or enhance supports in the posttreatment environment.

CONCLUDING COMMENT

The field of addictive behavior has been dominated until recently by contributions from disciplines other than psychology—particularly from medicine and the neurosciences. A glut of popular and lay books has appeared on the topic of addiction, many written by individuals who are themselves recovering from addictions. The frequent discrepancies between the “professional” and “craft” literatures have added fuel to ongoing debates and have contributed to the divisive nature of the field. Recently psychology and its allied behavioral disciplines have been increasingly recognized for their contributions in helping to understand addiction and its treatment. We have presented a selective review of different research programs that illustrate an emerging integration of biological, psychological, and sociological approaches to etiology and treatment. This emerging biopsychosocial model will no doubt be refined and elaborated through the remainder of this century. We hope that research-based refinements of this model will reduce divisiveness and improve treatment outcomes in the field of addictive behavior.

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